Corporate Discount Rates

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Introduction

Stylized view

- Firms' required returns on investment, known as **discount rates**, determined by cost of capital (COC)
- Financial shocks directly impact investment

Today

- Measure time-varying wedges btw. discount rates and COC
- Wedges affect investment
- Growing wedges account for US "missing investment" 2002-19

Framework

Textbook approach to investment

1. Unconstrained firms invest in projects for which

$$\text{expected return} > \delta,$$

   where δ = discount rate (required return)

2. To max. firm value, δ should be the "cost of capital" i
   - No risk: i = risk-free interest rate
   - With risk: i = weighted cost of debt and equity (Modigliani and Miller 1958)

Textbook approach leads to a stylized view

- $i = \delta$
- Shocks to fin. prices directly affect investment
- Standard assumption in economics and finance

Framework

Stylized view: $i = \delta$

Challenges to stylized view

1. i unobserved and difficult to estimate (Fama and French 1997):

$$i^{\text{perceived}} = i + \upsilon$$

2. Managers may incorporate other factors into δ due to frictions:

$$\delta = i^{\text{perceived}} + \kappa$$

Examples of frictions (not focus of this paper):

- Avoid empire building (Jensen 1986)
- Prevent internal power struggles (Rajan et al. 2000; Graham 2022)
- Financial and org. constraints (Poterba and Summers 1995; Jagannathan et al. 2016)

Any relation btw. Δi and $\Delta\delta$?

Data from Corporate Conference Calls

Example Nasdaq 100 and S&P 500 firm Intuit, Q1-2014:

"We continued to take a disciplined approach to capital management, investing in opportunities that yield 15%-plus. Our weighted average cost of capital is about 9 or 9.5%. Our IRR hurdle is a 15% rate of return."

- Perceived cost of capital: **9.25%**
- Discount rate: **15%**
- In practical usage, hurdle = minimum required IRR = discount rate (Jagannathan et al. 2016)

High bar on terminology

- Focus on non-hypothetical investment rules
- Discount rate: explicit minimum IRR on potential investment
- COC: internal estimate of firm's WACC

Constructing the Dataset

Approach

- Manual entry from call transcripts (Hassan et al. 2019)
- Read 110k paragraphs containing a keyword (sample still growing)

2,500 listed firms, 20 countries

- E.g., AT&T, Disney, Exxon, Home Depot, Intel, Nestle, Novartis
- Firms included once cover 50% of Compustat assets
- Firms with multiple discount rates cover 15%
- Firms and timing representative, except larger firms
- Predicted data under costofcapital.org

Verifiable data

- Calls are repeated and high-stakes
- Used in security lawsuits (Rogers et al. 2011)
- Discount rates predict investment
- Key novelty: can test within-firm changes
- Levels can be high depending on excluded overhead costs (see paper)

Firms Included in the Sample

No selection based on many observables

Skewed toward large firms

- $\sim$ 3% unconditional probability of being in sample
- $\sim$ 50% probability of inclusion for top 100 firms

Characteristics of included firms in cross-sectional percentiles

	Discount rates			Perceived cost of capital		
	mean	min	max	mean	min	max
Market value	83.1	3.0	100.0	79.4	8.5	100.0
Return on equity	59.8	0.8	100.0	58.3	0.2	100.0
Book-to-market	49.4	0.2	100.0	47.3	0.2	100.0
Investment rate	53.6	0.3	100.0	54.0	1.4	100.0
Physical capital to assets	59.0	2.2	100.0	59.7	2.4	100.0
Z-score (bankruptcy risk)	47.6	0.8	99.0	48.8	2.3	99.0
Financial constraints	20.5	0.0	100.0	23.0	0.0	90.7
Leverage	60.4	1.2	100.0	59.3	0.5	100.0

Average percentile relative to all firms in Compustat in same year and country

Within-Firm Timing of Inclusion

Little evidence that firms experience unusual shocks when included

	Discount rate included		Perc. COC included	
Z-score (bankruptcy risk)	0.00081		0.00047	
	(0.0018)		(0.0015)	
Return on equity		0.00096		0.0011
		(0.0013)		(0.0012)
Book-to-market		0.00046		0.0013
		(0.0018)		(0.0014)
Investment rate		-0.0016		0.00043
		(0.0012)		(0.0011)
Financial constraints		0.0016		0.0037
		(0.0027)		(0.0039)
Leverage		-0.00091		0.00066
		(0.0023)		(0.0020)
Observations	228,501	235,329	228,501	235,329
FE	Firm/year	Firm/year	Firm/year	Firm/year
Within R^2	2.6e-06	0.000020	9.1e-07	0.000036

Regressors in percentile ranks relative to all firms in Compustat in same year and country

Discount Rate Changes Predict Investment

	Net investment rate			
Discount rate	-0.93***	-0.91***		-0.79***
	(0.28)	(0.27)		(0.30)
Discount rate wedge			-0.91***	
			(0.26)	
Perceived COC (predicted)			-0.70	1.48
			(1.02)	(1.56)
Financial WACC (firm level)				-0.70
				(1.01)
Tobin's Q				0.26*
				(0.11)
Observations	1,634	1,634	1,634	1,634
FE	Firm	Firm/year	Firm/year	Firm/year

Standard Q-model (Philippon 2009): slope = -1

$\Rightarrow$ Measured discount rates capture investment demand

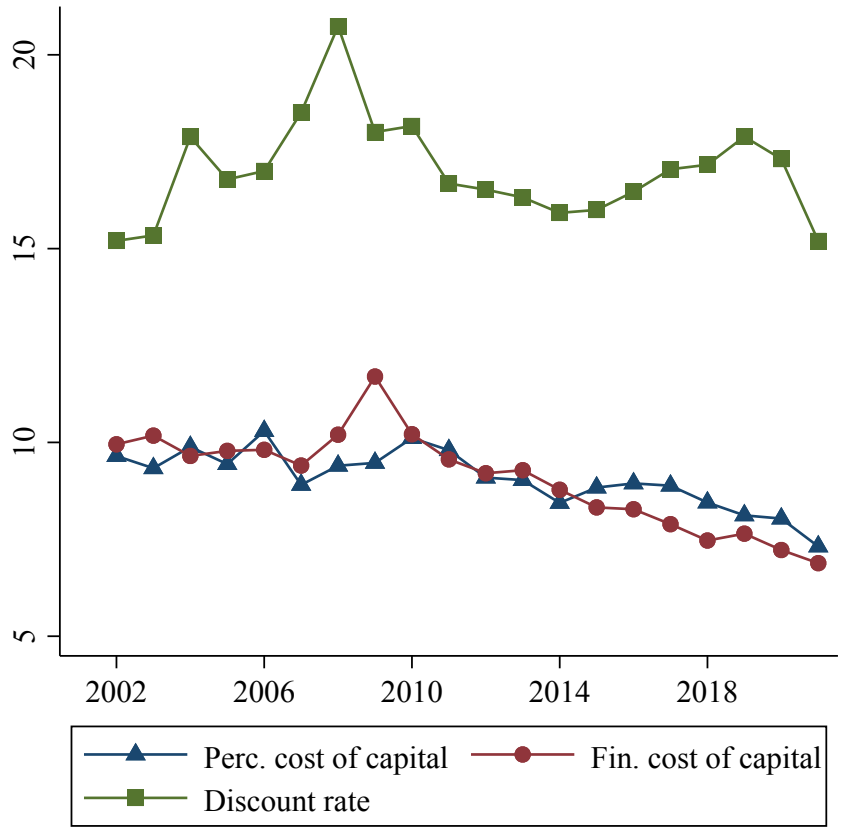
Discount Rates Predict Higher Realized Returns

	(1) Rlzd. return	(2) Rlzd. return
Discount rate	1.27***	1.21***
	(0.22)	(0.20)
Observations	211	211
FE	Country	Country/quarter/type
Within R^2	0.25	0.23

Discount rates associated with realized returns on projects

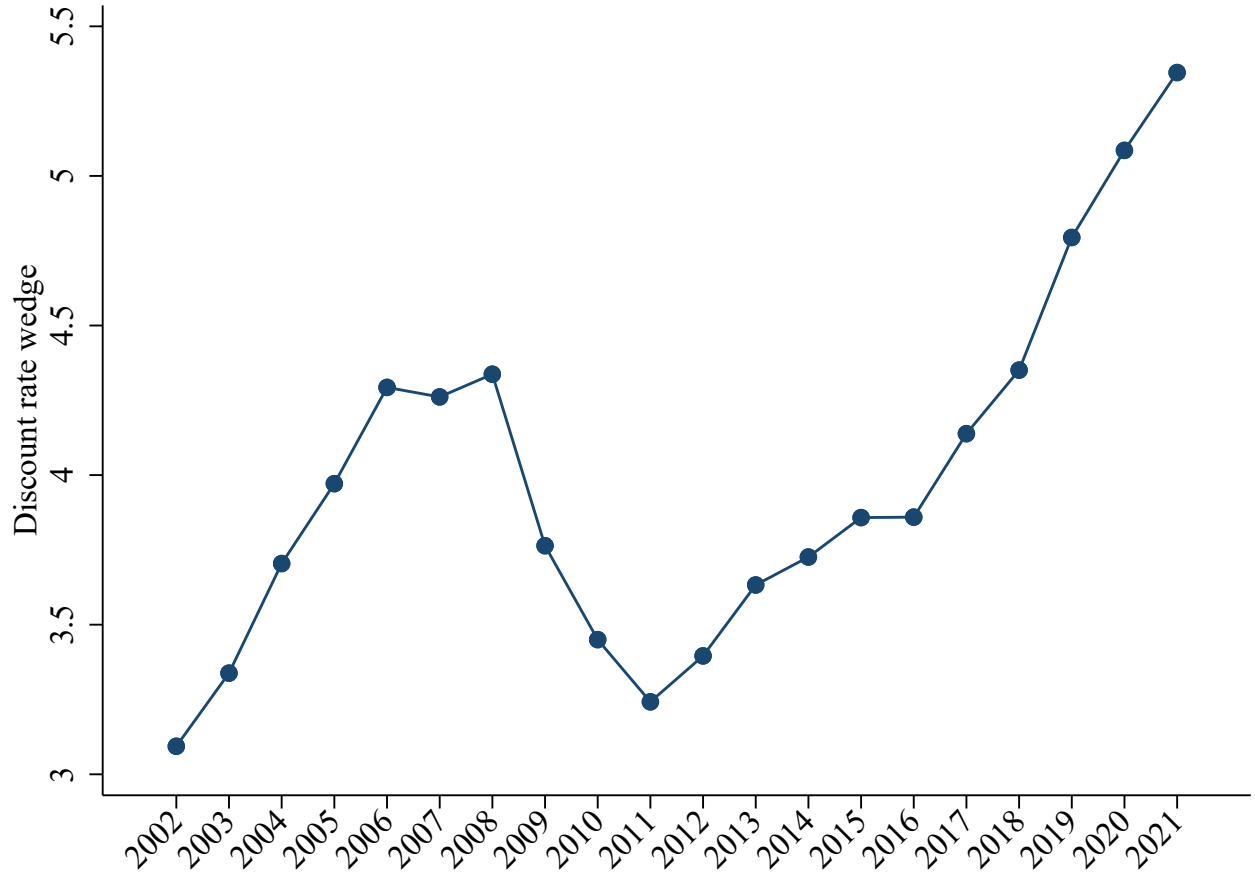
$\Rightarrow$ Measured discount rates capture required returns

Raw Averages for US Firms



- Perc. COC tracks financial rates over time (aside: not in cross-section)
- Discount rates have "life of their own"

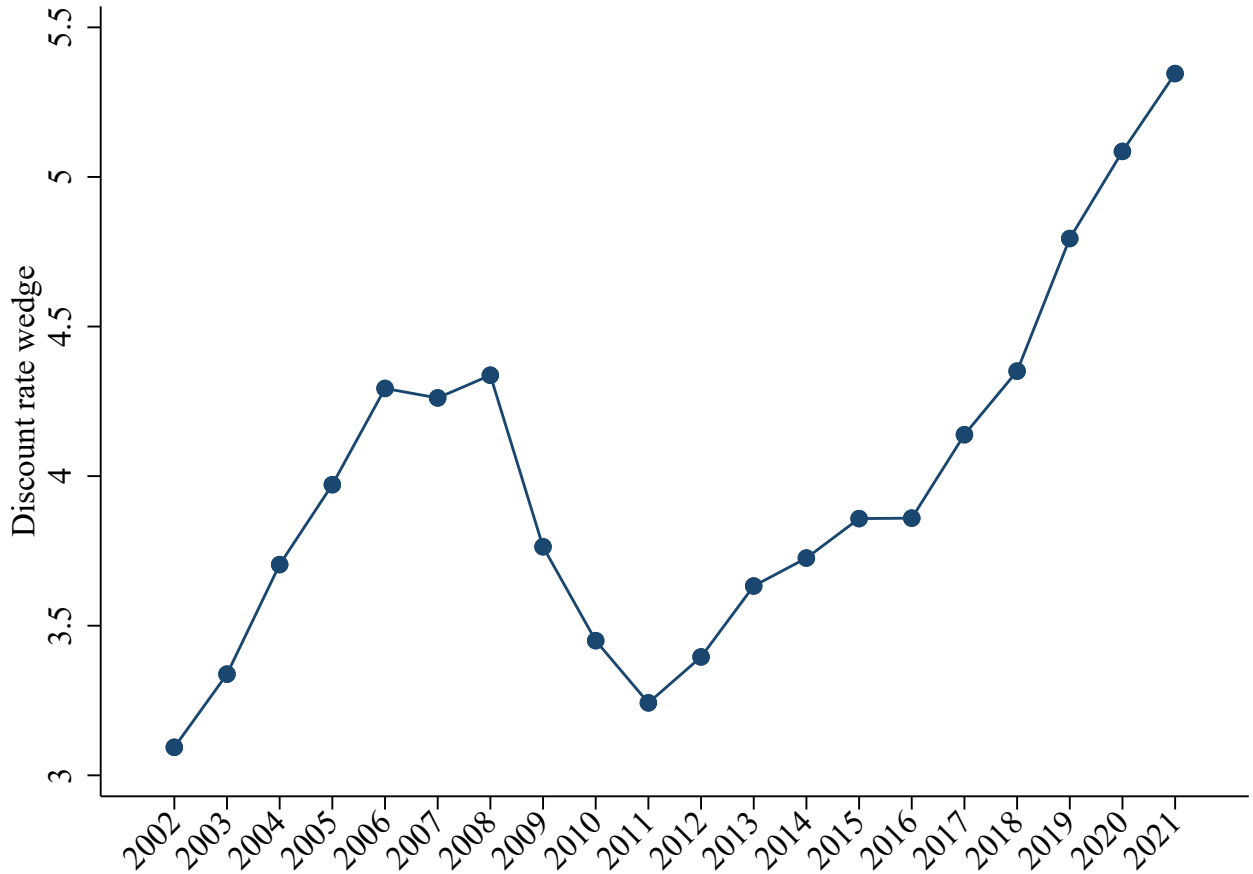
Discount Rate Wedge in the US



Time variation in κ

- Estimate avg. annual discount rate and cost of capital using firm FE
- Figure plots difference = avg. within-firm κ

Discount Rate Wedge in the US

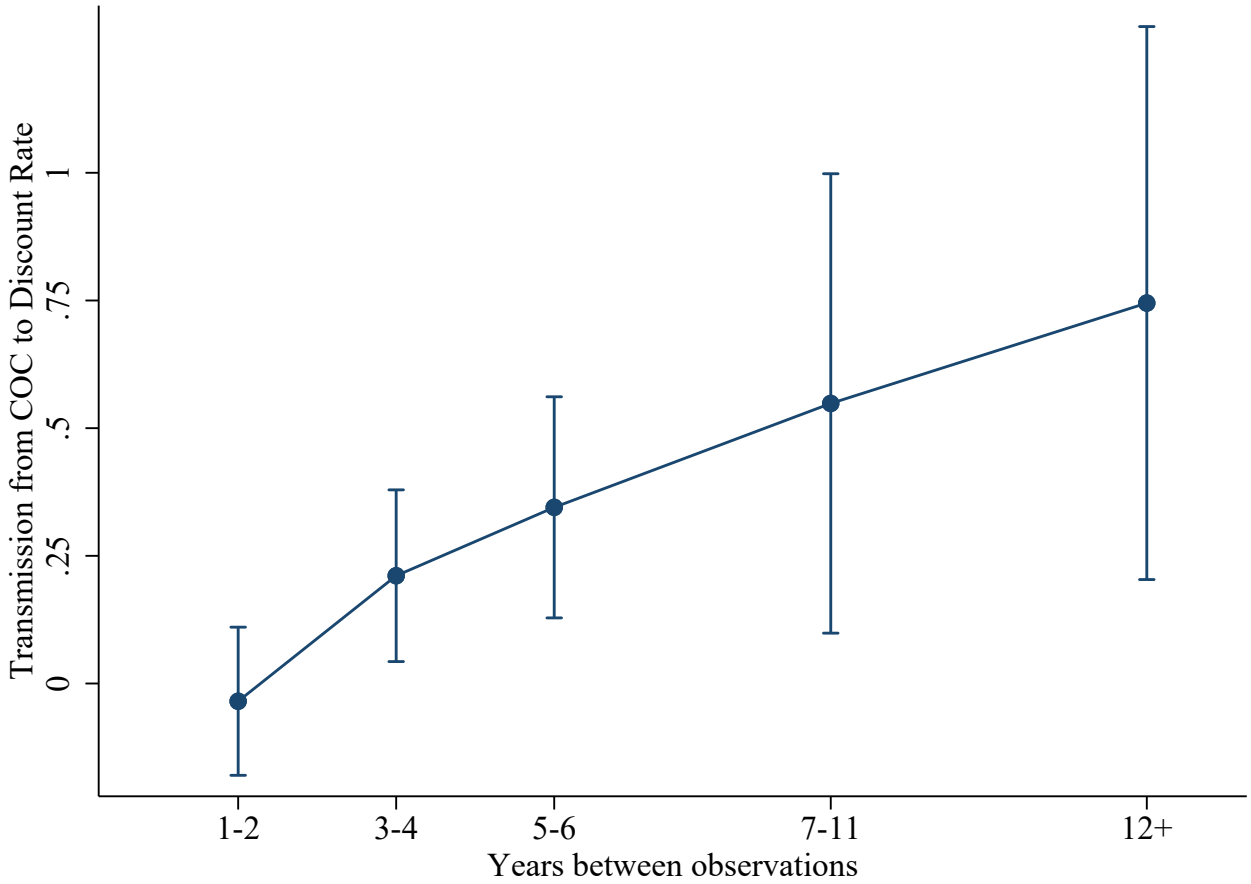


Large magnitude of $\Delta\kappa$

- QE $\Downarrow$ firm bond yields by 0-0.5 ppt (Krishnamurthy and Vissing-Jørgensen 2011)
- Natural real rate $\Downarrow$ by 1 ppt since 2002 (Bauer and Rudebusch 2020)

Slow Incorporation Over Time

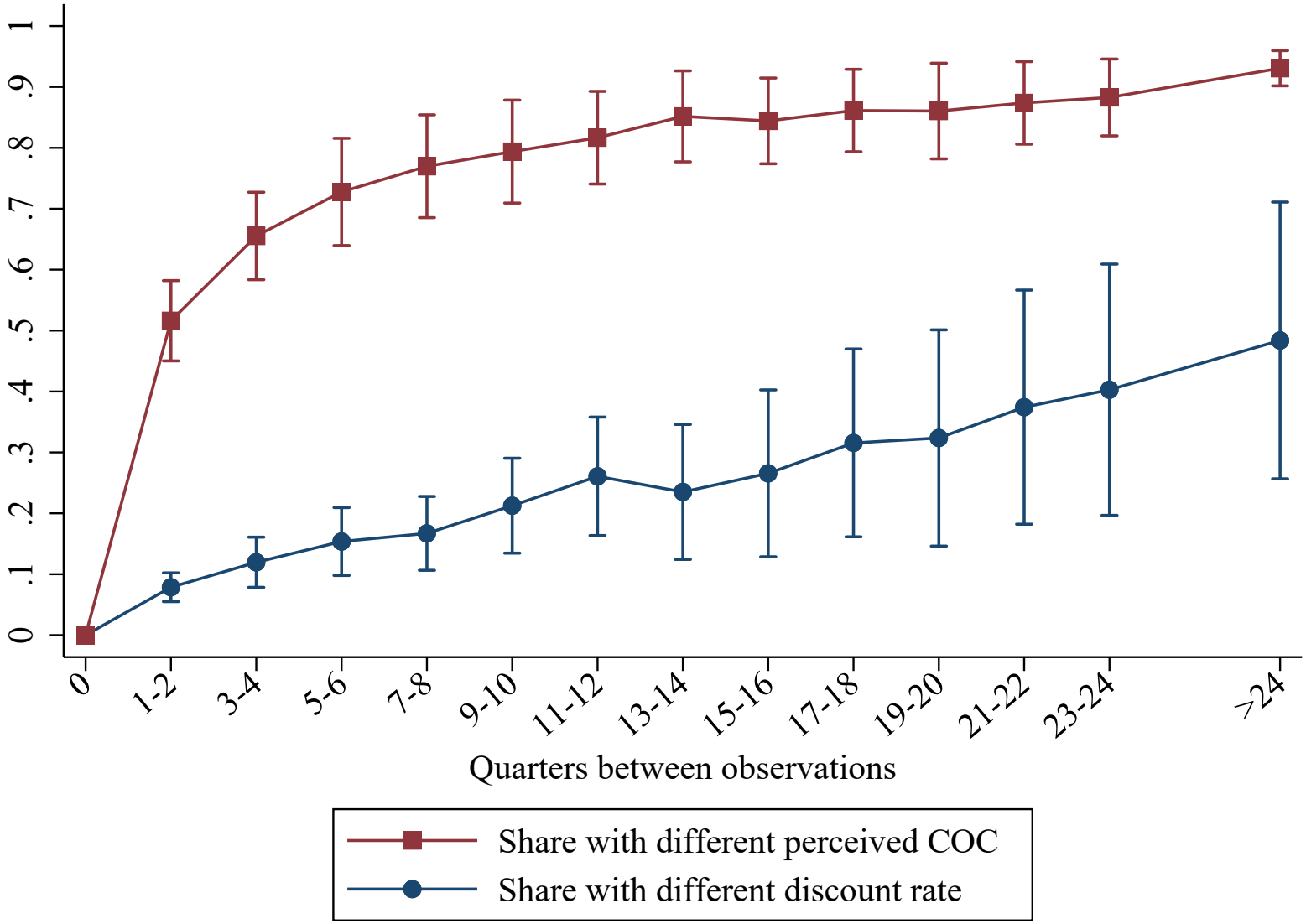
Discount rates incorporate COC only in the long run



Analysis requires within-firm data, previous surveys inconclusive (e.g., Poterba and Summers 1995; Meier and Tarhan 2007; Sharpe and Suarez 2021; Graham 2022)

Discount Rate Changes Are Rare

<5% of firms change discount rate in first quarters



Discount Rate Dynamics Raise New Questions

1. **Secular distortions?**
   Discount rate wedges fluctuate and account for US "missing investment" puzzle (**this paper**)

2. **Macro policy?**
   Conventional monetary policy weak, but demand shocks and exp. inflation powerful (Fukui et al. 2025)

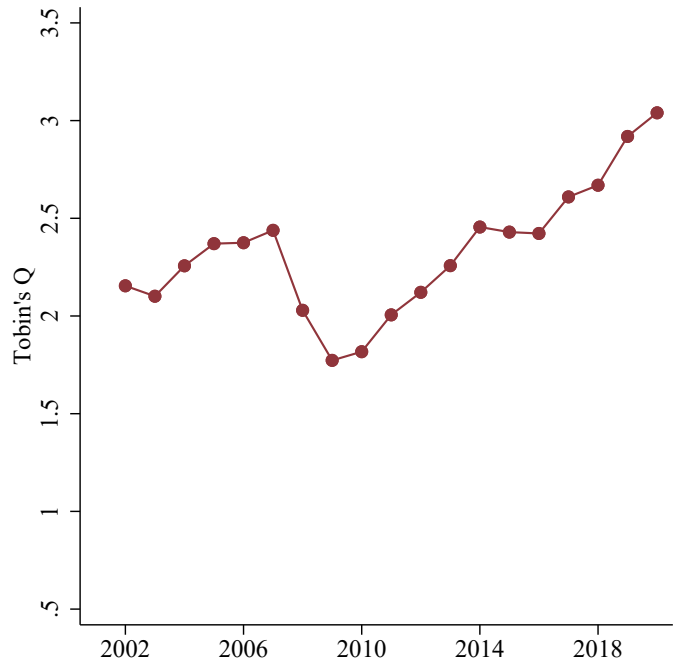
3. **Micro foundations?**
   Organizational, behavioral, or financing frictions (Barry et al. 2024; Best et al. 2024; Caramp et al. 2024; Jeenas 2024; Wroblewski 2024; Fukui et al. 2025)

4. **Long run capital allocation?**
   Depends on perc. CoC, so want to understand its drivers (Gormsen and Huber 2025)

"Missing Investment"

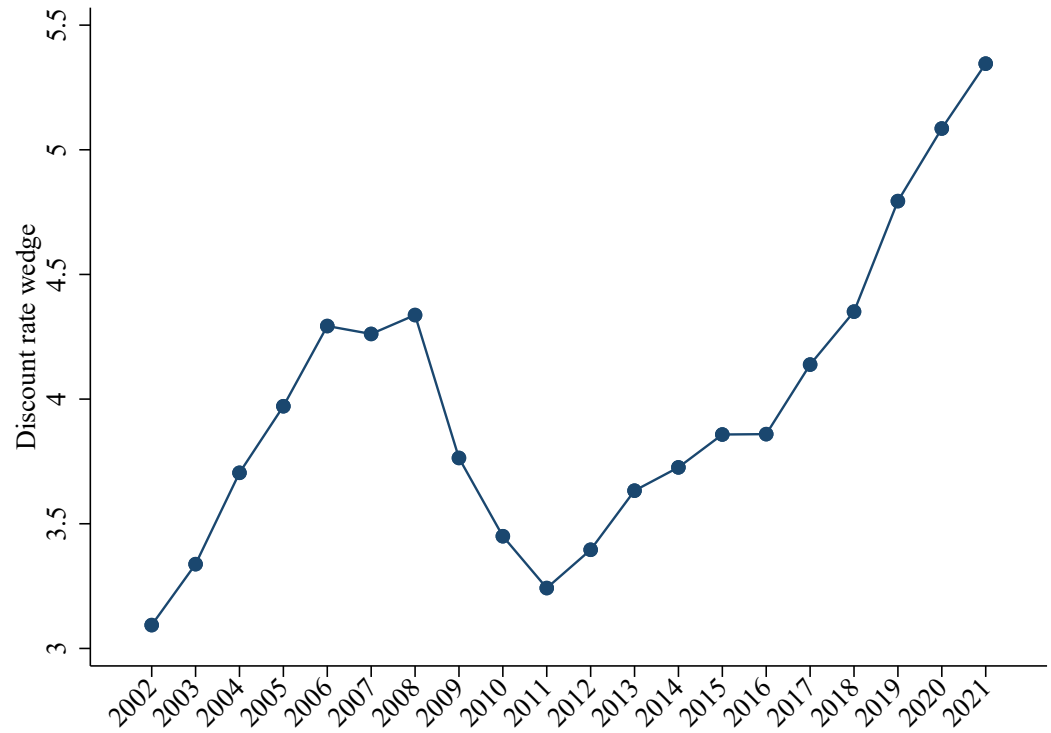
US investment since 2002 puzzling

- Exp. stock/bond returns, int. rates $\Downarrow \rightarrow$ COC $\Downarrow \rightarrow$ Tobin's Q $\Uparrow$
- Stylized theory: investment $\Uparrow$ with Tobin's Q
- Reality: low investment, even incl. intangibles (Crouzet et al. 2022)
- Q more decoupled from investment than in 90s (Gutiérrez and Philippon 2017)



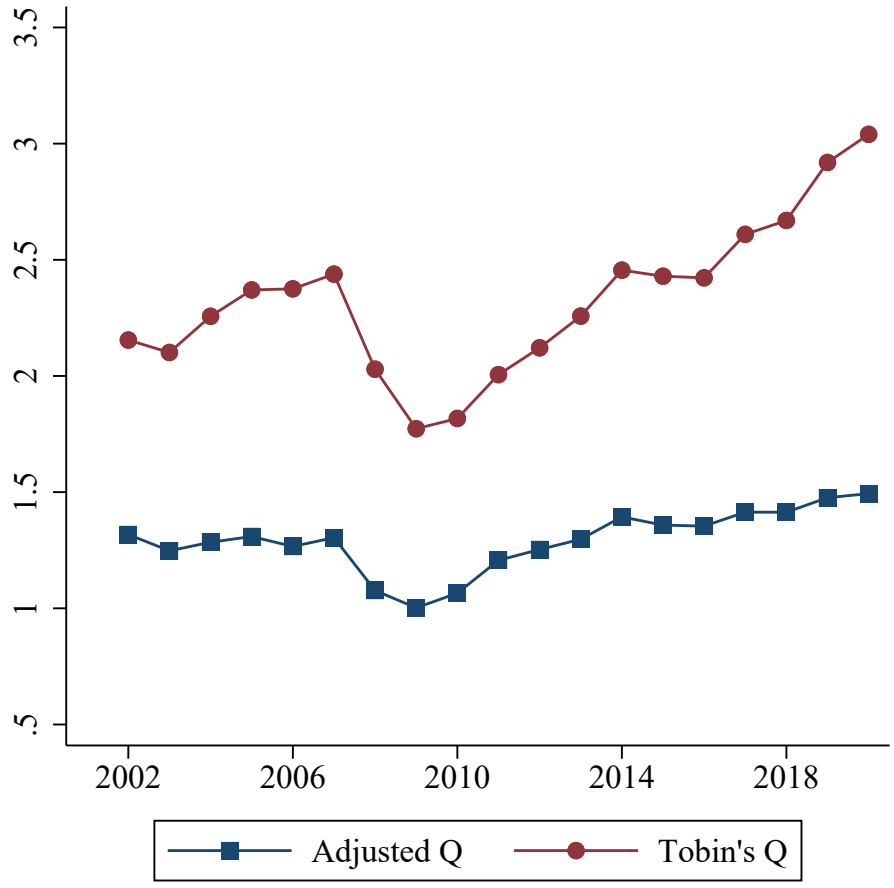
Measuring Adjusted Q

- Wedges imply that firms react less to falling CoC
- Define adjusted Q in theory, measure using κ
- Recall: large time variation in avg. κ



Measuring Adjusted Q

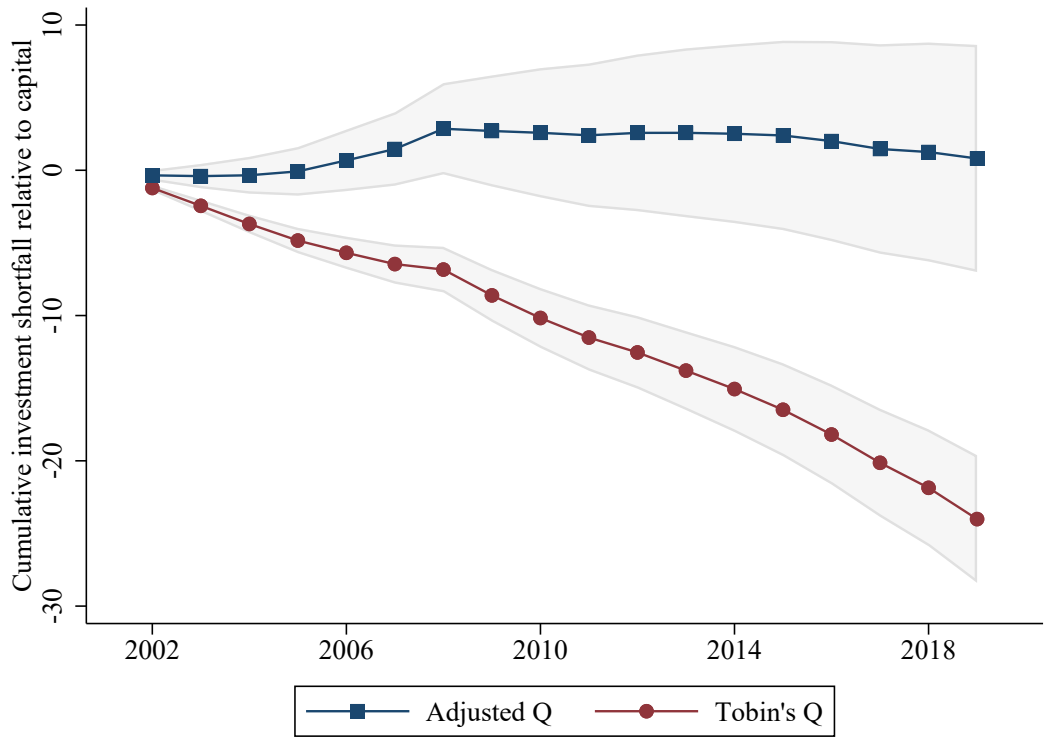
- Adjusted Q more consistent with level and dynamics of investment
- Wedges large enough to account for low investment
- Without relying on mismeasurement or low marginal returns



Adjusted Q Accounts for Low Investment

Method of Gutiérrez and Philippon (2017)

- Estimate relation btw. Tobin's Q and aggr. investment for 1990-2002
- Predict investment for 2002-2019
- Deviation from prediction is "missing investment," $>$ 20% of capital



Firm-Level Q and Wedges

Firms with increasing wedges contributed more to rising aggregate Q

	Tobin's Q	
Discount rate wedge κ	0.20***	
	(0.078)	
Discount rate and COC wedge $\kappa + \upsilon$		0.17***
		(0.058)
Observations	685	685
FE	Firm	Firm
Within R^2	0.015	0.012

Investment and the Financial COC

General lesson: wedges lower sensitivity of investment to COC

Standard Q-model (Philippon 2009): 1 ppt. rise in COC changes investment rate after 3 years by:

- 2 with zero discount rate wedge
- 0.25 with observed average wedge
- not 0

Consistent with micro evidence; standard models imply excessively high sensitivity (Koby and Wolf 2020)

Differs from adj. costs because sensitivity to cash flows remains high

Relevant for calibration of investment models (Caballero 1999)

Drivers of Stable Discount Rates

1) Complexity
   - Simplifying device to avoid internal power struggles (Rajan et al. 2000; Graham 2022)
   - 59% of managers believe that wedges "add value"

2) Prudence
   - Prevent managerial empire building (Jensen 1986)
   - Easier for high-markup firms (less scrutiny, less elastic demand)

3) Risk and real options
   - When investment is irreversible and risky, investment is postponed (Abel and Eberly 1996, McDonald 2000, Bloom 2009)
   - High wedges approximate optimal timing

4) Constraints
   - Firms cannot take on all projects due to financial or managerial constraints (Jagannathan et al. 2016)

Conclusion

1. Panel of perceived COC, discount rates, and investment
2. Weak short-run, strong long-run incorporation of CoC into discount rates
3. Greater wedges accounts for US “missing investment”
4. Wedges may be driven by organizational and financial frictions

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