Industrial Specialization Matters: A New Angle on Equity Home Bias

Chenyue Hu

UCSC

Motivation

Equity Home Bias Puzzle

Domestic equity accounts for a predominant share of portfolios

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My Contribution

Adds the sectoral dimension

Examines how industrial structure affects home bias

Preview of Results

Empirical Findings

- Compute home bias (HB) with proprietary financial datasets
- Find HB decreases in countries' degree of industrial specialization

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Build a 2×2 DSGE model with Eaton-Kortum's framework

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- Explain why sectoral productivity differences matter for home bias

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Build a 2×2 DSGE model with Eaton-Kortum's framework

- Identify interplay between sector choice and country choice
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Quantitative Assessment

- Estimate and solve the model covering 58 countries and 15 industries
- Confirm the empirical connection between portfolio diversification and industrial specialization

Related Literature

- Home Bias surveyed by Coeurdacier and Rey (2013):
  - Risk-hedging motives
    - Labor income risk
      Baxter and Jermann (1997) and Heathcote and Perri (2013)
    - Real exchange rate risk
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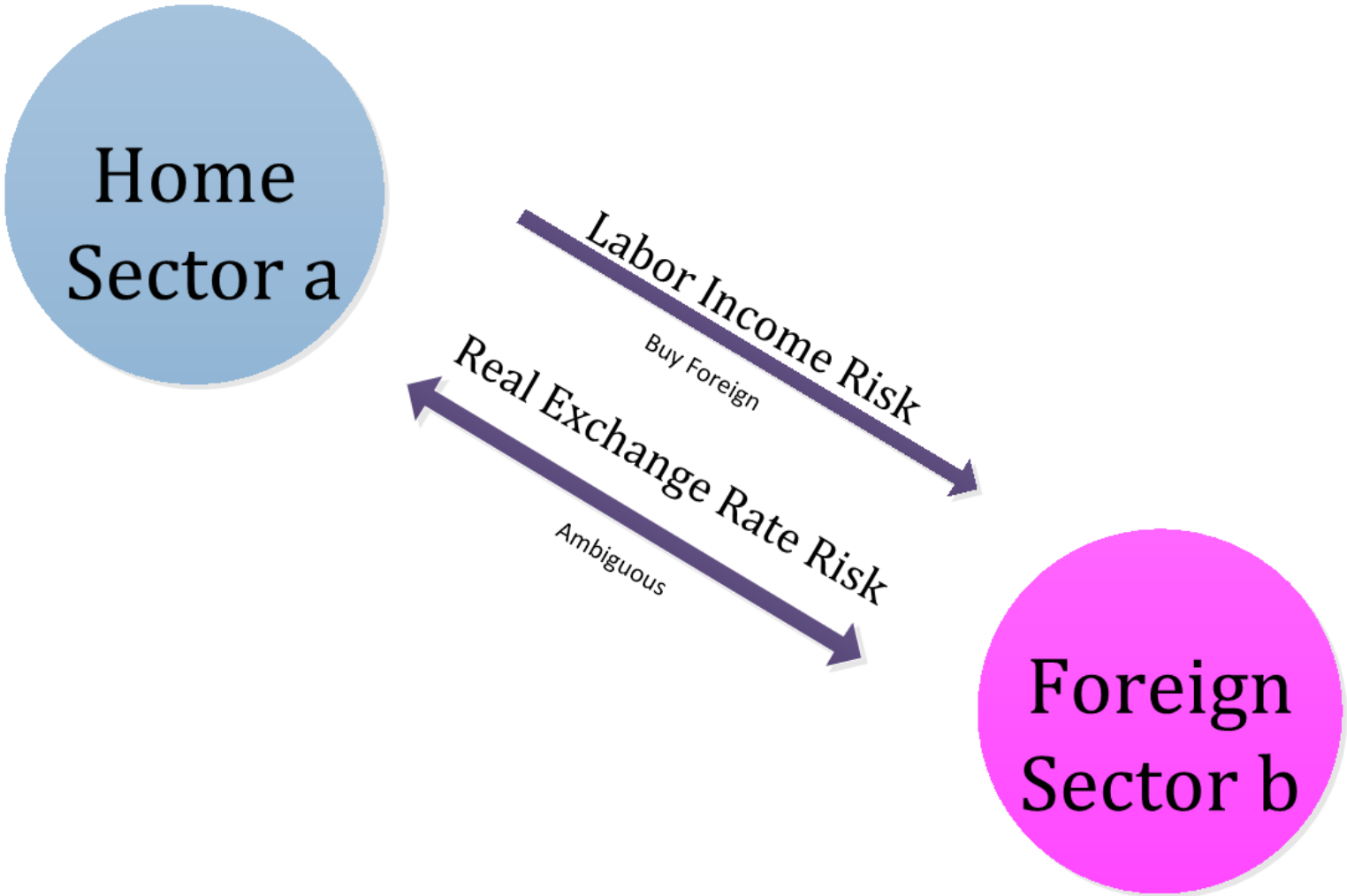
- Industrial specialization and risk-sharing
  Helpman and Razin (1978), Kalemli-Ozcan et al. (2003)

Intuition — Existing Papers



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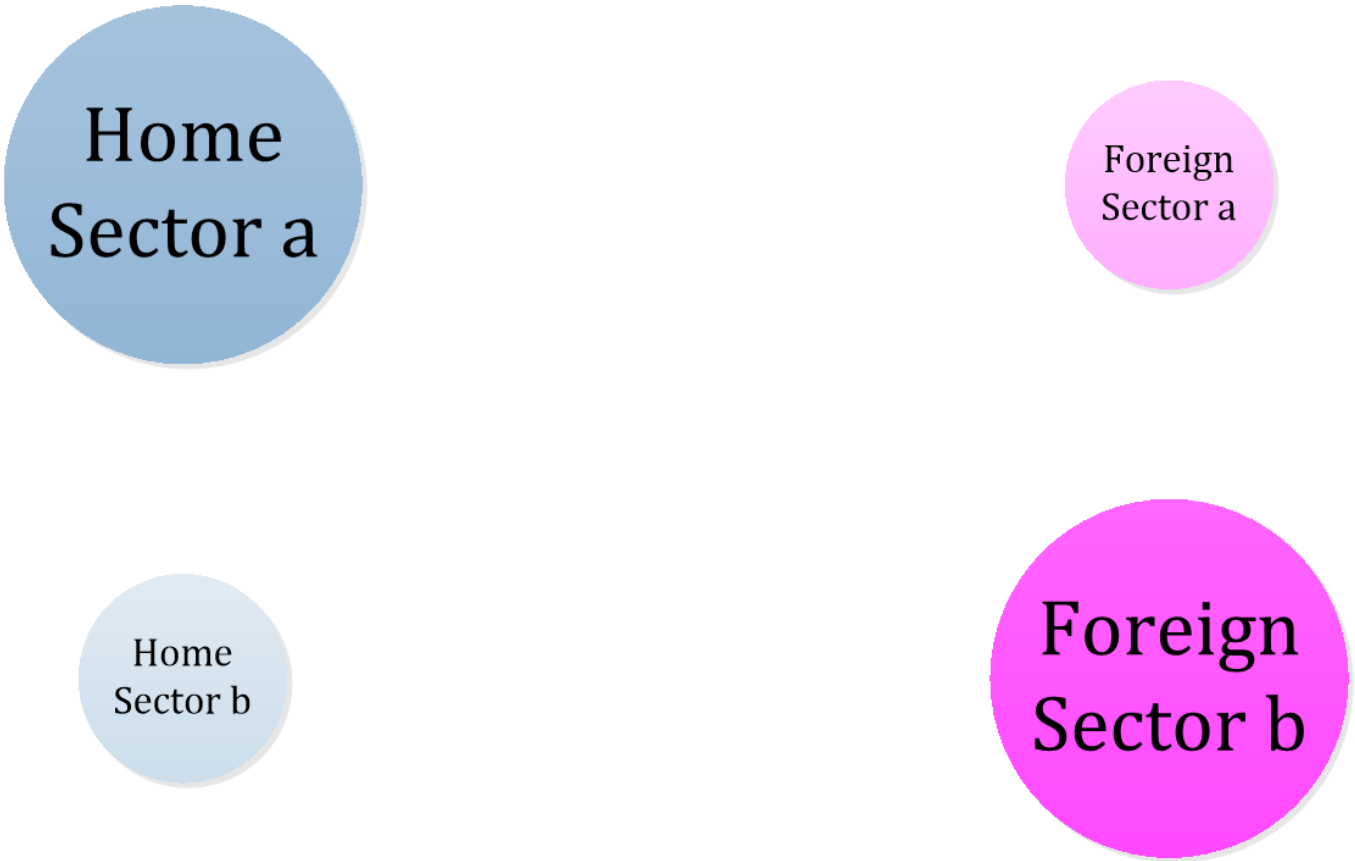

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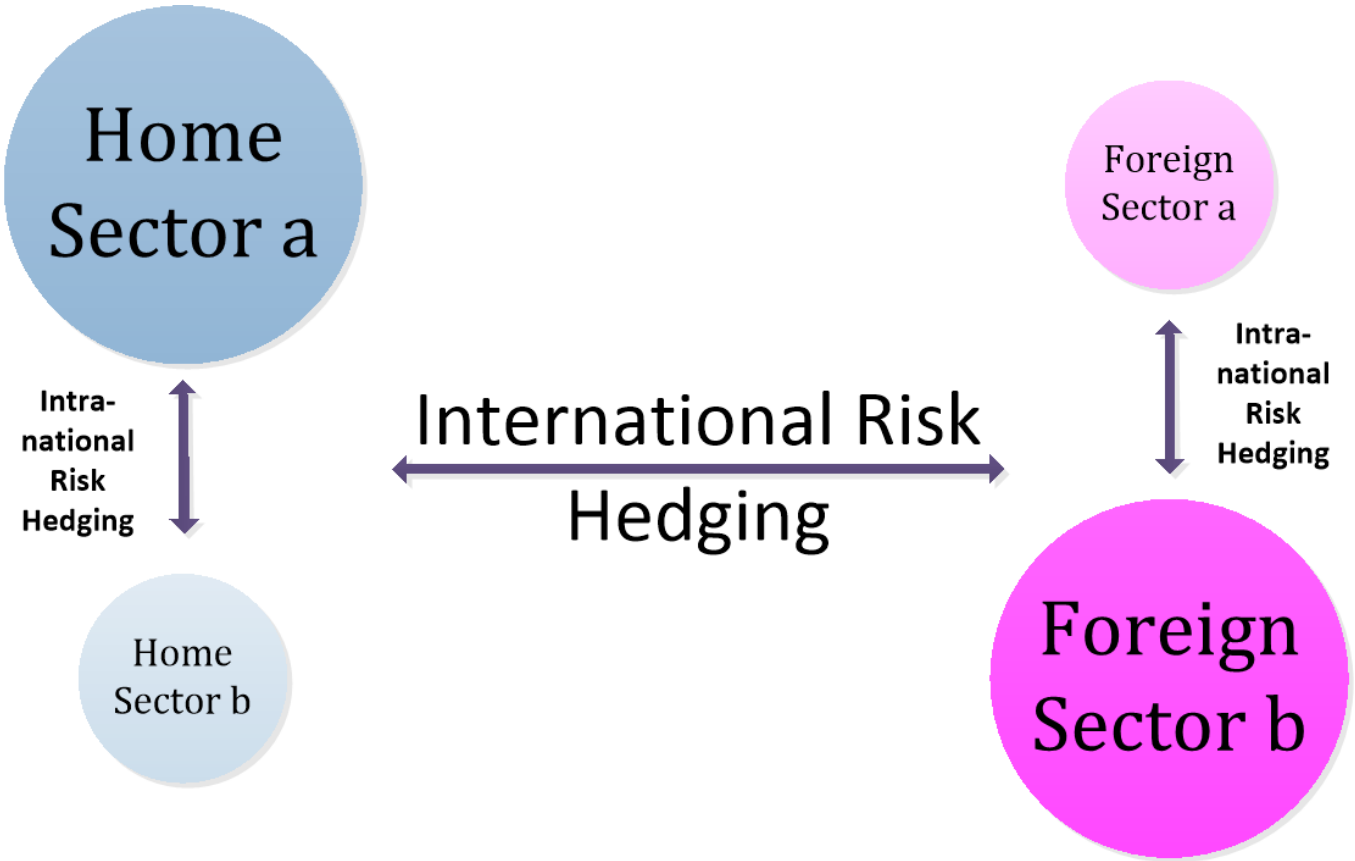

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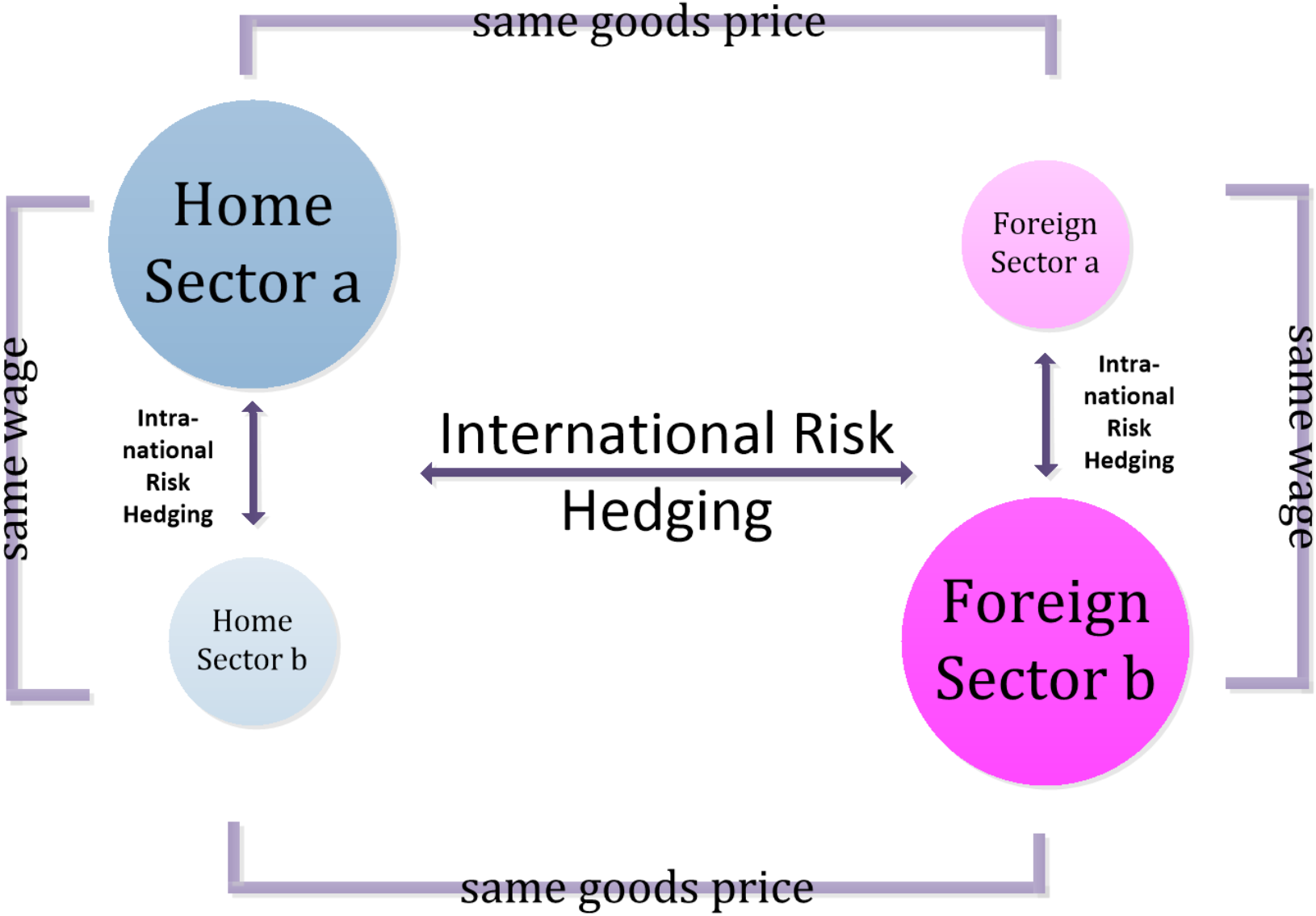

Outline

Measure of Home Bias

$$HB_{i,t} = 1 - \frac{\text{Share of Foreign Equities in Country i's Equity Holding at t}}{\text{Share of Foreign Equities in World Market Portfolio at t}}$$

Example: US Market Values 40%
US investors split holdings 50-50

$$HB_{\text{US}} = 1 - \frac{50\%}{60\%} = \frac{1}{6}$$

$HB = 1$ full home bias; $HB = 0$ full diversification

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Data

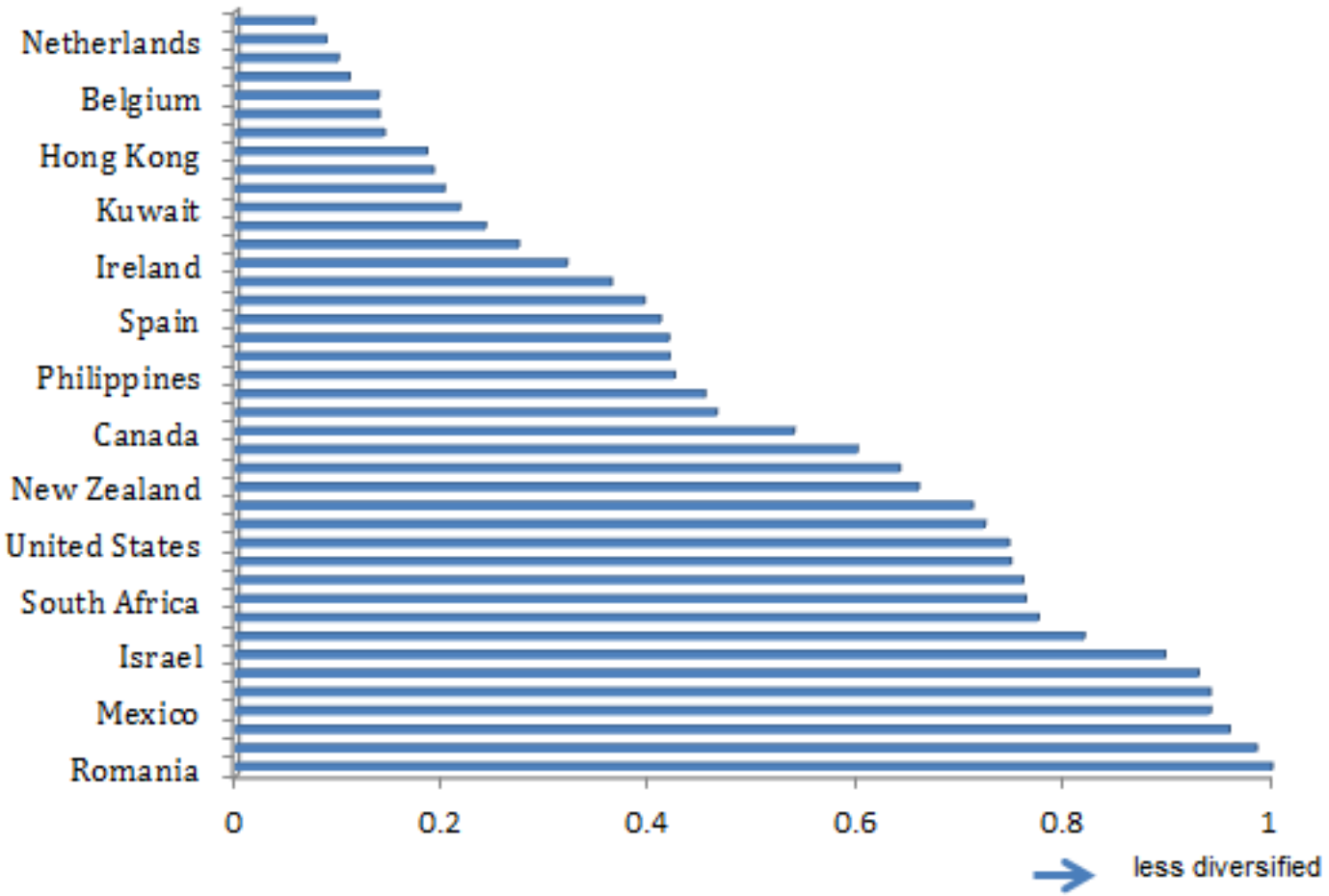
- Numerator: Factset/Lionshare
- Denominator: Datastream

Factset/Lionshare Data

- When: 1998 - 2014
- Where: 100 countries or regions
- Who: institutional investors: banks, insurance companies, retirement or pension funds, hedge funds, sovereign wealth funds and mutual funds (▸ Comparison)
- How: public filings (e.g. 13-Filings with SEC in the U.S.)

Ranking of Home Bias

$$HB_i = 1 - \frac{\text{Share of Foreign Equities in Country i Equity Holding}}{\text{Share of Foreign Equities in World Market Portfolio}}$$



Independent Variables

- Hirschman-Herfindahl index : $HHI_{i,t} = \sum_{s=1}^{S} b_{i,s,t}^2$
  (b : share of sectoral output in national output)
- Chinn-Ito index: a de jure measure of financial openness
- Real GDP: economic size
- IV: factor endowment including land, population, natural resource rents

Home Bias and Country Specialization

Dep. Var: Home Bias	(1)	(2)	(3)	(4)
HHI	-2.072 ***	-2.380 ***	-2.407 ***	-2.866 ***
	(0.373)	(0.276)	(0.308)	(0.472)
	[-0.234]	[-0.268]	[-0.271]	
Chinn-Ito		-0.781 ***	-0.778 ***	-0.779 ***
		(0.052)	(0.052)	(0.054)
		[-0.607]	[-0.605]	
log(GDP)			-0.004	-0.007
			(0.013)	(0.012)
			[-0.015]	
IV	No	No	No	Yes
Observations	332	332	332	330
R^2	0.080	0.438	0.438	0.434

Robust standard errors in parentheses, standardized coefficients in brackets.***significant at 1%, **significant at 5%.

Outline

Setup

- Two symmetric countries ($i = \{H, F\}$) both produce and consume two goods ($s = \{a, b\}$)
- Eaton-Kortum trade framework with productivity differences $\bar{T}_{H,b} = \bar{T}_{F,a} = 1$, $\bar{T}_{H,a} = \bar{T}_{F,b} = T > 1$
- $1 - \alpha$ of firms' revenue is used to cover labor costs, and α is paid as dividends to stock owners
- Households have CRRA utility and CES consumption bundles; they supply labor inelastically
- Budget constraint $P_{i,t}C_{i,t} + \sum_{s=\{a,b\}}[q_{H,s,t}(\nu^i_{H,s,t} - \nu^i_{H,s,t-1}) + q_{F,s,t}f_i(\nu^i_{F,s,t} - \nu^i_{F,s,t-1})]$
  $= w_{i,t}L_{i,t} + \sum_{s=\{a,b\}}(d_{H,s,t}\nu^i_{H,s,t} + d_{F,s,t}f_i\nu^i_{F,s,t})$
  (q asset prices; d dividends; ν^i asset holdings i ; f_i financial frictions))

Proposition 1

The share of total domestic assets in the portfolio is

$$D = \underbrace{\frac{1}{2}}_{\textit{Diversification}} + [\underbrace{\frac{\sigma-1}{2\sigma\alpha}\sum\chi(\hat{e})}_{\textit{Exchange Rate Risk}} - \underbrace{\frac{1-\alpha}{2\alpha}\sum\chi(\hat{wL})}_{\textit{Labor Income Risk}} - \frac{2\mu-1}{2}\sum\chi(\hat{d}_H)] \times A$$

where $\Sigma\chi(\hat{x})$: covariance between $\hat{x}$ and the two domestic dividends; $A > 0$

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Proposition 2

Sectoral share μ and domestic share D are substitutes as long as $\sum\chi(\hat{d}_H) > 0$.
(Notation: $\mu = \nu_{H,a} + \nu_{F,a}$, $D = \nu_{H,a} + \nu_{H,b}$)

$\Sigma\chi(\hat{d}_H)$: the covariance between domestic dividends relative to foreign ones and sector a dividends relative to sector b ones

Proposition 4

Home bias decreases in T the sectoral productivity disparity.

$$HB = \frac{f-1}{f+1} + \frac{2}{f+1}\left[-\frac{1-\alpha}{\alpha} + \frac{1}{\alpha}\frac{T-1}{T+1}\frac{1-\frac{1}{\sigma}}{\lambda}\right]$$

where $\lambda \equiv \frac{1-\tau^{1-\phi}}{1+\tau^{1-\phi}}[1-\phi+(\phi-\frac{1}{\sigma})(\frac{1-\tau^{1-\phi}}{1+\tau^{1-\phi}})^2]^{-1} < 0$

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Infinite financial friction f, full home bias

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$f = \infty$

Infinite financial friction f, full home bias

$f = 0, T = 1$

A single good world, as in Baxter and Jermann (1997)

$f = 0, T = \infty$

Fully specialized countries, as in Coeurdacier and Rey (2013)

Outline

Extended Model

- Covers 58 countries and 15 manufacturing sectors
- Includes nontradable sectors

$$C_i = C_{i,T}^{\mu_i} C_{i,N}^{1-\mu_i} = \left(\sum_{s=1}^{S} \psi_s^{\frac{1}{\phi}} C_{i,s}^{\frac{\phi-1}{\phi}}\right)^{\frac{\phi}{\phi-1}\mu_i} C_{i,N}^{1-\mu_i}.$$

- Embeds trade costs

$$p_{i,s}(z) = \frac{\tau_i r_{i,s}^{\alpha} w_{i,s}^{1-\alpha}}{A_{i,s}(z)}.$$

- Incorporates capital restriction

$$\begin{aligned} & P_{i,t} C_{i,t} + \sum_{k \in \{1,2,\ldots,S,N\}} \left[q_{i,k,t} (\nu_{i,k,t}^{i} - \nu_{i,k,t-1}^{i}) + q_{j,k,t} f_i (\nu_{j,k,t}^{i} - \nu_{j,k,t-1}^{i}) \right] \\ & = w_{i,t} L_{i,t} + \sum_{k \in \{1,2,\ldots,S,N\}} (d_{i,k,t} \nu_{i,k,t}^{i} + d_{j,k,t} f_i \nu_{j,k,t}^{i}). \end{aligned} \tag{1}$$

Parametrization(1)

Common variables from previous literature

Parameter	Description	Value
β	Discount factor	0.95
σ	Coefficient of relative risk aversion	2
ϕ	Elasticity of substitution between sectors	2
θ	Dispersion of productivity draws	8.28

Country-specific factors

- Examples: labor and capital endowments, expenditure on nontradables
- Sources: Penn World, OECD

Parametrization(2)

Sector-specific factors

Sector Name	Expenditure Shares within Tradables (ψ_s)	Capital Intensity (α_s)
Food	0.165	0.329
Beverages	0.054	0.272
Tobacco	0.010	0.264
Clothing & Accessories, Footwear	0.134	0.491
Forestry	0.009	0.452
Paper	0.013	0.366
Oil & Gas Producers,Coal	0.096	0.244
Chemicals	0.008	0.308
Pharmeceutical	0.036	0.319
Iron & Steel	0.015	0.381
Nonferrous Metals	0.074	0.407
Electronics & Electric Equipement	0.060	0.405
Machinery	0.073	0.473
Automobiles & Parts	0.183	0.464
Furnishings	0.068	0.460

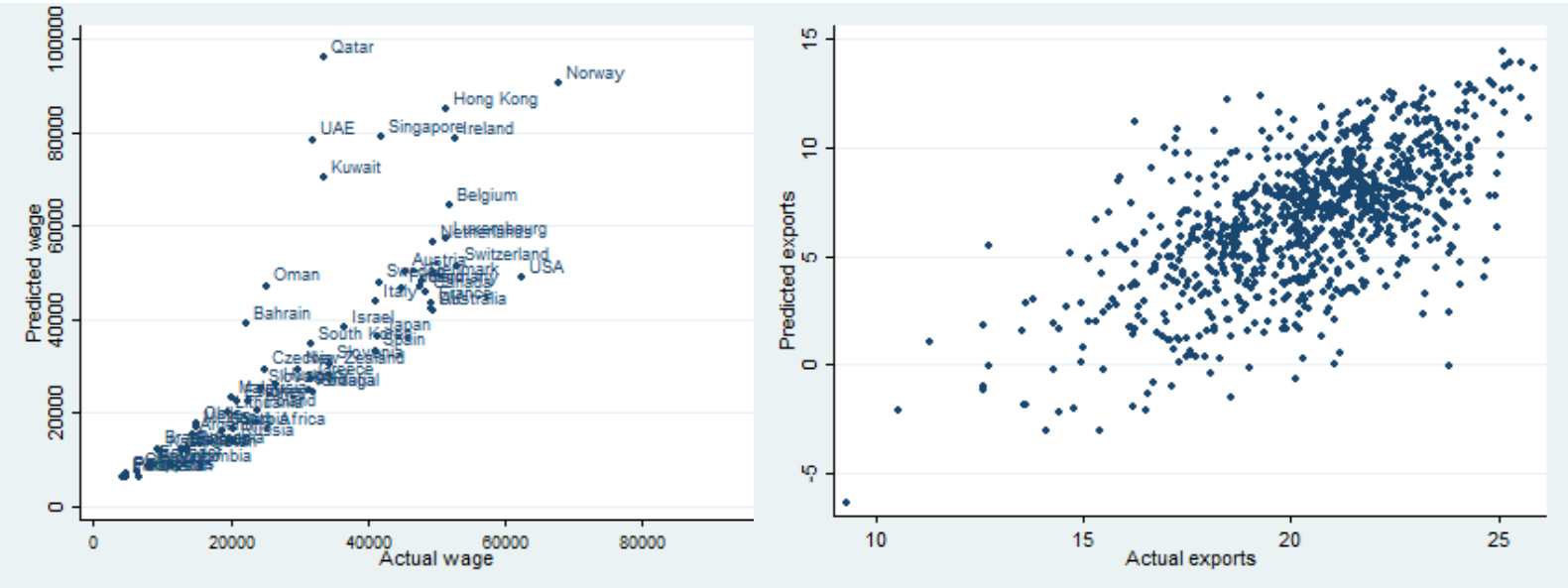
Sources: US consumption data and I-O table

Country-sector specific factors

- Productivity estimated with trade data (▸ Algorithm)

Model Fit

Figure: Model-implied and Actual Wages and Sectoral Exports



Numerical Results(1)

HB and HHI

Dep. Var: Home Bias	Model	Data
HHI	-2.849 ***	-2.134 **
	(1.028)	(0.867)
	[-0.311]	[-0.313]
Constant	-0.452	0.650 ***
	(0.488)	(0.082)
Observations	58	36
R^2	0.097	0.098

Note: Robust standard errors in parentheses and standardized coefficients in brackets. **significant at 5%, and *** significant at 1%.

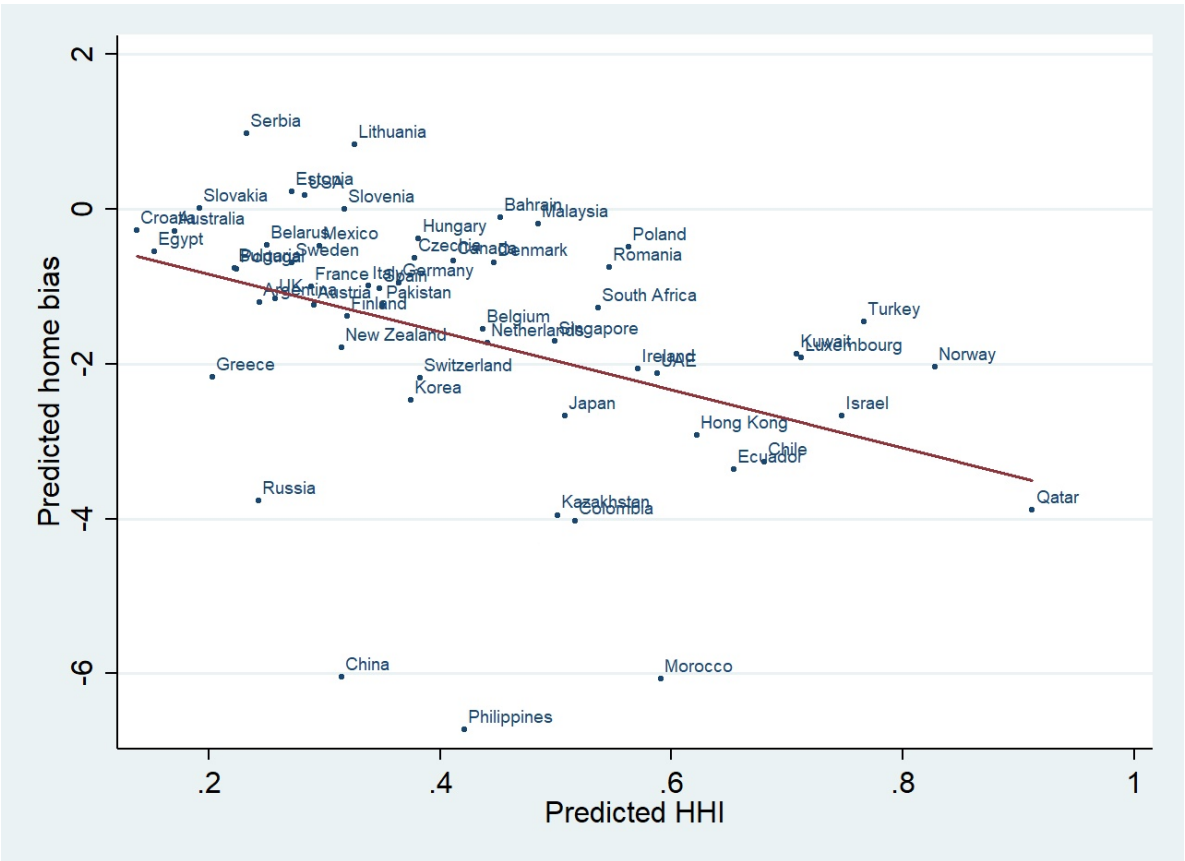
Financial Frictions

$$f_i = \alpha + \beta Chinn_i + \epsilon_i,$$

$$\hat{\beta} = -0.60^{**}$$

Numerical Results (2)

Figure: Home Bias and HHI absent Financial Frictions



Counterfactual Analysis

When there is no productivity difference across sectors within a country,

- HHI decreases by 0.24 (or 55.8 percent) on average
- Home bias increases by 2.04 (126 percent) on average
- HHI and home bias are no longer significantly correlated
- Baseline vs counterfactual

$$\Delta HB_i = \alpha + \beta \Delta HHI_i + \epsilon_i.$$

$$\hat{\beta} = -.304^{**}$$

Outline

Conclusion

Summary

- Add the sectoral dimension to the home bias literature
- Examine the influence of industrial structure on portfolio choice

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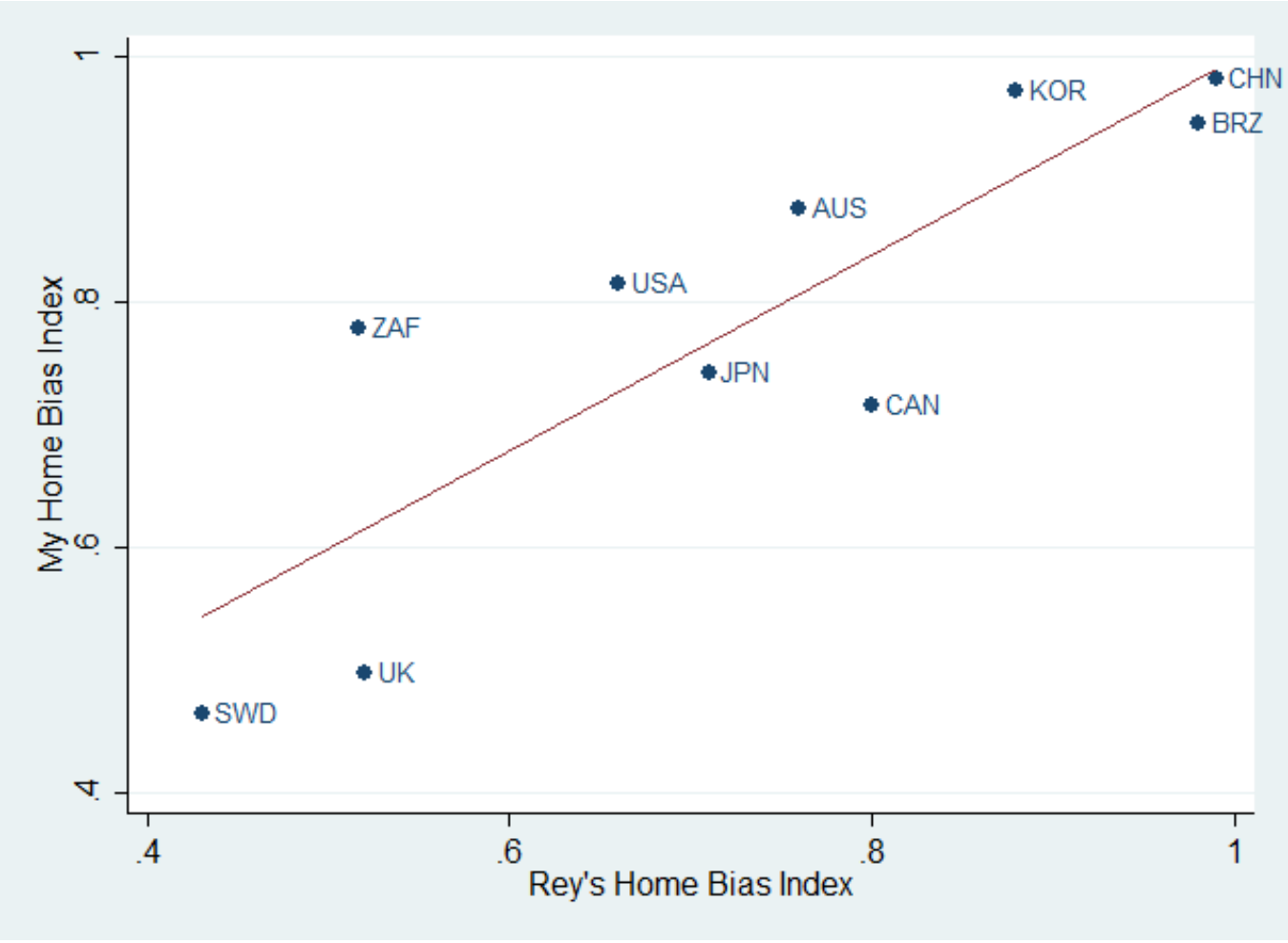
Future Research

- Study bilateral financial investment
- Introduce debt and examine investors' preferences between different types of assets

National HB based on Factset Data versus that based on IFS



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Algorithm

- **Step 1**. Guess factor prices using national output and endowment data.
- **Step 2**. Estimate sectoral productivity and trade cost to fit a country's trade pattern including
  - (1) its share of all the countries' exports in a sector
  - (2) the country's overall export-to-output ratio
- **Step 3**. Plug the estimated productivity and trade cost in the model equations to determine factor allocations.
- **Step 4**. Update factor prices, repeat Step 2 and 3, until they satisfy the market-clearing conditions.
- **Step 5**. Solve the portfolio choice problem using Devereux and Sutherland (2011)'s method.

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