Firms' Perceived Cost of Capital

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Introduction

CFO of Nestlé, September 2020:

> *"For Nestlé, the weighted average cost of capital is around 7%, 6.5 to 7%."*

Introduction

Unanswered questions:

1. **Normative:** What *should* the cost of capital be?
   - No clear consensus — expected returns? CAPM? Something else?
   - Hard to measure

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1. **Normative:** What *should* the cost of capital be?
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   - Hard to measure

2. **Positive:** What do firms *think* their cost of capital is?
   - Do firms follow our models? What are the economic consequences of deviations?
   - Until now, lack of data on firms' perceptions

This talk: new tools for (1), new data for (2)

This Talk

Normative: Build benchmarks and tools

1. Market-value maximization $\Rightarrow$ CoC = expected return on debt and equity
   - New method (MCC): market-based cost of capital that measures long-run returns

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   - Natural starting point: CAPM

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Positive: Study firm perceptions

- Hand collected data on perceived CoC from conference calls
- What explains perc. CoC? Test the benchmarks
- Does perc. CoC matter for capital allocation, firm valuation, etc?

This Talk: Main Results

Testing the benchmarks

- Reject the market-value benchmark
  - ∼20% of variation in perc. CoC can be justified by expected returns
- Fair-value benchmark does better
  - CAPM explains ∼50% of the variation in perc. CoC

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Testing the benchmarks

- Reject the market-value benchmark
  - $\sim$20% of variation in perc. CoC can be justified by expected returns
- Fair-value benchmark does better
  - CAPM explains $\sim$50% of the variation in perc. CoC

Economic impact

- Firms with higher perc. CoC have higher ROIC and invest less
- Firms whose perc. CoC is closer to market-based CoC have higher valuations
- Misallocation: deviations from market-based benchmark lowers TFP by $\sim$5%

Relation to Previous Work

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Previous work: Firms' perceptions of their cost of capital have a muted effect on investment in the short run

- After firms update their cost of capital, it takes years to update the required return on investment
- Broad implications for investment and econ. fluctuations (Gormsen & Huber, 2025; Fukui et al., 2026)

Relation to Previous Work

Previous work: Firms' perceptions of their cost of capital have a muted effect on investment in the short run

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Today's talk focuses on the **long run**

- In the long run, CoC reflected in required return and investment 1-to-1
- CoC influences steady state and long-run allocation of capital

Defining Benchmarks

Overview

Fixing ideas

- Simple model of inefficient capital markets
- Define exp. returns and benchmarks for the cost of capital

Model: Asset Prices

Assumptions

- Two investors $i = A, B$: Arbitrageurs (A) and behavioral investors (B)
- Invest $x_i^j P^j$ in stocks $j = 1, ..., J$ to maximize CARA utility

$$\max_{x_{t,i}} \quad x'_{t,i} \left(E_t^i [P_{t+1} + D_{t+1}] - (1 + r^f) P_t \right) - \frac{\gamma_i}{2} x'_{t,i} \Omega_t x_{t,i}$$

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- B's payout expectations are distorted by κ

$$E_t^B[P_{t+1}^j + D_{t+1}^j] = (1 + \kappa_t^j) \times E_t^{\mathrm{O}}[P_{t+1}^j + D_{t+1}^j].$$

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Solution — Three types of expected returns

1. Objective expected returns,

$$E_t^{\mathrm{O}}[r_{t+1}^j] = r^f - \tilde{\kappa}_t^j + \beta_t^j \lambda_t^{\mathrm{O}}.$$

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2. Fair-value expected return ($\kappa^j = 0$),

$$E_t^{\text{O}}[r_{t+1}^{\text{fair value},j}] = r^f + \tilde{\beta}_t^j \tilde{\lambda}_t.$$

Model: Asset Prices

Assumptions

- Two investors $i = A, B$: Arbitrageurs (A) and behavioral investors (B)
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2. Fair-value expected return ($\kappa^j = 0$),

$$E_t^{\mathrm{O}}[r_{t+1}^{\text{fair value},j}] = r^f + \tilde{\beta}_t^j \tilde{\lambda}_t.$$

3. “Behavioral expected returns”

$$E_t^{\mathrm{B}}[r_{t+1}^j] = r^f + \hat{\kappa}_t^j + \beta_t^j \lambda_t^B.$$

Model: Firm Investment

Benchmark 1: Market-based approach

Objective: Maximize value in financial markets

Solution: Use objective expected returns as discount rate:

$$\delta_t^{\text{market-based}} = E_t^{\text{O}}[r]$$

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Benchmark 2: Fair-value approach

Objective: Maximize fair value in financial markets (value if $\kappa^j = 0$)

Solution: Use fair-value expected returns as discount rate:

$$\delta_t^{\text{fair-value}} = E_t^{\text{O}}[r^{\text{fair value}}]$$

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Solution: Use fair-value expected returns as discount rate:

$$\delta_t^{\text{fair-value}} = E_t^{\text{O}}[r^{\text{fair value}}]$$

Note: None of the benchmarks lead to $E^B[r]$ as the discount rate

Firms' Perceived Cost of Capital

Data from Corporate Conference Calls

Nestlé, 2020: "For Nestlé, the weighted average cost of capital is around 7%, 6.5 to 7%."

General Electric, 2006: "Our weighted average cost of capital is 7%."

Delta Airlines, 2022: "... the weighted average cost of capital of 8%."

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Data collection

- Manually read transcripts with RA team
- 160k paragraphs containing keywords, 2002–24 (sample growing)
- Analyze only firm-level CoC; separately collect project-specific numbers

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Data overview

- 3,200 observations of perc. CoC for 1,200 firms in 20 countries
- Representative, except larger firms
- Firms with perc. CoC account for 40% of Compustat assets in advanced economies
- Predicted data under costofcapital.org

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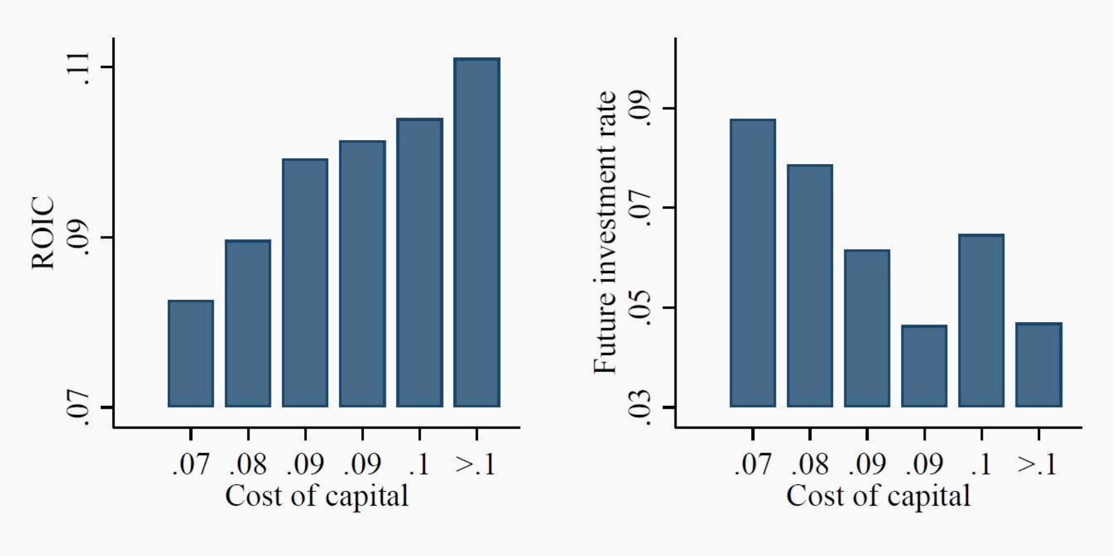
Verifiable data

- Calls are repeated high-stakes interactions (Hassan et al., 2019)
- Information from conference calls used in security lawsuits
- Data validation in paper and next

Perceived Cost of Capital and Real Outcomes

Perceived CoC influences real decisions, so it generates:

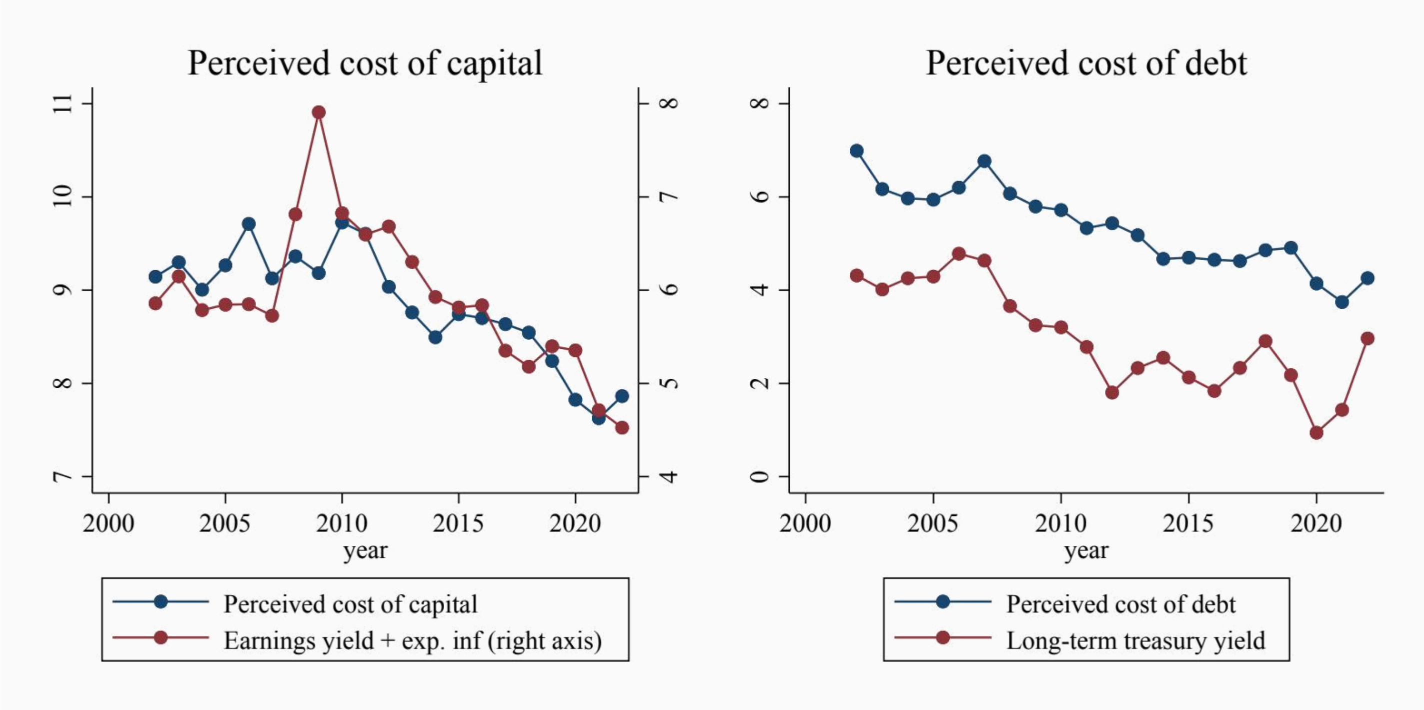
- Lower investment
- Higher average realized returns



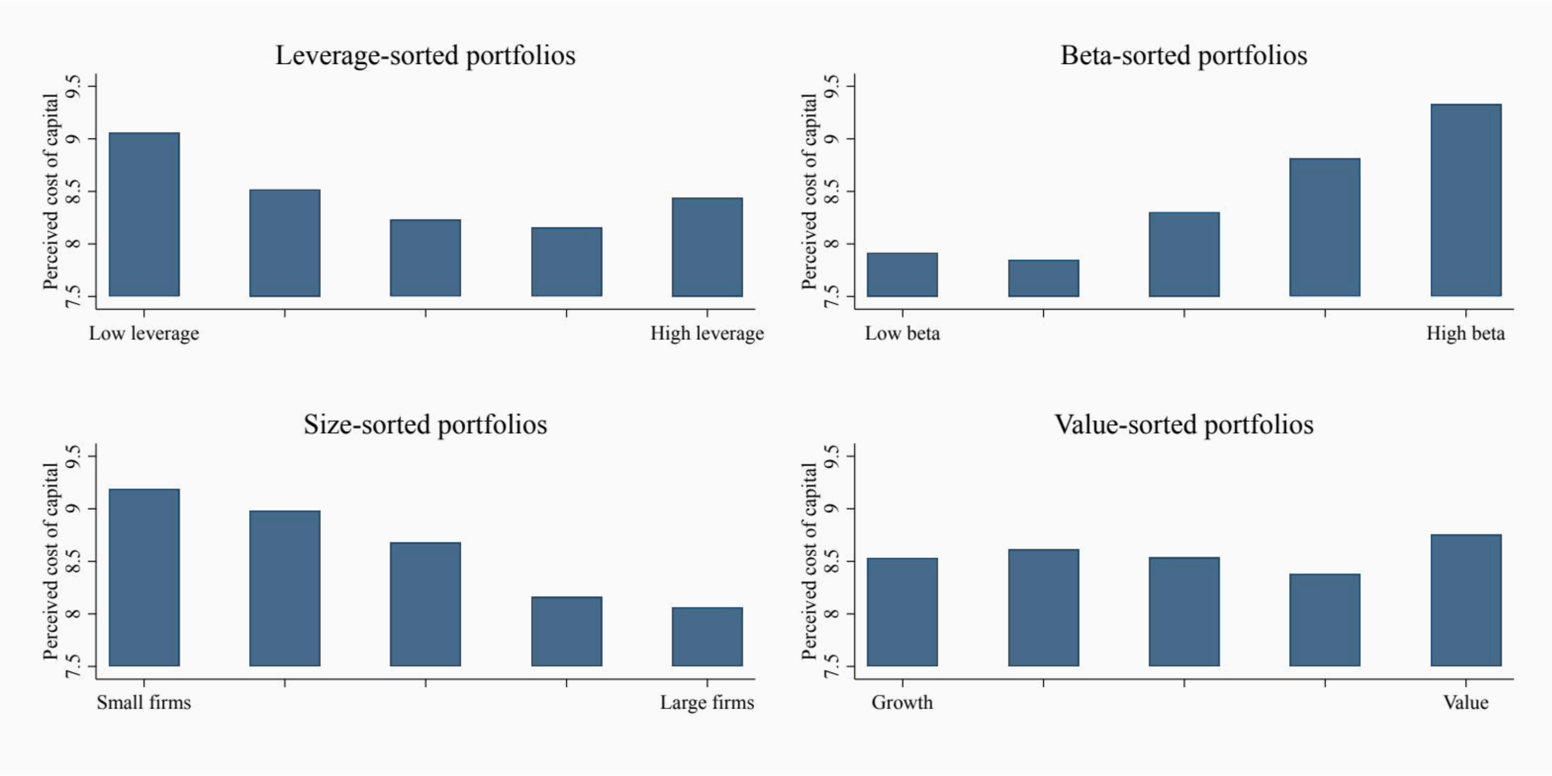
Magnitudes consistent with standard model and robust to controls

Time Variation in r^{perc} Follows Classic Expected Return Measures

$$r^{\text{perc}} = a_0 + 0.59^{***} \times \text{Earnings yield}_t + 0.32^{***} \times \text{Treasury yield}_t + \epsilon$$



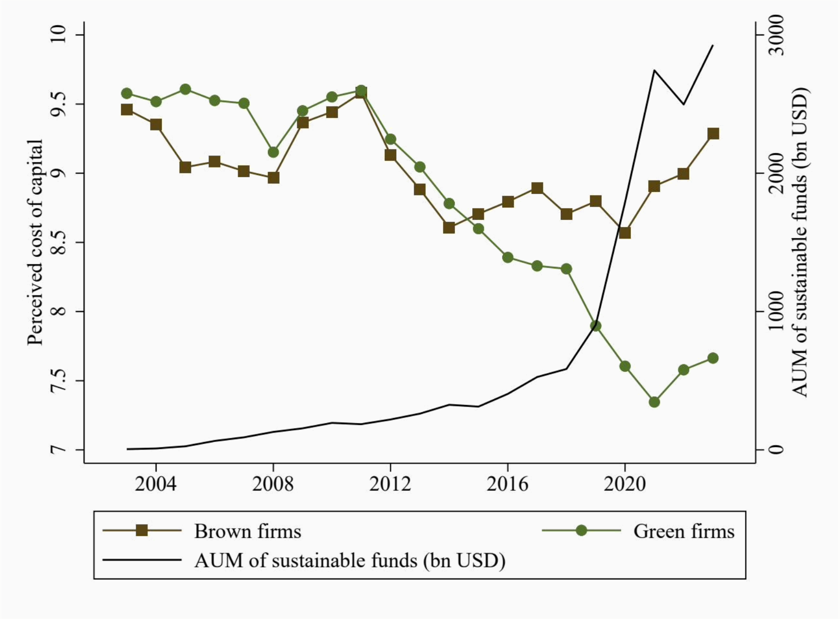
Classic Factors Shape Cross-Sectional Variation in r^{perc}



Consistent with Modigliani and Miller (1958) and Fama and French (1993)

A New Factor: Greenness Since 2016

– “Climate Capitalists” (with Simon Oh) studies CoC of green and brown firms

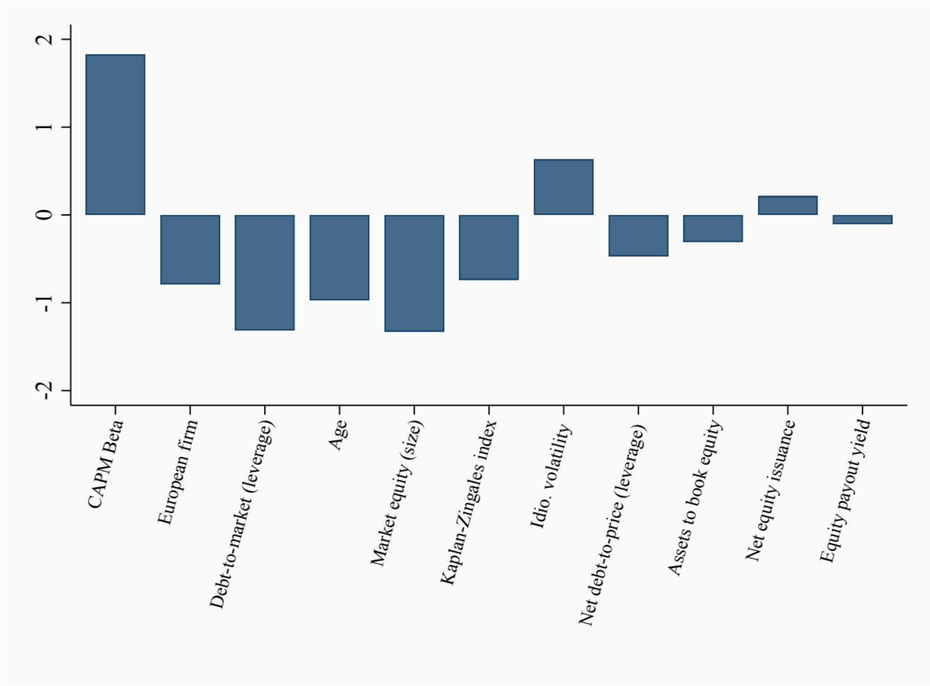


– Identify green and brown firms using MSCI data

– Green firms perceive significantly lower CoC since 2016

Main Predictors of r^{perc}

- Lasso selects 11 predictors (among factor zoo of 153)
- Slope coefficients (measured in percentiles from 0 to 1)



Excess Dispersion in the Perc. Cost of Capital

Testing the Benchmarks

The two benchmarks:

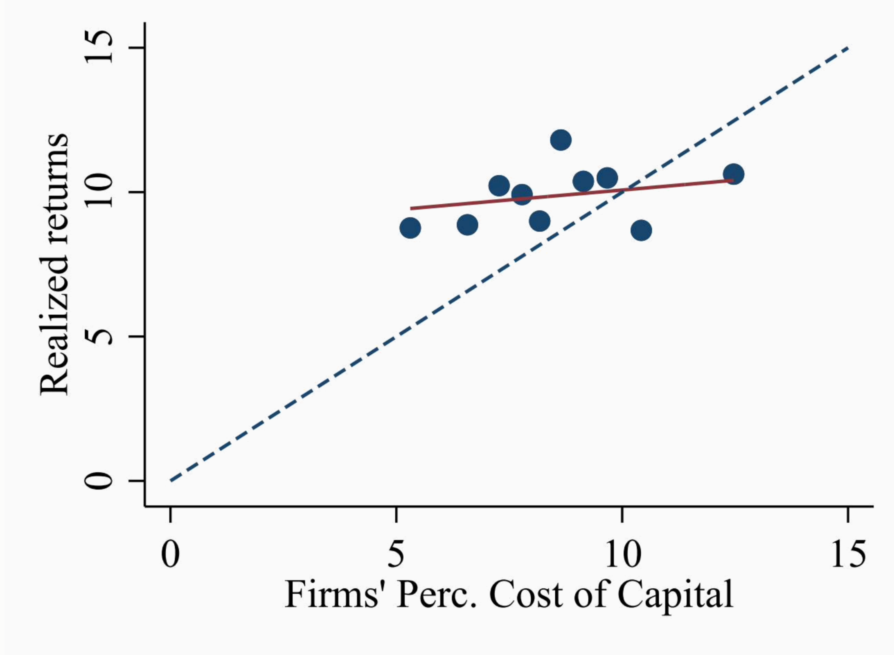
1. Market-based approach: firms should use exp. returns as cost of capital
2. Fair-value approach: firms should use fair-value discount rate

We reject both views, firms do something different

Benchmark 1: The Market-Based Approach

$$r^{\text{realized}} = (1-\omega)\, r^{\text{equity, realized}} + \omega\,(1-\tau)\, r^{\text{debt}}$$

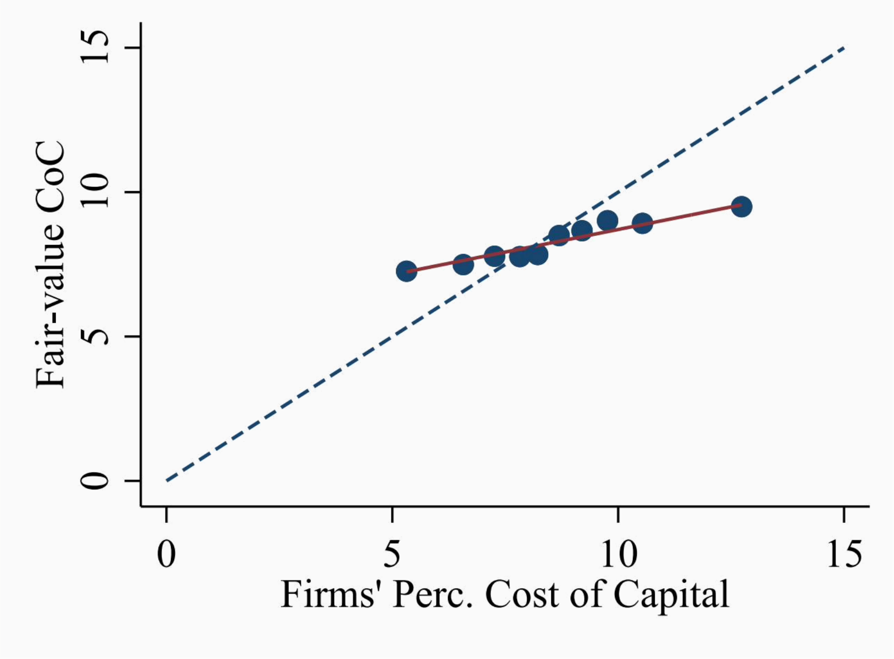
Returns to 10 portfolios sorted on PCoC (global sample, 2002–2024)



Benchmark 2: The Fair-Value Approach

$$r^{\text{CAPM}} = (1-\omega)\, r^{\text{equity, CAPM}} + \omega\,(1-\tau)\, r^{\text{debt}}$$

r^{CAPM} to 10 portfolios sorted on PCoC (global sample, 2002–2024)



Excess Dispersion

$$r^{\text{perc.}} = r^{\text{benchmark}} + \upsilon$$

$$\text{var}\left(r_{i,t}^{\text{perc.}}\right) = \underbrace{\text{cov}\left(r_{i,t}^{\text{benchmark}}, r_{i,t}^{\text{perc.}}\right)}_{\text{Benchmark dispersion}} + \underbrace{\text{cov}\left(\upsilon_{i,t}, r_{i,t}^{\text{perc.}}\right)}_{\text{Excess dispersion}}$$

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β_1 from previous regression is answer to the variance decomposition

$$r_{i,t}^{\text{benchmark}} = \beta_0 + \beta_1 \, r_{i,t}^{\text{perc.}} + \epsilon_{i,t}.$$

- β_1 = % benchmark dispersion
- $1 - \beta_1$ = % excess dispersion

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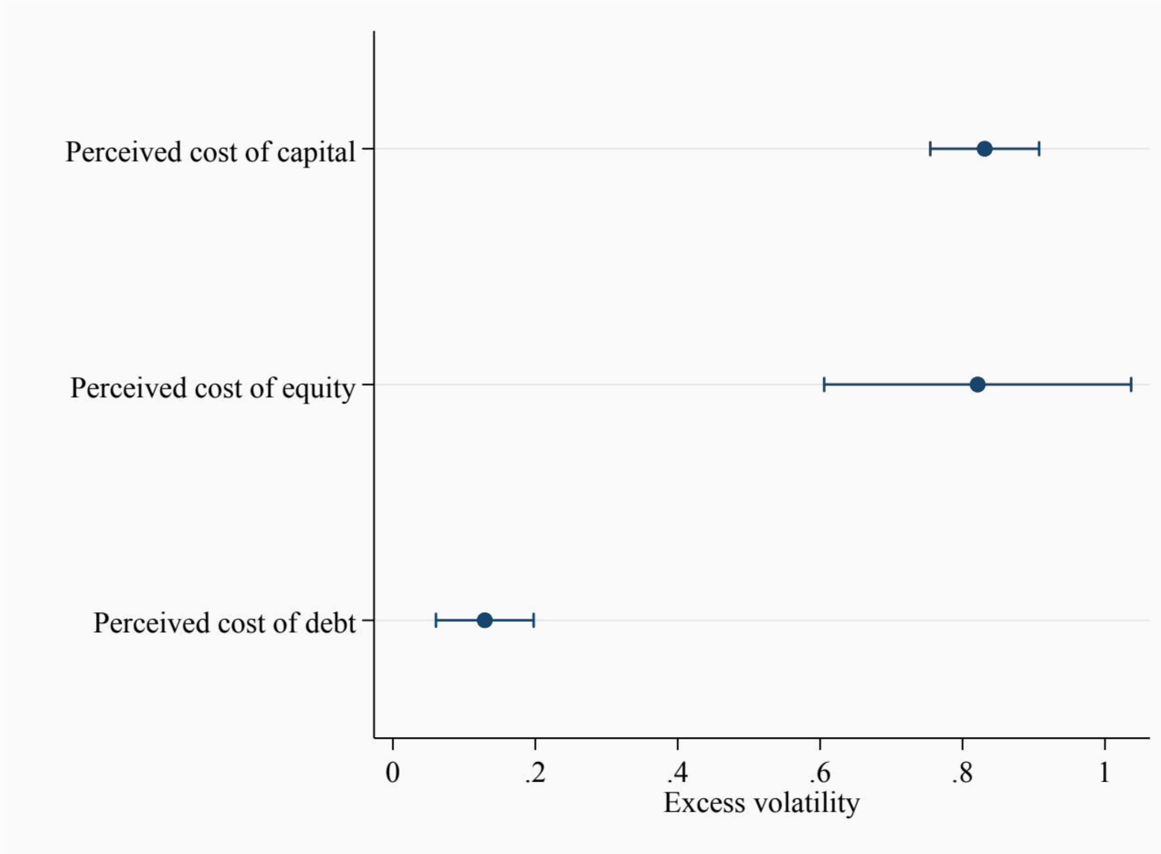
	$\upsilon_{i,t+1}^{\text{realized}} = r_{i,t}^{\text{perc.}} - r_{i,t+j}^{\text{realized}}$		$\upsilon_{i,t+1}^{\text{CAPM}} = r_{i,t}^{\text{perc.}} - r_{i,t}^{\text{CAPM}}$	
	(1)	(2)	(3)	(4)
$r_{i,t}^{\text{perc.}}$	0.79***	0.91**	0.50***	0.53***
	(0.30)	(0.28)	(0.036)	(0.036)
Observations	2,590	2,590	3,282	3,282
Quarter-year FE	No	Yes	No	Yes
P(slope = 1)	0.48	0.75	0	0
R^2	0.0057	0.25	0.17	0.25

Excess Dispersion in Cost of Debt, Equity, and Capital



Excess Dispersion Relative to Market-Based Approach: Robustness

Results on excess dispersion are robust to

- Measures of expected returns, horizons, etc
- Alternative measures of fair-value discount rates
- Analysis of perc. CoE and CoC in separation
- Splitting sample on characteristics and time
- U.S. versus global

The Market-Based Cost of Capital (MCC)

Niels Joachim Gormsen, Kilian Huber, and Theis Jensen

Measuring the Market-Based Cost of Capital

Challenge

- The market-based discount rate $E_t^{O}[r]$ is **unobserved**
- Requires AP methods to estimate, but existing methods often
  - Focus on short-term returns
  - Produce biased out-of-sample estimates
- Notable exceptions: Hommel et al. (2025) and Cohen et al. (2009)

The MCC

- New method for calculating firm-level cost of equity (long-run expected returns)
- Key feature: unbiased estimates of 10-year returns

The Market-Based Cost of Equity

Starting from PV identity

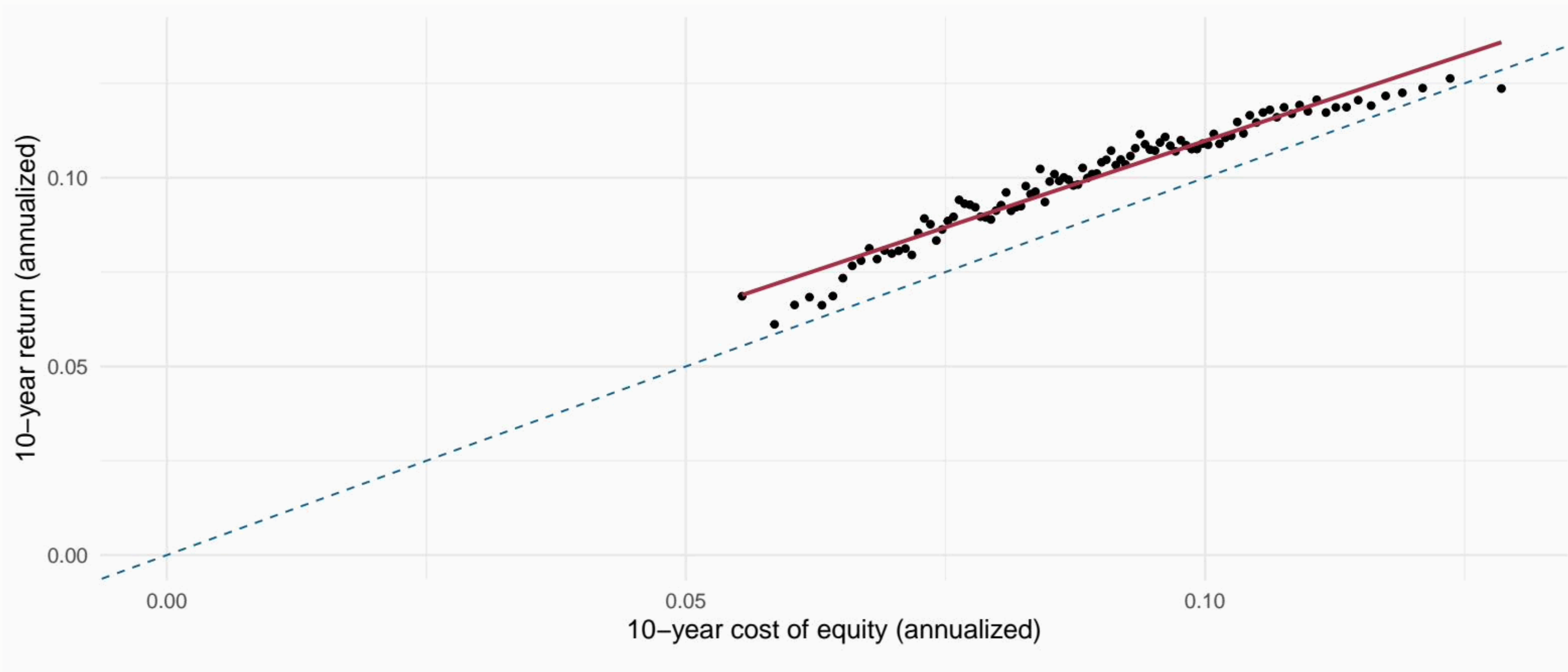
$$P_t^j = \sum_{h=1}^{10} \frac{\mathbb{E}_t\left[CF_{t+h}^j\right]}{(1+r_E)^h} + \frac{\mathbb{E}_t\left[CF_{t+10}^j\right](1+g)}{r_E - g} \cdot \frac{1}{(1+r_E)^{10}}$$

Approach

- Forecast cash flows $\mathbb{E}_t[CF_{t+1}], \ldots, \mathbb{E}_t[CF_{t+10}]$ using machine learning
- Decision tree based on Light GBM (gradient boosted decision tree ensemble)
- Specify $\boldsymbol{g}$ as country-specific five-year forward real growth forecast from the IMF
- Solve for r^E based on observed price

The Market-Based Cost of Equity Vs. Realized Returns

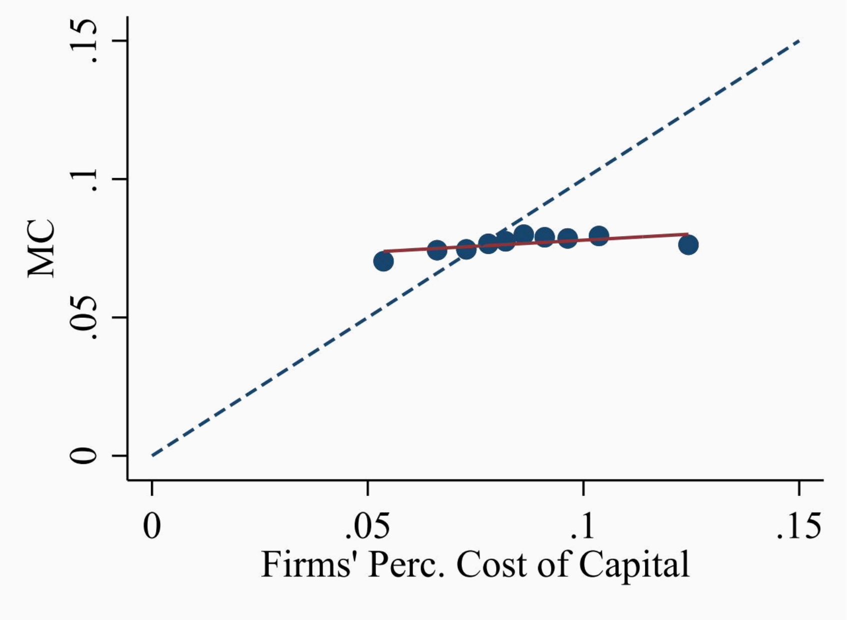
Returns to 100 portfolios sorted on MCC (global sample, 1990–2024)



Gormsen, Huber, and Jensen (2026)

Excess Dispersion Relative to MCC

MCC for 10 portfolios sorted on PCoC (global sample, 2002–2024)



Takeaways:

- No relation between r^{MCC} and $r^{\text{perc.}}$

Alternatives to MCC

1. Implied cost of capital (ICC)
   - Worse estimates of cash flows $\rightarrow$ poor estimates of returns

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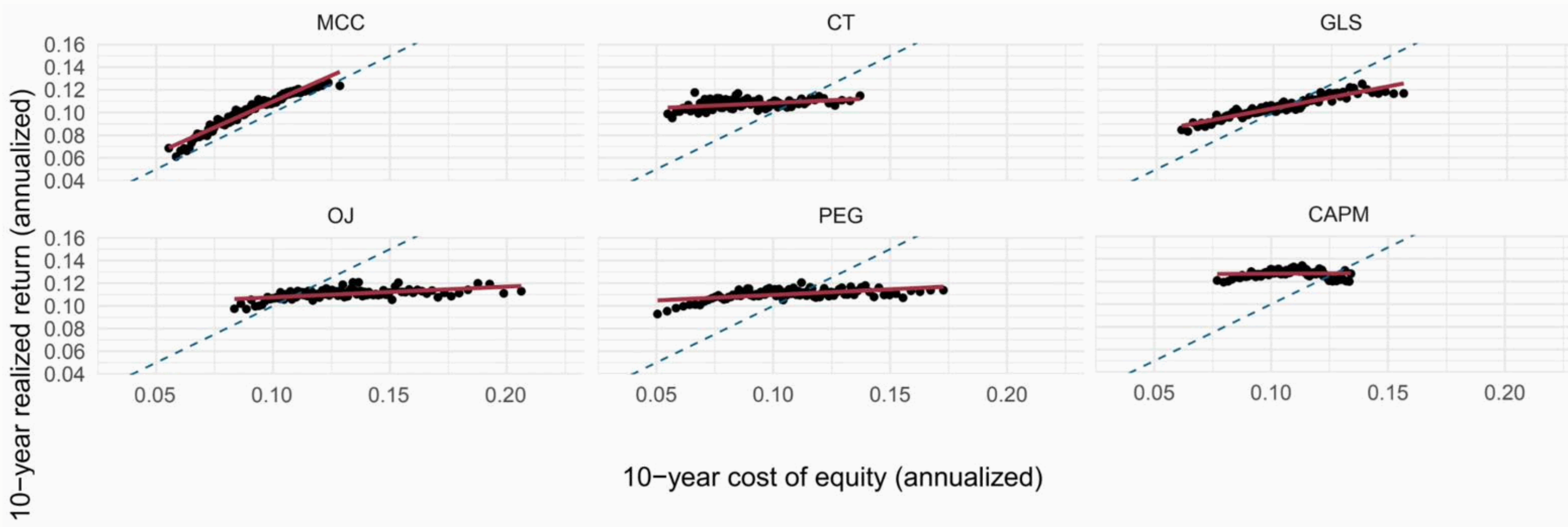
Results for different ICC methodologies (CT, OJ, GLS, PEG)



Alternatives to MCC

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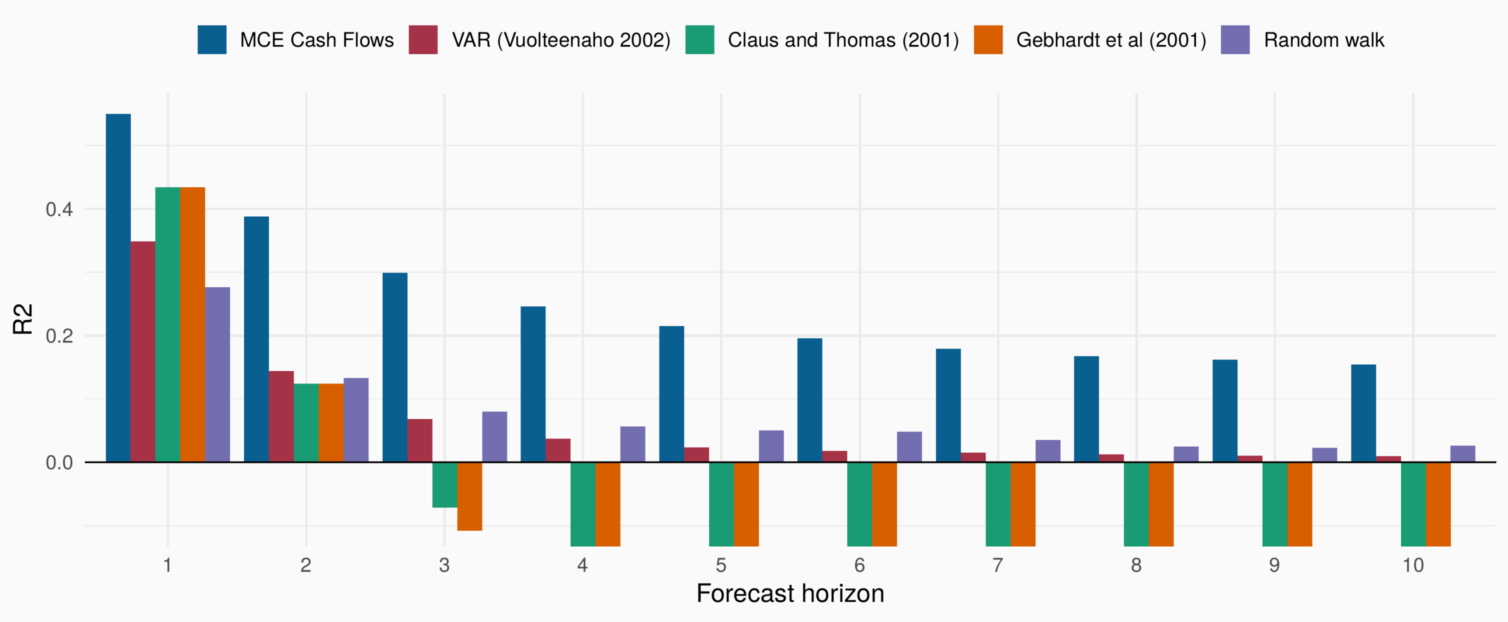
   - Worse estimates of cash flows → poor estimates of returns

Cash flow predictability for different methodologies



Alternatives to MCC

1. Implied cost of capital (ICC)
   - Worse estimates of cash flows $\rightarrow$ poor estimates of returns

2. Machine learning returns
   - Unstable model, biased estimates

Economic Consequences of $r^{\text{perc.}} \neq r^{\text{benchmark}}$

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In the data: $r^{\text{perc}} \propto$ investment, capital, and returns

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Consequences:

1. $r^{\text{perc.}} \neq r^{\text{market-based}}$ implies firms are not maximizing current market value
   - We document an “inverted-U” relation between market values and $r^{\text{perc.}} - r^{\text{market-based}}$

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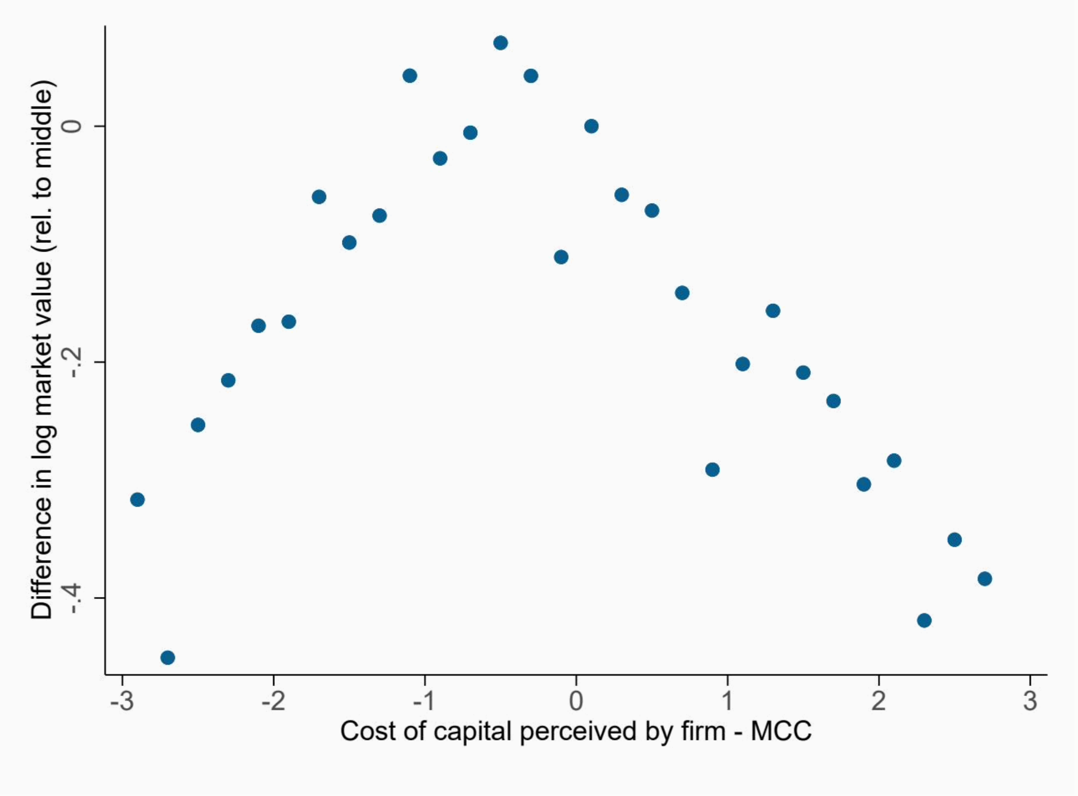
In the data: $r^{\text{perc}} \propto$ investment, capital, and returns

Consequences:

1. $r^{\text{perc.}} \neq r^{\text{market-based}}$ implies firms are not maximizing current market value
   - We document an "inverted-U" relation between market values and $r^{\text{perc.}} - r^{\text{market-based}}$
2. Capital is misallocated across firms
   - Standard misallocation model: observed excess dispersion lowers TFP by 5%

The Inverted U

Market value for firms with different $r^{\text{perc.}} - r^{\text{MCC}}$



The Inverted U

	(1)	(2)
	U.S.	Global
$\left\|r^{\text{perc.}} - r^{\text{MCC}}\right\|$	−0.083∗∗∗	−0.097∗∗∗
	(0.019)	(0.018)
Observations	3,120	5,226
Within R^2	0.0200	0.0278

- Firms for which $r^{\text{perc.}}$ is closer to r^{MCC} have higher market value
- “Too low” $r^{\text{perc.}}$: investment in negative NPV projects
- “Too high” $r^{\text{perc.}}$: too little investment, firm too small

Excess Dispersion and Misallocation

Standard models: $r^{\text{perc}} \neq r^{\text{market-based}} \Rightarrow$ capital misallocation $\Rightarrow$ TFP loss

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Benchmark of Hsieh and Klenow (2009):

$$\text{TFP loss} \;\propto\; \text{var}\big(\log(r^{\text{perc.}})\big) - \text{var}\big(\log(r^{\text{benchmark}})\big)$$

Impact of excess dispersion on TFP	
Using realized returns (baseline)	−5.36%
Using implied cost of capital	−5.02%
Using market-based CoC (MCC)	−5.8%

Implication:
(1) either $r^{\text{perc}} \neq r^{\text{market-based}}$ causes large welfare losses
(2) $r^{\text{perc}} \neq r^{\text{market-based}}$ efficient, standard models incomplete, firms do not max. market value

Firm Perceptions and Analyst Beliefs

A Third Benchmark: Analyst Beliefs

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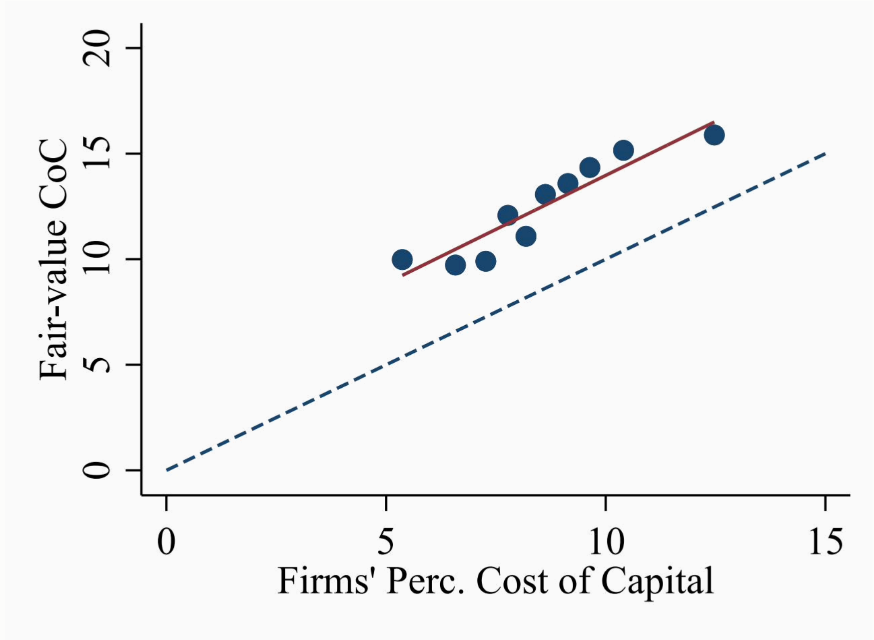
$$r^{\text{analyst}} = (1 - \omega)\, r^{\text{equity, analyst}} + \omega\, (1 - \tau)\, r^{\text{debt}}$$

A Third Benchmark: Analyst Beliefs

$$r^{\text{analyst}} = (1-\omega)\, r^{\text{equity, analyst}} + \omega\,(1-\tau)\, r^{\text{debt}}$$

r^{analyst} for 10 portfolios sorted on PCoC (global sample, 2002–2024)



A Third Benchmark: Analyst Beliefs

$$\mathrm{var}\left(r_{i,t}^{\text{perc.}}\right) = \underbrace{\mathrm{cov}\left(r_{i,t}^{\text{benchmark}}, r_{i,t}^{\text{perc.}}\right)}_{\text{Benchmark dispersion}} + \underbrace{\mathrm{cov}\left(v_{i,t}, r_{i,t}^{\text{perc.}}\right)}_{\text{Excess dispersion}}$$

	IBES expectations		Value Line expectations	
	$v_{i,t+1}^{\text{IBES}} = r_{i,t}^{\text{perc.}} - r_{i,t}^{\text{IBES}}$		$v_{i,t+1}^{\text{VL}} = r_{i,t}^{\text{perc.}} - r_{i,t}^{\text{VL}}$	
	(1)	(2)	(3)	(4)
$r_{i,t}^{\text{perc.}}$	−0.13	−0.0034	0.016	0.17
	(0.19)	(0.19)	(0.15)	(0.18)
Observations	2,434	2,434	961	961
Quarter-year FE	No	Yes	No	Yes
P(slope = 1)	0	0	0	0
R^2	0.13	0.25	0.000016	0.26

No excess dispersion relative to analyst beliefs

Conclusions

New data on perc. CoC reveal

1. $r^{\text{perc}} \neq r^{\text{market-based}}$
   $\rightarrow$ inconsistent with firms maximizing *current* market value

2. r^{perc} closer to $r^{\text{fair-value}}$
   $\rightarrow$ consistent with firms partly maximizing fair (intrinsic) value

Economic consequences

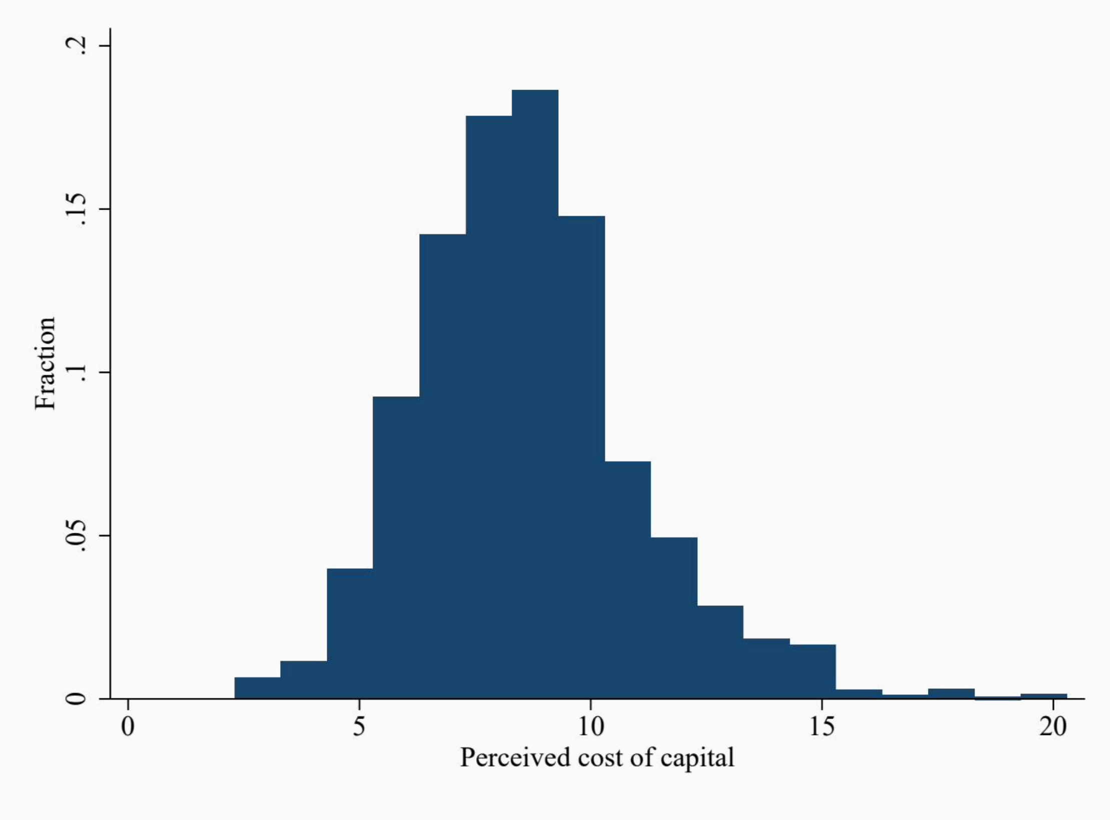
1. Our new MCC measure can be used by firms to increase market value
   $\rightarrow$ Firms with $r^{\text{perc.}}$ closer to r^{MCC} have higher market value

2. The excess dispersion in $r^{\text{perc.}}$ distorts allocation of capital
   $\rightarrow$ Simple model suggests TFP 5% lower than market-based benchmark

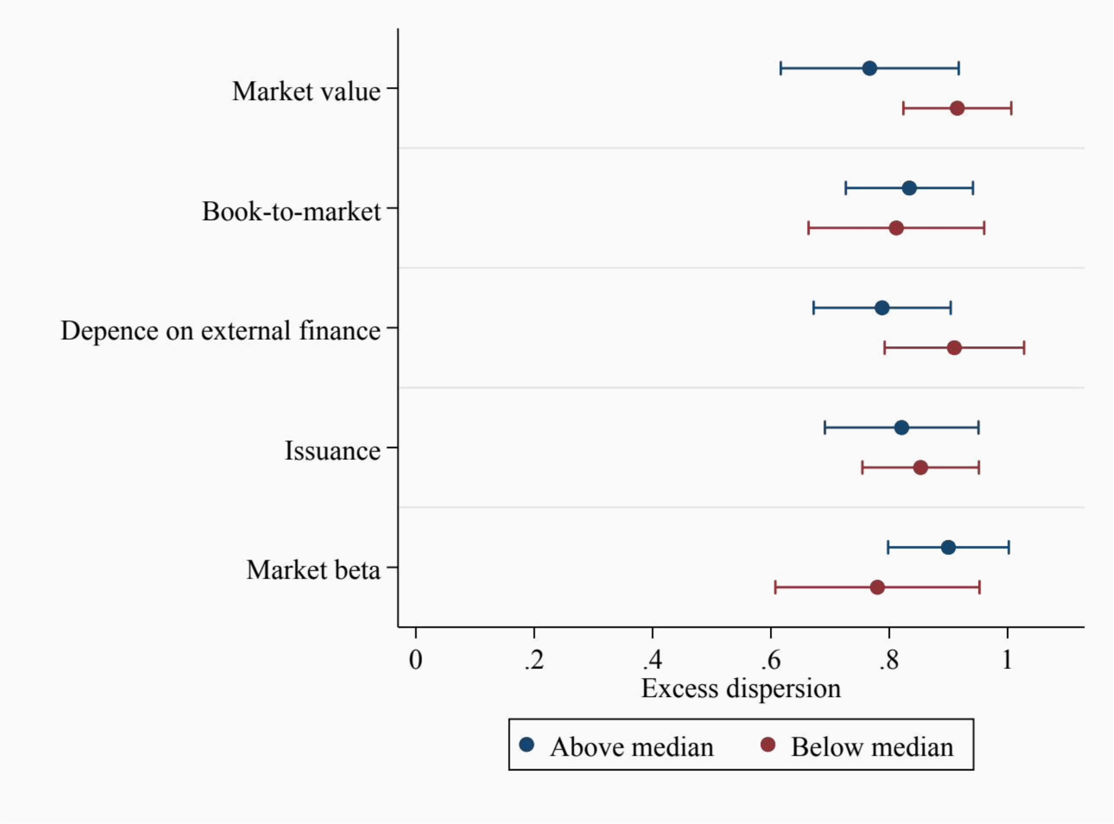
More on costofcapital.org

Thank You!

Summary Statistics



Heterogeneity in Excess Dispersion



APPENDIX

Excess Dispersion and Misallocation

Perceived cost of capital shapes *long-run* allocation of capital

Standard models: deviations from true CoC lead to misallocation of capital

We quantify this effect in the Hsieh and Klenow (2009) model

- In this model, excess dispersion maps directly to TFP loss

APPENDIX

Model

Three layers of production:

1. Representative firm produces output good by combining sector output (Y_s) with sector share θ

$$Y = \prod_{s=1}^{S} Y_s^{\theta_s}$$

2. Sector output is a CES aggregate of firm-level output within sector

$$Y_s = \left(\sum_{i=1}^{M_s} Y_{si}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

3. Firms produce using Cobb-Douglas

$$Y = A K^{\alpha_s} L^{1-\alpha_s}$$

Solution: Misallocation from Excess Dispersion

Solution

- TFP loss from misallocation:

$$\log(\mathrm{TFP}) - \log\left(\mathrm{TFP}^{\tau=0}\right) =$$

- $\log\left(\mathrm{TFP}^{\tau=0}\right)$ is TFP if $\tau_i = 0 \; \forall \; i$

Solution: Misallocation from Excess Dispersion

Solution

- TFP loss from misallocation:

$$\log(\mathrm{TFP}) - \log\left(\mathrm{TFP}^{\tau=0}\right) = -\frac{\sigma}{2} \underbrace{\mathrm{var}\left(\log(1+\tau_i)\right)}_{\text{excess dispersion}}$$

- $\log\left(\mathrm{TFP}^{\tau=0}\right)$ is TFP if $\tau_i = 0 \ \forall \ i$

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Results

- Calibrate $\sigma = 4$ in baseline (evidence suggests 3 to 10)

Solution: Misallocation from Excess Dispersion

Solution

- TFP loss from misallocation:

$$\log(\text{TFP}) - \log\left(\text{TFP}^{\tau=0}\right) = -\frac{\sigma}{2} \underbrace{\text{var}\left(\log(1+\tau_i)\right)}_{\text{excess dispersion}}$$

Results

- Calibrate $\sigma = 4$ in baseline (evidence suggests 3 to 10)

Impact of excess dispersion on TFP	
Using realized returns (baseline)	−5.36%
Using implied cost of capital	−5.02%
Low elasticity ($\sigma = 3$)	−4.02%
High elasticity ($\sigma = 5$)	−6.70%

APPENDIX

Free Cash Flow to Equity

$$fcfe_t = e_t + (d\&a_t - capx_t) - \Delta nwc_t + \Delta debt_t$$

where:

- e_t = net income
- $d\&a_t$ = depreciation and amortization
- $capx_t$ = capital expenditures
- Δnwc_t = change in net operating working capital
- $\Delta debt_t$ = net debt issuance

Plug into the present value identity and solve for r^E (the MCE):

$$p_t = \sum_{h=1}^{10} \frac{\mathbb{E}_t[fcfe_{t+h}]}{(1+r_t^E)^h} + \frac{\mathbb{E}_t[fcfe_{t+10}](1+g_t)}{r_t^E - g_t} \frac{1}{(1+r_t^E)^{10}}$$