Institutional Investment and International Risk-sharing

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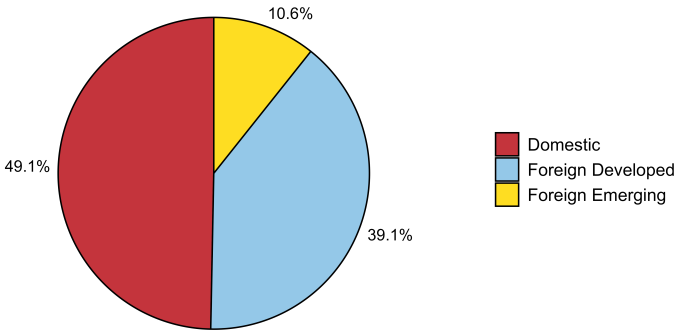
INTRODUCTION

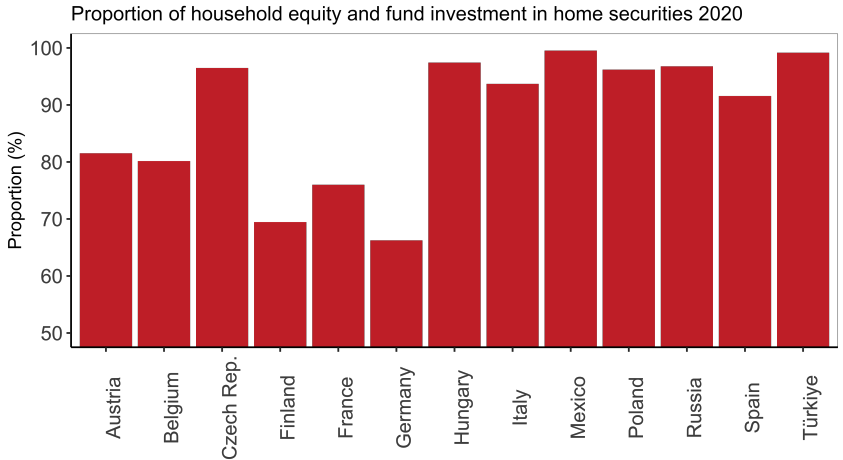
Motivation (1/2) - Global institutional investment

- **Global institutional investors**: e.g. Vanguard
- Global institutional ownership of total market capitalization (IO) has grown from **2%** to **20%** 2000-2020. details
- High level of international diversification:

Average portfolio composition 2020 Diversification 2000



Motivation (2/2) - Highly home-biased retail investment



*Source: IMF CPIS, OECD National Account

Research question

Global institutional investment acts as a pass-through for international risk-sharing when retail invesors are home-biased.

- How does global institutional investment affect international risk-sharing and the resulting global and local risk premia?

Contribution

Theoretical

- Develop a new international asset pricing model (IAPM): global institutional investors and home-biased retail investors.

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- Existing IAPMs do not distinguish institutional investors and retail investors.
  - Distinguish investors by country of domicile.
  - Focus on **investability**:

    Investable securities: securities that are traded on open exchanges (NYSE) and not subject to foreign investment restrictions.

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  - Predict that investable securities are priced globally. e.g. De Jong and De Roon, 2005, Karolyi and Wu, 2018.
  - Contrary evidence: globally traded assets are priced by local risk factors: e.g. Lewis, 2011; Hollstein, 2020.

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Empirical

- Both institutional and retail local risk premia are economically important.
- Higher global IO reduces cost of capital in emerging markets (EMs).

Snapshot of the paper

1. **A new asset pricing model**
   - Investors with heterogeneous investment scopes

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Take US, 2020

	Apple	US Seafood
Global IO	24%	0%

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- Two local risk premia
  - **Institutional local risk premium**
  - **Retail local risk premium**

	world premium	institutional local premium	retail local premium
institutional securities	✓	✓	✗
retail securities	✓	✓	✓

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2. Estimation

- Local risk premia are economically large:

Annualized risk premia

	Institutional local	Retail local
Developed	2.8%	1.7%
Emerging	6.3%	2.7%

- 1% ↑ global IO ⇒ **8bps** ↓ cost of capital in EMs.

Other related literature

Institutional investment and asset returns

- Domestic: Edelen, Ince, and Kadlec, 2016; Pavlova and Sikorskaya, 2020.
- International: variance explained by global factors (Faias and Ferreira, 2017), common ownership factor (Bartram et al., 2015), price efficiency (Kacperczyk, Sundaresan, and Wang, 2021).
- This paper: risk-sharing channel across segmented markets.

Arbitrage and market integration

- Financial frictions: collateral constraints (Gromb and Vayanos, 2002), holding costs (Tuckman and Vila, 1992), slow-moving capital (Greenwood, Hanson, and Liao, 2018).
- This paper: arbitrageur has limited mandate and integrates markets indirectly through correlation.

Plan

Theory

- **Setup**
- **Pricing results**
- **Equilibrium investments**

Empirical analyses

- Data and econometric specification
- Institutional and retail local premia across markets
- How global institutional ownership affects cost of capital
- How risk premia vary over time

THEORY

Model setup (1/3)

A1: Two-country world: domestic (US) and foreign (China). No currency risk (PPP).

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A2: Four securities

US		China	
Retail (R)	Institutional (I)	Institutional (I^*)	Retail (R^*)
US Seafood	Apple	Tencent	Panda Seafood
			

Model setup (1/3)

A1: Two-country world: domestic (US) and foreign (China). No currency risk (PPP).

A2: Four securities

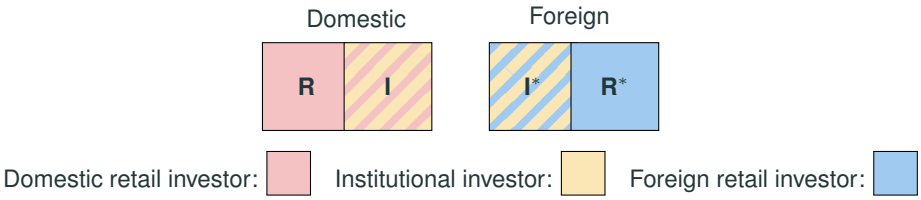
		R	I	I^*	R^*
jointly normal	excess return	r_R	r_I	r_{I^*}	r_{R^*}
exogenous	volatility	σ_R	σ_I	σ_{I^*}	σ_{R^*}
	market capitalization	M_R	M_I	M_{I^*}	M_{R^*}
endogenous	risk premium	μ_R	μ_I	μ_{I^*}	μ_{R^*}

Correlation structure is exogenous.

Model setup (2/3)

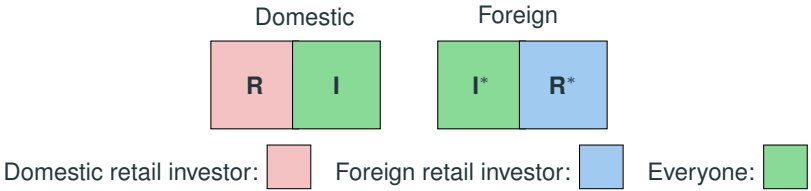
A3: Three representative investors with limited *choice set* $\mathcal{C}$ (Koijen, Richmond, and Yogo, 2022):

- Institutional investor i (Vanguard) only invests in I and I^*, $\mathcal{C}^i = \{I, I^*\}$.
- Domestic retail investor d invests locally in R and I, $\mathcal{C}^d = \{R, I\}$.
- Foreign retail investor f invests locally in I^* and R^*, $\mathcal{C}^f = \{I^*, R^*\}$.



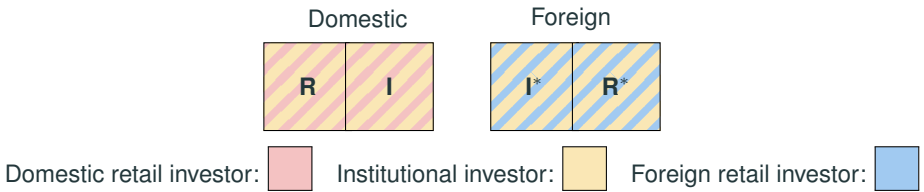
Model setup (2/3)

Market structure reduced to Chaieb and Errunza, 2007 if domestic and foreign institutional securities are perfectly correlated.



Model setup (2/3)

Market structure reduced to Greenwood, Hanson, and Liao, 2018 if no mandate constraint.



Model setup (3/3)

A4: Investor $k \in \{d, f, i\}$ has CARA preference (γ^k) and solves one-period portfolio problem for her dollar investment x_i^k:

$$\max_{\{x^k_{i\in\mathcal{C}^k}\}} \mathbb{E}_t[-\exp(-\gamma^k W^k_{t+1})]$$

$$W^k_{t+1} = W^k_t(1 + r_f) + \sum_{i\in\mathcal{C}^k} x_i^k(r_{i,t+1} - r_f)$$

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A5: Exogenous risk free rate r_f. No short-sale constraint.

Equilibrium

Equilibrium consists of

- The risk premium of each security.
- Investors' dollar investment in securities in their choice sets.

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What to expect when there is segmentation

- Local premium due to imperfect risk-sharing.
- Investors hold **replicating portfolios** to gain **partial exposure** to securities beyond their choice set.

derivation

Attainable returns

Due to **limited mandate**, institutional investors access domestic investment through the domestic institutional security I.

- The **attainable return** of any domestic investment j is defined as its component that can be replicated by I

$$\hat{r}_j = B_{j,I} r_I$$

$B_{j,I} = \rho_{jI} \frac{\sigma_j \sigma_I}{\sigma_I^2}$ is the coefficient of regressing r_j onto r_I.

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- Attainable market portfolios
  - **Attainable domestic market portfolio $\hat{\mathbf{D}}$**: the component of US market return that can be replicated by Apple.
  - Attainable foreign market portfolio $\hat{\mathbf{F}}$: the component of Chinese market return that can be replicated by Tencent.

Main pricing results

The risk premium of any domestic security j is:

$$\mu_j = \underbrace{\gamma M_W cov(\hat{r}_j, r_{\hat{W}})}_{\text{attainable world market premium}} + \underbrace{\frac{\gamma^i}{\gamma^f}\gamma M_D cov(\hat{r}_j, f^{ilocal})}_{\text{institutional local premium}} + \underbrace{\gamma^d M_R cov(r_j - \hat{r}_j, f^{rlocal})}_{\text{retail local premium}}$$

- **Attainable world market factor $\hat{W}$**: value-weighted portfolio of $\hat{D}$ and $\hat{F}$.
- Aggregate risk aversion γ

$$\frac{1}{\gamma} = \underbrace{\frac{1}{\gamma^i} + \frac{1}{\gamma^d} + \frac{1}{\gamma^f}}_{\text{simple aggregation}} + \underbrace{(1-\rho^2)\frac{\gamma^i}{\gamma^d\gamma^f}}_{\text{adjustment}}, \ \rho = corr(r_I, r_{I^*})$$

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- **Institutional local factor**:

$$f^{ilocal} = r_{\hat{D}} - r_{D^s}$$

- **Substitute portfolio D^s**: a position in I^* that replicates $\hat{\mathbf{D}}$
  - Substitute for domestic investment to foreign retail investor
  - Domestic risk that can be shared with home-biased foreign retail investor
- Institutional local premium **decreases** as institutional investor becomes **less risk averse** $\gamma^i \downarrow$

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- **Retail local factor**:

$$f^{rlocal} = r_R - \hat{r}_R$$

- Retail local premium **increases** as retail investor d becomes **more risk averse** $\gamma^d \uparrow$.
- **Institutional securities** have **zero retail local premium**.

Components of investors' portfolios

Component	Domestic retail investor	Institution	Foreign retail investor
Unattainable domestic return	$D - \hat{D}$		
Attainable domestic return	$\hat{D}$	$\hat{D}$	
Risk-sharing $D \to f$		$-D^s$	$+D^s$
Risk-sharing $F \to d$	$+F^s$	$-F^s$	
Attainable foreign return		$\hat{F}$	$\hat{F}$
Unattainable foreign return			$F - \hat{F}$

domestic securities foreign securities

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Attainable foreign return		$\hat{F}$	$\hat{F}$
Unattainable foreign return			$F - \hat{F}$

domestic securities foreign securities

Equilibrium investments

Components of investors' portfolios

Component	Domestic retail investor	Institution	Foreign retail investor
Unattainable domestic return	$\mathbf{D - \hat{D}}$		
Attainable domestic return	$\mathbf{\hat{D}}$	$\mathbf{\hat{D}}$	
Risk-sharing $D \rightarrow f$		$\mathbf{-D^s}$	$\mathbf{+D^s}$

Special cases

The risk premium of any domestic security j is:

$$\mu_j = \underbrace{\gamma^{W} M_W cov(\hat{r}_j, r_{\hat{W}})}_{\text{attainable world market premium}} + \underbrace{\gamma^{ilocal} M_D cov\left(\hat{r}_j, f^{ilocal}\right)}_{\text{institutional local premium}} + \underbrace{\gamma^{rlocal} M_R cov\left(r_j - \hat{r}_j, f^{rlocal}\right)}_{\text{retail local premium}}$$

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No home bias.

- Perfect cross-border risk-sharing.

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No mandate constraint.

- Perfect risk-sharing between institutional and retail investors in each country.

Beta representation

- **Beta representation**

$$\mu_j = \beta_j^{\hat{W}} \mu^{\hat{W}} + \beta_j^{ilocal} \mu^{ilocal} + \beta_j^{rlocal} \mu^{rlocal}$$

- Results generalize to multiple institutional and retail securities.

Details

Plan

Theory

- Setup
- Pricing results
- Equilibrium investments

Empirical analyses

- **Data and econometric specification**
- **Institutional and retail local premium across markets**
- **How global institutional ownership affects cost of capital**
- **How risk premia vary over time**

EMPIRICAL ANALYSES

From theory to measurement

Test assets

- 33,966 individual stocks from 38 countries (23 DMs and 15 EMs). January 2000 - December 2020.

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Classifying institutional and retail securities

- Use firm-level global institutional ownership to proxy unobservable mandate.
- Theory has binary classification of institutional versus retail security, in the data there is a continuous transition of institutional ownership, need a cutoff.
- Institutional securities are those with
  - Global institutional ownership above the median in its country-period
  - Global institutional ownership higher than 1%.

Constructing pricing factors

Portfolios constructed for each country c

- **Institutional portfolio** I, **retail portfolio** R. Correlation
- **Foreign institutional portfolio** I^*
- **Attainable domestic market portfolio** $\hat{D}$: 36-month rolling regression of D on I.

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Pricing factors

- **Attainable world market factor** $r_{\hat{W}}$: value-weighted portfolio of $\hat{D}$ from all countries.
  Attainable world market portfolio
- **Institutional local factor** f_c^{ilocal}: residual from 36-month rolling regression of $\hat{D}$ onto I^*.
- **Retail local factor** f_c^{rlocal}: residual from 36-month rolling regression of R onto I.

Data

- Compustat Global: monthly USD returns and other firm characteristics.
- WRDS FF: one-month T-bill rate.
- FactSet: quarterly institutional holdings.
  - **Global institutions**: institutions whose maximum country weight is less than 90% and maximum region weight is less than 80% (Bartram et al., 2015).
- Datastream: country and world dividend yield.

Estimation framework

Conditional two-pass regression à la Gagliardini, Ossola, and Scaillet, 2016; Chaieb, Langlois, and Scaillet, 2021

Estimate time-varying risk premia of country c: $\mu_{c,t} = [\mu_{c,t}^{\hat{W}}, \mu_{c,t}^{ilocal}, \mu_{c,t}^{rlocal}]'$:

$$r_{i,t} = \alpha_{i,t} + \beta_{i,t}' f_{c,t} + \epsilon_{i,t}$$
$$\mu_{i,t} = \beta_{i,t}' \mu_{c,t}$$

- Equilibrium pricing result $\Rightarrow \alpha_{i,t} = \beta_{i,t}' \Big[\mu_{c,t} - E_{t-1}[f_{c,t}]\Big]$.
- $\beta_{i,t}$, $\mu_{c,t}$, $E_{t-1}[f_{c,t}]$ as linear functions of instruments:
  - Common instruments: constant, country and world dividend yield.
  - Stock-specific instrument: percentile rank of size.
- Two-pass regression provides estimates for time-varying risk premia at the country level $\mu_{c,t}$ and at the individual stock level $\mu_{i,t}$.

Details

What to expect

- Institutional and retail local premia are positive.
- Institutional local premium $\downarrow$ as institutional risk-bearing capacity $\uparrow$.
- *IO* $\uparrow$ cost of capital $\downarrow$.

How risk premia vary across markets? (1/2)

Average annualized risk premia by market (loading of $\mu_{c,t}$ on the constant).

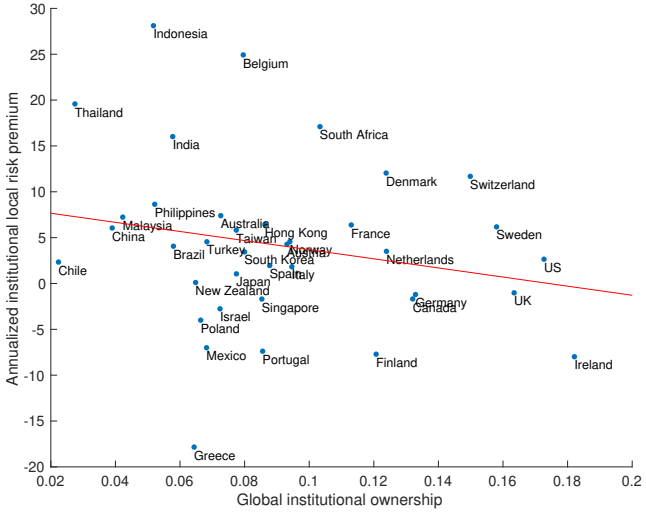
	Attainable world	Institutional local	Retail local
Developed	5.5%	2.8%	1.7%
Emerging	4.2%	6.3%	2.7%

Price of risk

Alternative cutoffs

How risk premia vary across markets (2/2)

The institutional local premium is lower in countries with higher institutional ownership



Institutional ownership and cost of capital (1/3)

- Run panel regression to study how cost of capital is affected by global institutional ownership in DMs and EMs.

$$\mu_{i,t} = \beta_1 IO_{i,t-1} + \beta_2 \rho_i + \beta_2 X_{i,t-1} + \beta_3 CountryIO_{c,t-1} + \beta_4 CR_{t-1} + \epsilon_{i,t},\ \mu \in \{\mu_{i,t}^{total}, \mu_{i,t}^{\hat{W}}, \mu_{i,t}^{ilocal}, \mu_{i,t}^{rlocal}\}$$

  - $IO_{i,t-1}$: firm-level global institutional ownership.
  - ρ_i: the correlation between security i and the domestic institutional portfolio.
  - $X_{i,t-1}$: firm-level controls (logmv, bm, dy).

- For each dependent variable two specifications:
  - Country and time-varying variables for institutional risk-bearing capacity
    - $CountryIO_{c,t-1}$: country-level institutional ownership.
    - CR_{t-1}: the intermediary capital ratio of He, Kelly, and Manela, 2017.
  - Country-time FE

Institutional ownership and cost of capital (2/3) - Developed markets

1% ↑ in global IO ⇒ cost of capital ↑ **3.6bps**.

	Total		World		Institutional local		Retail local	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IO	0.063***	**0.036*** **	0.046***	**0.014*** **	0.029***	**0.019*** **	-0.012***	**0.004*** **
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.001)	(0.001)
ρ_i	0.163***	0.177***	0.100***	0.129***	0.039***	0.038***	0.024***	0.010***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
logmv	-0.009***	-0.007***	-0.005***	-0.003***	-0.001***	-0.001***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CountryIO	-0.219***		-0.044***		-0.034***		-0.141***	
	(0.005)		(0.004)		(0.004)		(0.002)	
CR	-2.576***		-1.718***		-0.481***		-0.377***	
	(0.021)		(0.018)		(0.013)		(0.008)	
Obs	3,220,189	3,220,189	3,220,189	3,220,189	3,220,189	3,220,189	3,220,189	3,220,189
R-squared	0.185	0.412	0.173	0.640	0.019	0.296	0.088	0.359
Firm-level control	Y	Y	Y	Y	Y	Y	Y	Y
Country-time FE	N	Y	N	Y	N	Y	N	Y

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Institutional ownership and cost of capital (3/3) - Emerging markets

1% ↑ in global IO ⇒ cost of capital ↓ **8.1bps**.

	Total		World		Institutional local		Retail local	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IO	-0.128***	**-0.081*** **	0.003	**0.063*** **	-0.003	**-0.043*** **	-0.128***	**-0.102*** **
	(0.011)	(0.009)	(0.010)	(0.007)	(0.010)	(0.005)	(0.006)	(0.004)
ρ_i	0.093***	0.217***	0.039***	0.100***	0.107***	0.125***	-0.053***	**-0.008*** **
	(0.005)	(0.004)	(0.003)	(0.003)	(0.005)	(0.004)	(0.003)	(0.002)
logmv	0.007***	-0.003***	0.007***	-0.002***	-0.007***	-0.002***	0.006***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CountryIO	0.211***		0.029***		-0.099***		0.281***	
	(0.014)		(0.011)		(0.013)		(0.008)	
CR	-3.466***		-3.869***		0.087***		0.317***	
	(0.028)		(0.025)		(0.018)		(0.009)	
Observations	1,790,675	1,790,675	1,790,675	1,790,675	1,790,675	1,790,675	1,790,675	1,790,675
R-squared	0.153	0.651	0.273	0.752	0.033	0.655	0.045	0.626
Firm-level controls	Y	Y	Y	Y	Y	Y	Y	Y
Country-time FE	N	Y	N	Y	N	Y	N	Y

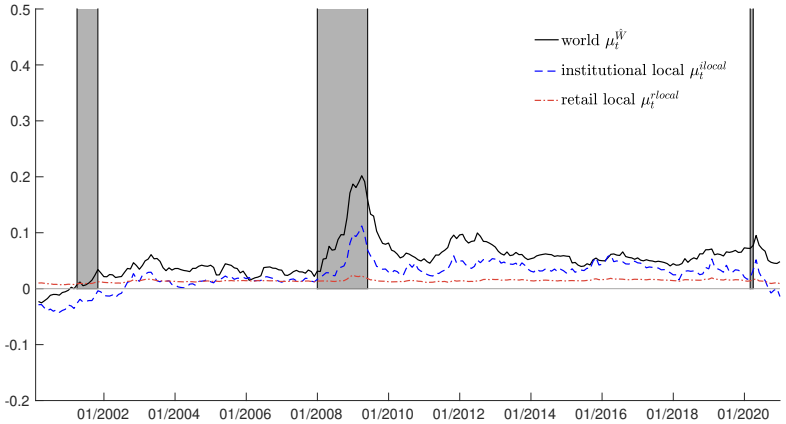
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Alternative cutoffs

Time-varying risk premia (1/2) - Developed markets

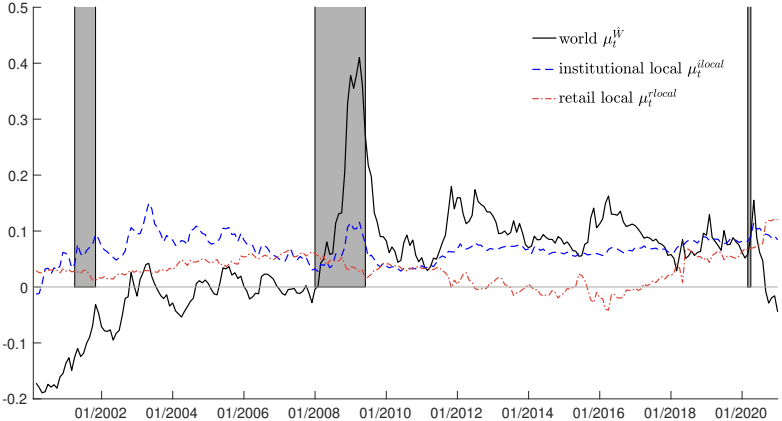
Time-varying risk premium driven by the attainable world and the institutional local premia.



Value-weighted time-varying risk premia across developed markets.

Time-varying risk premia (2/2) - Emerging markets

- Retail local risk premium increased during Covid not Global Financial Crisis.
- Institutions' capacity to invest in EMs is reduced with tighter financial constraints (Akbari, Carrieri, and Malkhozov, 2022).



Value-weighted time-varying risk premia across emerging markets.

Concluding remarks

- New asset pricing model with global institutions and local retail investors.

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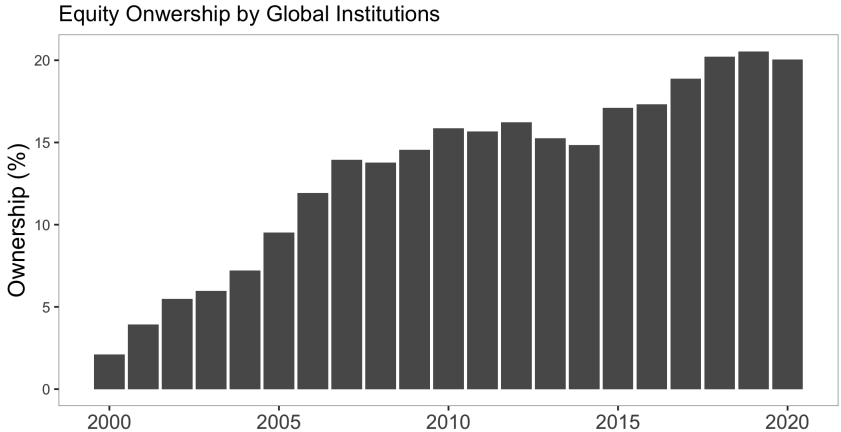
- New asset pricing model with global institutions and local retail investors.
- Unique decomposition of market level local risk premium into: **institutional local premium** and **retail local premium**.
- Higher global institutional ownership reduces the cost of capital in emerging markets.

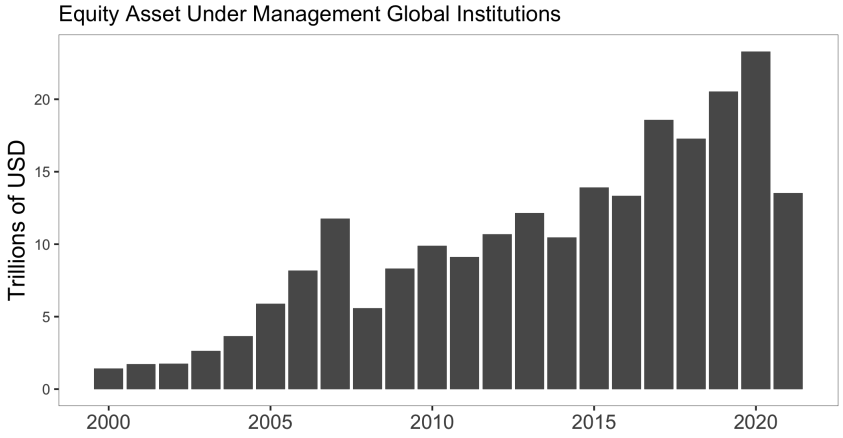
Future research

- How different components of local premium change over time.
  - Comparing levels of institutional local premium vs retail local premium helps us diagnose whether a distressed episode originates from financial shocks or fundamental shocks.
  - Proxies for institutional and retail risk aversion.
- How institutional investment affects risk-sharing in other markets:
  - Bond markets are invested primarily by institutions.
  - How does institutional investment affect default risk?

Growth of global institutional ownership



Growth of Global Institutional Investment



*Source: FactSet

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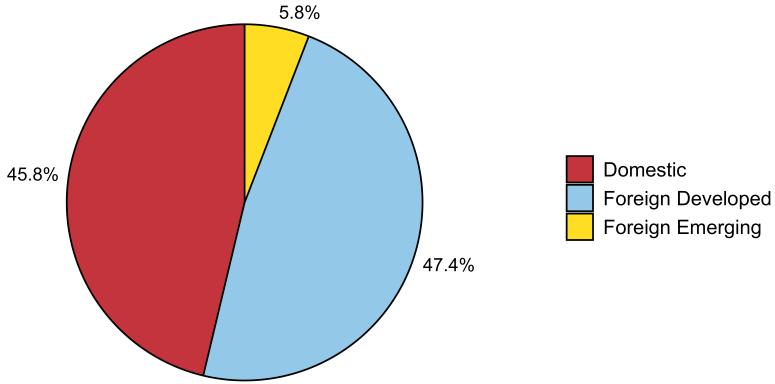
Global institutional investors' portfolio composition 2000



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What is a mandate: Vanguard Global ESG Select Stock Fund

Investment objective

Vanguard Global ESG Select Stock Fund seeks to maximize returns while having greater exposure to companies with attractive environmental, social, and governance characteristics.

Investment strategy

1

Under normal circumstances, at least 80% of the fund's assets will be invested in common stocks of companies that meet the advisor's environmental, social, and governance (ESG) criteria. The fund will typically invest in stocks of large and mid-size companies located in a number of countries throughout the world, including issuers located in emerging markets. The fund's investment approach is based on proprietary, bottom-up fundamental research conducted by the advisor. The advisor considers the investment universe, sector-by-sector and region-by-region, looking for companies with strong long-term fundamentals with an emphasis on the following company attributes: (1) a proven track record of effective capital allocation, (2) leading ESG practices (e.g., increased transparency into the company's ESG practices, board diversity

2

Benchmark

3

FTSE All-World Index

Growth of a $10,000 investi

$15,852
Fund as of 12/31/21

$15,109
Benchmark
as of 12/31/21

Annual returns

Fund

Benchmark

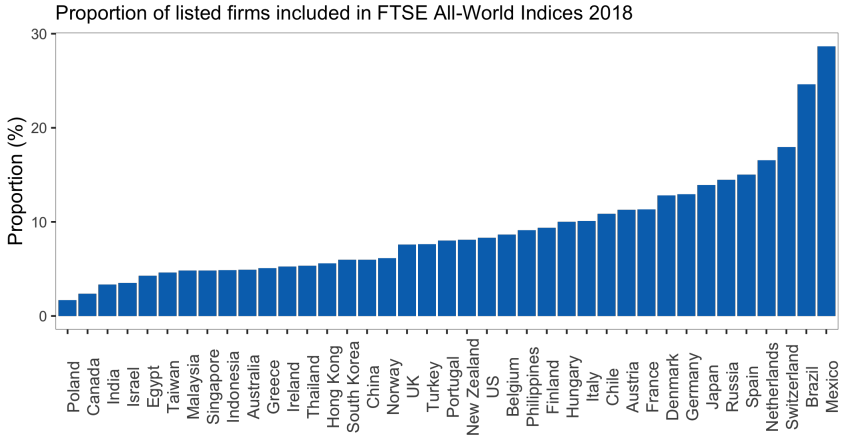
Lucie Y. Lu

Why is there a mandate?

- Information
  - Fixed due diligence costs therefore not worthwhile to participate in certain securities (Merton, 1987).
  - Not investing in stocks that they do not have existing information advantage (Van Nieuwerburgh and Veldkamp, 2009).
- ESG considerations: not investing in sin stocks.
- Benchmarking: no incentive to deviate too much from the benchmark (Basak and Pavlova, 2013; Buffa and Hodor, 2022).

Institutional investors holding concentrated portfolios also documented in (Ferreira and Matos, 2008; Koijen and Yogo, 2019).

Limited inclusion by major global indices



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Deriving the equilibrium

Equilibrium security holdings and risk premia μ_I, μ_{I^*}, μ_R, μ_{R^*} can be solved from the FOC of each investors' portfolio optimization and the market clearing conditions.

First Order Conditions

$$\frac{1}{\gamma^d}\mu_R = \sigma_R^2 x_R^d + \rho_R \sigma_I \sigma_R x_I^d$$

$$\frac{1}{\gamma^d}\mu_I = \rho_R \sigma_I \sigma_R x_R + \sigma_I^2 x_I^d$$

$$\frac{1}{\gamma^i}\mu_I = \sigma_I^2 x_I^i + \rho \sigma_I \sigma_{I^*} x_{I^*}^i$$

$$\frac{1}{\gamma^i}\mu_{I^*} = \rho \sigma_I \sigma_{I^*} x_I^i + \sigma_{I^*}^2 x_{I^*}^i$$

$$\frac{1}{\gamma^f}\mu_{I^*} = \sigma_{I^*}^2 x_{I^*}^f + \rho_R^* \sigma_{I^*} \sigma_{R^*} x_{R^*}$$

$$\frac{1}{\gamma^f}\mu_{R^*} = \rho_R^* \sigma_{R^*} \sigma_{I^*} x_{I^*}^f + \sigma_{R^*}^2 x_{R^*}^f$$

Market clearing conditions

$$x_R^d = M_R$$

$$x_I^d + x_I^i = M_I$$

$$x_{I^*}^i + x_{I^*}^f = M_{I^*}$$

$$x_{R^*}^f = M_{R^*}$$

The linear system has the same number of equations and unknowns.

Back

Beta representation details

Risk premiums

$$\mu^{\hat{W}} = \gamma M_W var(f^{\hat{W}})$$

$$\mu^{ilocal} = \frac{\gamma^i}{\gamma^f} \gamma M_D var(f^{ilocal})$$

$$\mu^{rlocal} = \gamma^d M_R var(f^{rlocal})$$

Beta exposures

$$\beta_j^{\hat{W}} = \frac{cov(\hat{r}_j, f^{\hat{W}})}{var(f^{\hat{W}})}$$

$$\beta_j^{ilocal} = \frac{cov(\hat{r}_j, f^{ilocal})}{var(f^{ilocal})}$$

$$\beta_j^{rlocal} = \frac{cov(r_j - \hat{r}_j, f^{rlocal})}{var(f^{rlocal})}$$

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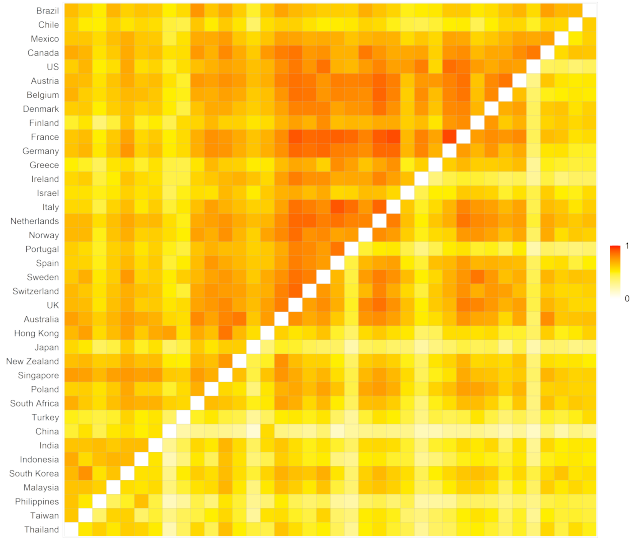
Correlation between institutional and retail portfolios across countries



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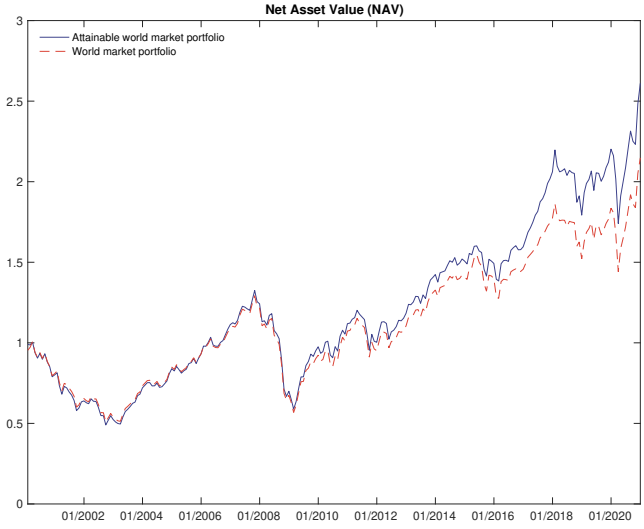
Attainable world market portfolio



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Two-pass regression details (1/3)

Gagliardini, Ossola, and Scaillet, 2016; Chaieb, Langlois, and Scaillet, 2021 conditional two-pass regression designed for individual stocks with bias correction for error-in-variable problem

(I) Linear regression:

$$r_{i,t} = \alpha_{i,t} + \beta_{i,t}' f_{c,t} + \epsilon_{i,t} \Rightarrow E_{t-1}[r_{i,t}] = \alpha_{i,t} + \beta_{i,t}' E_{t-1}[f_{c,t}]$$

(II) Beta representation of the equilibrium

$$E_{t-1}[r_{i,t}] = \beta_{i,t}' \mu_{c,t}, \ \mu_{c,t} = [\mu_{c,t}^{\hat{W}}, \mu_{c,t}^{ilocal}, \mu_{c,t}^{rlocal}]'$$

(I)+(II) implies asset pricing restriction

$$\alpha_{i,t} = \beta_{i,t}' \Big[\mu_{c,t} - E_{t-1}[f_{c,t}]\Big]$$

(III) $\beta_{i,t}$**,** $\mu_{c,t}$**,** $E_{t-1}[f_{c,t}]$ **as linear functions of instruments.**

Two-pass regression details (2/3)

Factor exposure

$$\beta_{i,t} = B_i Z_{c,t-1} + C_i Z_{i,t-1}$$

Conditional expectation of factors:

$$E_{t-1}[f_{c,t}] = F_c Z_{c,t-1}$$

Factor risk premium

$$\mu_{c,t} = \Lambda_c Z_{c,t-1}$$

Transaction costs

$$\alpha_{i,t} = \beta_i' \nu_{c,t}$$
$$\nu_{c,t} = \mu_{c,t} - E_{t-1}[f_{c,t}] = (\Lambda_c - F_c) Z_{c,t-1}$$

- p common instruments $Z_{c,t-1}$
- q firm-specific instruments $Z_{i,t-1}$

Two-pass regression details (3/3)

$$r_{i,t} = \underbrace{\beta'_{i,t}}_{B_i Z_{c,t-1} + C_i Z_{i,t-1}} \times \Big[\underbrace{\mu_{c,t}}_{\Lambda Z_{c,t-1}} - \underbrace{E_{t-1}[f_{c,t}]}_{F Z_{c,t-1}} \Big] + \underbrace{\beta'_{i,t}}_{B_i Z_{c,t-1} + C_i Z_{i,t-1}} \times f_{c,t} + \epsilon_{i,t}$$
$$= b'_{1,i} x_{1,i,t} + b'_{2,i} x_{2,i,t}$$

- Common instruments: $Z_{c,t-1} = [1, DY_{t-1}, DY_{c,t-1}]$, world and country dividend yield
- Stock-specific instrument: $Z_{i,t-1} = pctl_{mv,t-1}$, percentile rank of size.
- First-pass: regress $r_{i,t}$ on $x_{1,i,t}$ and $x_{2,i,t}$, get $\beta_{i,t}$
- Second-pass: regress b_1 on transformation of b_2 to estimate $\mu_{c,t} = \Lambda_c Z_{c,t-1}$.
- Model-implied risk premium of individual stocks $\mu_{i,t} = \beta'_{i,t} \mu_{c,t}$.

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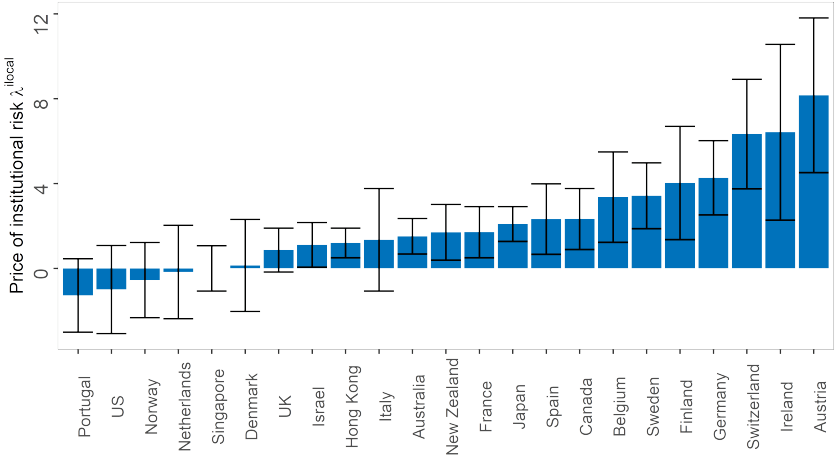
Unconditional estimation

$$E[r_i] = \alpha + \lambda^{\hat{W}} cov(r_i, r_{\hat{W}}) + \lambda^{ilocal} cov(r_i, f^{ilocal}) + \lambda^{rlocal} cov(r_i, f^{rlocal})$$

- Fama and MacBeth, 1973 two-pass regression.
- 36-month rolling window for covariance then cross-sectional regression.
- Estimated λ is the average across cross-sections, Newey and West, 1987 standard errors.

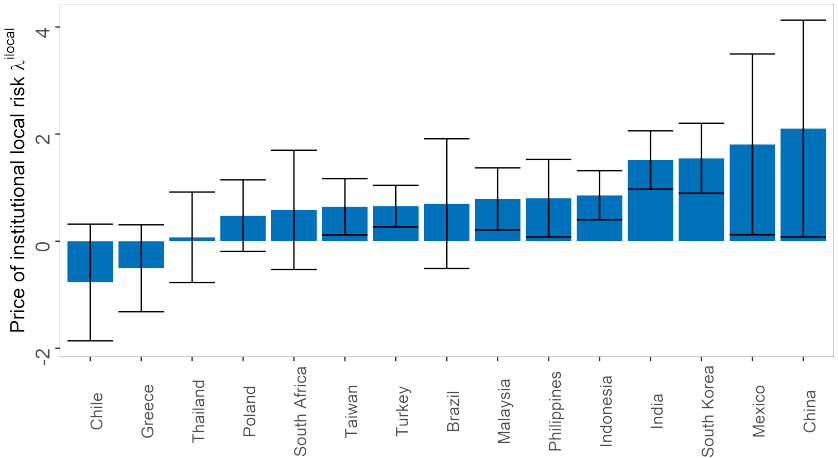
Unconditional price of institutional local factor: DMs



* Error bars indicate 95% confidence interval.

Positively and significantly priced in 15 out of 23 DMs.

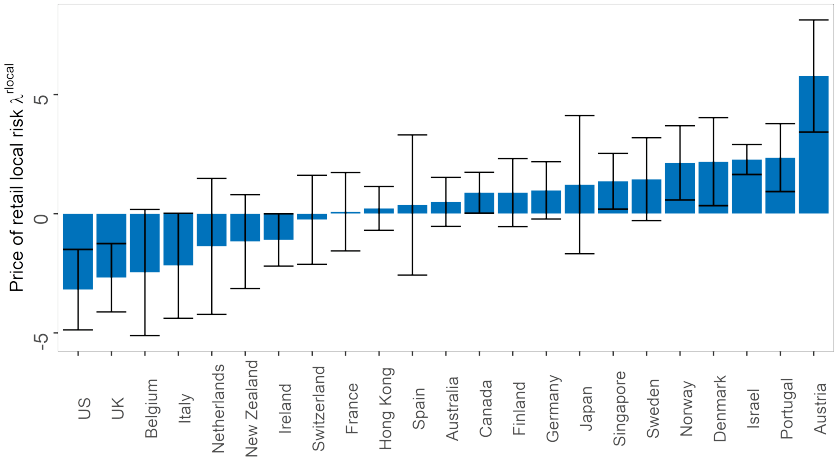
Unconditional price of institutional local factor: EMs



* Error bars indicate 95% confidence interval.

Positively and significantly priced in 9 out of 15 EMs.

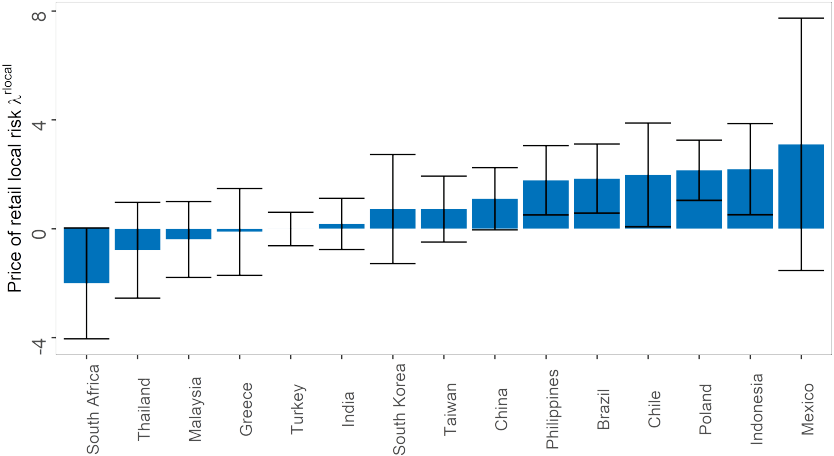
Unconditional price of retail local factor: DMs



* Error bars indicate 95% confidence interval.

Positively and significantly priced in 7 out of 23 DMs.

Unconditional price of retail local factor: EMs



* Error bars indicate 95% confidence interval.

Positively and significantly priced in 6 out of 15 EMs.

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Risk-premia across markets using alternative cutoffs

40^{th} percentile cutoff		Attainable world	Institutional local	Retail local
Developed	avg risk premium	6.15%	2.93%	1.73%
Emerging	avg risk premium	4.99%	4.97%	3.4%
60^{th} percentile cutoff		Attainable world	Institutional local	Retail local
Developed	avg risk premium	6.42%	2.83%	2.46%
Emerging	avg risk premium	5.73%	4.44%	2.69%
Random assignment		Attainable world	Institutional local	Retail local
Developed	avg risk premium	6.34%	3.56%	−0.22%
Emerging	avg risk premium	5.24%	6.15%	−0.33%

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Institutional ownership and cost of capital using alternative cutoffs

		Developed		
40th percentile cutoff	Total	World	Institutional local	Retail local
IO	0.038***	0.017***	0.021***	-0.000
ρ_i	0.086***	0.063***	0.022***	0.002***
60th percentile cutoff	Total	World	Institutional local	Retail local
IO	0.037***	0.019***	0.021***	-0.003*
ρ_i	0.084***	0.068***	0.022***	-0.007***
		Emerging		
40th percentile cutoff	Total	World	Institutional local	Retail local
IO	-0.138***	0.041***	-0.054***	-0.125***
ρ_i	0.101***	0.041***	0.066***	-0.006***
60th percentile cutoff	Total	World	Institutional local	Retail local
IO	-0.130***	0.041***	-0.045***	-0.126***
ρ_i	0.101***	0.045***	0.061***	-0.005***

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