Online Appendix to
"Corporate Discount Rates"

Appendix A Figures and Tables

Figure A1
Non-Zero Changes in Discount Rates and the Perceived Cost of Capital

Panel A plots a histogram of the difference between a firm's discount rate in a given quarter and the firm's first observed discount rate. The plotted difference is in percentage points and annualized (i.e., normalized by the years between the quarter of observation and the quarter of the first observation). The sample includes only observations with non-zero changes (i.e., observations where the firm's discount rate in the given quarter differs from the first observed discount rate). The sample runs from 2002 to 2021. The left-most bar combines all changes below -4 percentage points. The right-most bar combines all observations greater than 4 percentage points. Panel B plots the corresponding histogram for the perceived cost of capital.

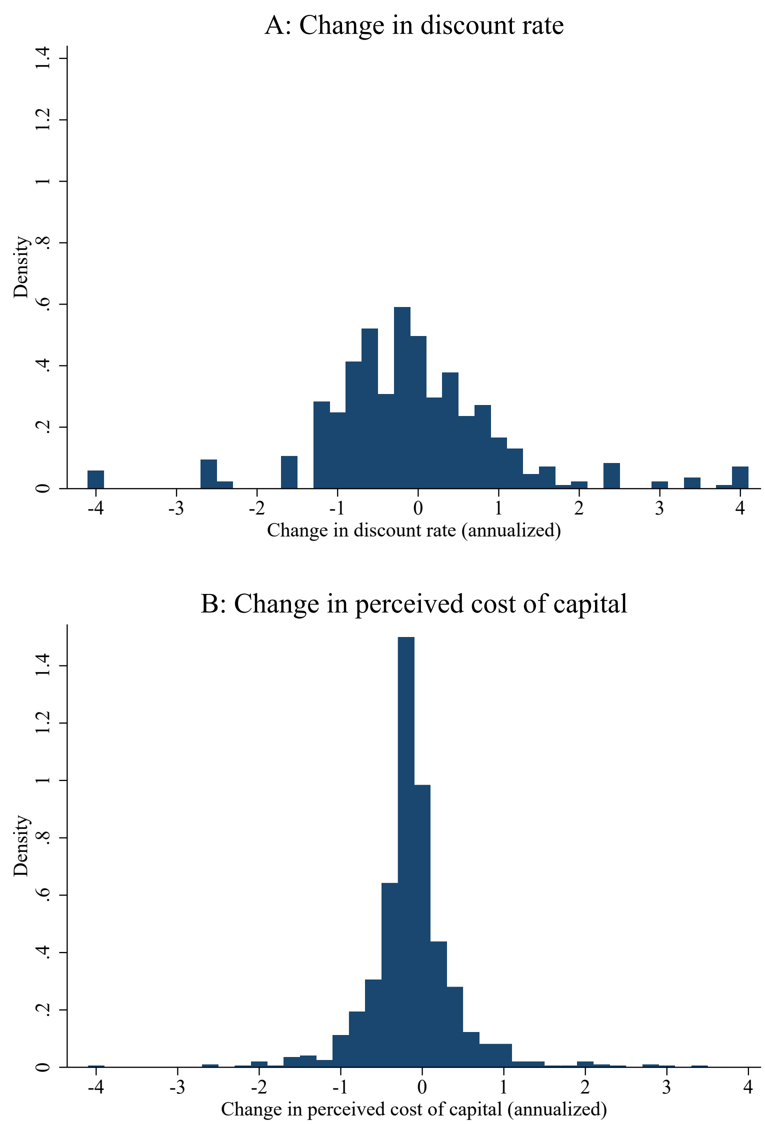

Figure A2
Tobin's Q, Adjusted Q, and Net Investment

The figure plots Tobin's Q and adjusted Q along with the net investment rate. The construction of adjusted Q is described in the text. The net investment rate is from the BEA and in percent of the capital stock at the start of the year. The sample runs from 1990 to 2021.

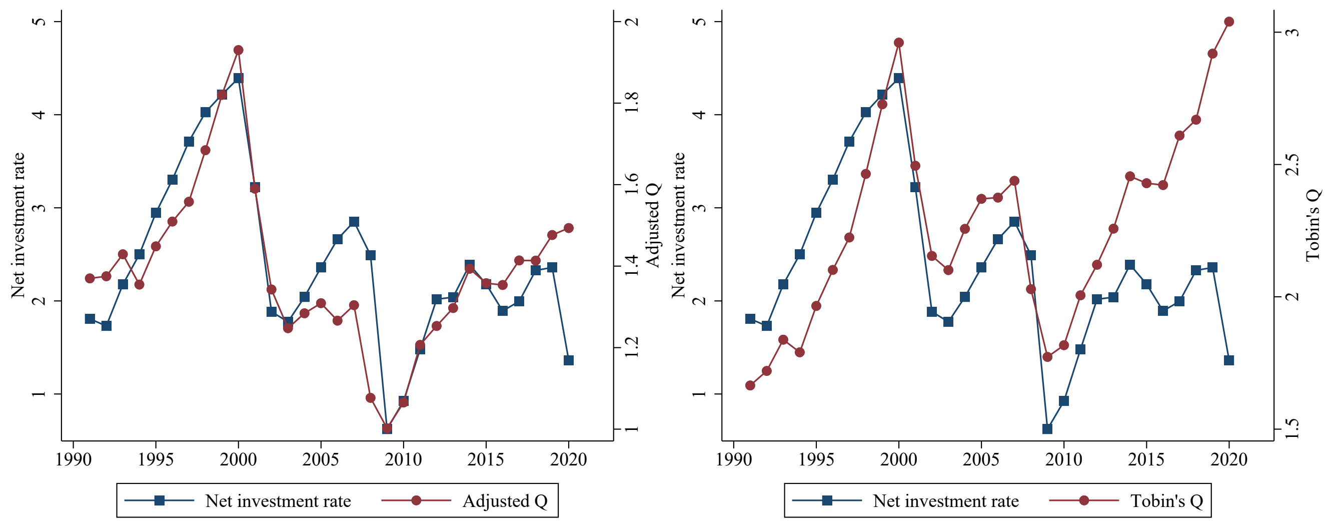

Table A1
Asset Expansion and Corporate Discount Rates

The table reports results of panel regressions of firm-level asset expansion, measured using Compustat as $\text{Assets}^i_{t+1}/\text{Assets}^i_t$, on discount rates. Right-hand side variables are measured at time t. The financial COC is the CAPM-based firm-level financial cost of capital. Tobin's Q is the market-to-book value of debt and equity. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm. The left- and right-hand side variables are measured in percent, except the wedges are in percentage points. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)
Discount rate	-0.81***	-0.89***			-0.84**
	(0.27)	(0.29)			(0.40)
Discount rate wedge $\tilde{\kappa}$			-0.82***		
			(0.30)		
Discount rate and COC wedge $\tilde{\kappa} + \upsilon$				-0.89***	
				(0.29)	
Perceived COC (predicted)			-3.53***		-4.04**
			(1.14)		(2.00)
Fin. COC (firm level)				-1.59*	1.36
				(0.81)	(1.23)
Tobin's Q					1.46***
					(0.34)
Observations	1,668	1,668	1,668	1,668	1,305
FE	Firm	Firm/year	Firm/year	Firm/year	Firm/year
R^2	0.61	0.64	0.65	0.65	0.68
Within R^2	0.0072	0.0088	0.016	0.0099	0.053

Table A2
Investment Including Intangibles and Corporate Discount Rates

The table reports regressions of firm-level net investment rates (in tangible and intangible capital) on discount rates. We measure investment in intangible capital as R&D expenditures plus adjusted Selling and General Administrative expenses, as described in Eisfeldt and Papanikolaou (2014). We measure investment in tangible capital as in Table 5. Right-hand side variables are measured at time t. The financial COC is the CAPM-based firm-level financial cost of capital. Tobin's Q is the market-to-book value of debt and equity. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm. The left- and right-hand side variables are measured in percent, except the wedges are in percentage points. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)
Discount rate	-0.28	-0.31**			-0.43***
	(0.17)	(0.12)			(0.14)
Discount rate wedge $\tilde{\kappa}$			-0.30**		
			(0.12)		
Discount rate and COC wedge $\tilde{\kappa} + \upsilon$				-0.31***	
				(0.12)	
Perceived COC (predicted)			-0.71**		0.089
			(0.31)		(0.49)
Fin. COC (firm level)				-0.75***	-0.48
				(0.21)	(0.35)
Tobin's Q					0.17**
					(0.070)
Observations	1,279	1,279	1,279	1,279	1,138
FE	Firm	Firm/year	Firm/year	Firm/year	Firm/year
R^2	0.91	0.92	0.92	0.92	0.93
Within R^2	0.033	0.041	0.047	0.058	0.079

Table A3
Investment, Wedges, and Components of the Financial Cost of Capital

The table reports results of panel regressions of net investment rates on discount rates. Net investment of firm i is from Compustat and measured as $(\text{CAPEX}^i_{t+1} - \text{Depreciation}^i_{t+1})/\text{PPEN}^i_t$. Right-hand side variables are measured at time t. The discount rate and cost of capital wedge, $\tilde{\kappa} + \upsilon$, is the discount rate minus the CAPM-based financial cost of capital. The remaining regressors of interest are components of the financial cost of capital. The credit spread is the difference between the representative corporate bond yield and the risk-free rate in the country of firm i in quarter t. The risk-free rate is the yield on government debt in the country of listing of firm i in quarter t. We scale the credit spread and risk-free rate by the leverage of firm i, since firms with higher leverage are more exposed to movements in the bond yield and risk-free rate. The financial cost of equity is the CAPM-based financial cost of equity, scaled by 1 minus firm leverage. Tobin's Q is the market-to-book value of debt and equity. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm. The left- and right-hand side variables (apart from Tobin's Q) are measured in percent, except the wedges are in percentage points. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)
Discount rate and COC wedge $\tilde{\kappa} + \upsilon$	-0.76***	-0.86***	-0.96***
	(0.22)	(0.29)	(0.31)
Credit spread (scaled)	-0.95*		-1.00*
	(0.53)		(0.56)
Risk-free rate (scaled)	-1.53		-0.95
	(1.04)		(1.81)
Fin. cost of equity (scaled)		-0.43	0.11
		(0.77)	(0.73)
Tobin's Q			1.43***
			(0.46)
ROE			0.094
			(0.064)
Observations	1,381	1,381	1,084
FE	Firm	Firm	Firm
R^2	0.86	0.86	0.87
Within R^2	0.042	0.033	0.064

Table A4
Missing Investment

The table reports results of annual time series regressions of net investment on Tobin's Q, adjusted Q, and variables capturing trends. The construction of adjusted Q is described in the text. We consider calendar year and a post-2002 dummy as trend variables. Net investment is calculated from the BEA tables. The sample runs from 1990 to 2020. Standard errors (in parentheses) are calculated using the Newey-West method adjusted for 5 lags. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)
Tobin's Q	2.13***	1.37***		
	(0.34)	(0.46)		
Adjusted Q			3.46***	3.44***
			(0.55)	(0.73)
Year	-0.09***		-0.02	
	(0.01)		(0.02)	
Post-2002 indicator		-1.23***		-0.16
		(0.27)		(0.36)
Observations	30	30	30	30
R^2	0.72	0.62	0.70	0.68

Table A5
Tobin's Q and Wedges at the Firm Level

The table reports results of panel regressions of firm-level Tobin's Q on firm-level wedges. The discount rate wedge $\tilde{\kappa}$ is the discount rate minus the perceived cost of capital (predicted as in Table 4). The discount rate and cost of capital wedge, $\tilde{\kappa} + \upsilon$, is the discount rate minus the CAPM-based financial cost of capital. Tobin's Q is the market-to-book value of debt and equity. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm. The wedges are measured in percentage points. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)
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
R^2	0.79	0.79
Within R^2	0.015	0.012

Table A6
Robustness: Market Power (User-Cost Approach) and the Secular Evolution of Discount Rates and Wedges

The table replicates Table 7, relying on the user-cost approach as in Baqaee and Farhi (2020) to measure market power.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Discount rate			$\tilde{\kappa}$	$\tilde{\kappa}$	$\tilde{\kappa}$	$\tilde{\kappa}+\upsilon$	$\tilde{\kappa}+\upsilon$	$\tilde{\kappa}+\upsilon$
Market power (2002)*Year	0.13**			0.11**			0.12**		
	(0.050)			(0.049)			(0.049)		
Market power (2002)*Perc. COC (country mean)		-0.49***			-0.39**			-0.43**	
		(0.17)			(0.18)			(0.18)	
Market power (2002)*Perc. COC (firm level)			-0.36*			-0.36*			-0.39*
			(0.19)			(0.19)			(0.20)
Observations	918	918	918	918	918	918	918	918	918
FE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
R^2	0.97	0.96	0.97	0.96	0.96	0.96	0.95	0.95	0.96
Within R^2	0.13	0.052	0.057	0.060	0.024	0.073	0.058	0.025	0.085

Table A7
Robustness: Market Power (De Loecker et al. 2020 Measures) and the Secular Evolution of Discount Rates and Wedges

The table replicates Table 7, relying on the market power measure of De Loecker et al. (2020).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Discount rate			$\tilde{\kappa}$	$\tilde{\kappa}$	$\tilde{\kappa}$	$\tilde{\kappa}+\upsilon$	$\tilde{\kappa}+\upsilon$	$\tilde{\kappa}+\upsilon$
Market power (2002)*Year	0.18**			0.17**			0.19***		
	(0.079)			(0.075)			(0.071)		
Market power (2002)*Perc. COC (country mean)		-0.41			-0.35			-0.36	
		(0.28)			(0.29)			(0.29)	
Market power (2002)*Perc. COC (firm level)			-0.49**			-0.49**			-0.60**
			(0.23)			(0.23)			(0.24)
Observations	791	791	791	791	791	791	791	791	791
FE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
R^2	0.97	0.96	0.96	0.96	0.96	0.96	0.96	0.95	0.96
Within R^2	0.18	0.052	0.044	0.11	0.022	0.058	0.11	0.020	0.082

Table A8
Additional Tests: Market Power and the Secular Evolution of Discount Rates and Wedges

The table reports additional tests based on the specifications in Table 7. We investigate whether the role of market power is driven by certain industries or is different for firms with a larger share of intangible investment. In columns 1 to 3, we exclude firms in communication services, health care, and utilities (according to the Global Industry Classification Standard). During our sample period, communication services was affected by digitization, health care by government interventions, and utilities by new energy technologies and government regulation. In columns 4 to 6, we interact market power (2002)*year with the firm-level ratio of intangible investment relative to tangible investment. The intangibles ratio is standardized, so that the coefficients estimate the impact of a one standard deviation increase. The specifications also include all the variables on their own. We measure investment in intangible capital as R&D expenditures plus adjusted Selling and General Administrative expenses, as described in Eisfeldt and Papanikolaou (2014). We measure investment in tangible capital as in Table 5. The table reports the slope coefficients for the interaction terms. The discount rate wedge $\tilde{\kappa}$ is the discount rate minus the perceived cost of capital (predicted as in Table 4). The discount rate and cost of capital wedge, $\tilde{\kappa} + \upsilon$, is the discount rate minus the CAPM-based financial cost of capital. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm. The left-hand side variables are in percent. Market power is standardized, so that the coefficients estimate the impact of a one standard deviation increase, and measured using the accounting method in Baqaee and Farhi (2020). Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)
	Discount rate	$\tilde{\kappa}$	$\tilde{\kappa} + \upsilon$	Discount rate	$\tilde{\kappa}$	$\tilde{\kappa} + \upsilon$
Market power (2002)*Year	0.14**	0.13*	0.14**	0.13*	0.12*	0.12**
	(0.071)	(0.064)	(0.064)	(0.068)	(0.062)	(0.063)
Market power (2002)*Year*Intangibles ratio				0.0011	0.0014	0.0014
				(0.00097)	(0.0011)	(0.0014)
Observations	855	855	855	949	949	949
FE	Firm	Firm	Firm	Firm	Firm	Firm
Sample	No communication/health/utilities			Full	Full	Full
R^2	0.97	0.96	0.96	0.97	0.97	0.96
Within R^2	0.12	0.062	0.060	0.13	0.085	0.10

Table A9
Firm-level Risk and the Secular Evolution of Discount Rates and Wedges

The table reports results of panel regressions of firm-level discount rates, discount rate wedges, and discount rate and cost of capital wedges on firm-level risk in 2002 interacted with three different variables: calendar year, mean perceived cost of capital in the firm's country of listing, and the perceived cost of capital at the firm level (predicted as in Table 4). The specifications include these variables on their own as well as interacted with risk in 2002. The table reports the slope coefficients for the interaction terms. The discount rate wedge $\tilde{\kappa}$ is the discount rate minus the perceived cost of capital (predicted as in Table 4). The discount rate and cost of capital wedge, $\tilde{\kappa} + \upsilon$, is the discount rate minus the CAPM-based financial cost of capital. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm. The left-hand side variables are in percent. Risk is standardized, so that the coefficients estimate the impact of a one standard deviation increase, and measured using the option implied volatility of equity. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Discount rate		$\tilde{\kappa}$	$\tilde{\kappa}$	$\tilde{\kappa}$	$\tilde{\kappa} + \upsilon$	$\tilde{\kappa} + \upsilon$	$\tilde{\kappa} + \upsilon$
Risk (2002)*Year	-0.100			-0.093			-0.10		
	(0.072)			(0.075)			(0.080)		
Risk (2002)*Perc. COC (country mean)		0.098			0.079			0.083	
		(0.19)			(0.16)			(0.16)	
Risk (2002)*Perc. COC (firm level)			0.19			0.19			0.16
			(0.15)			(0.15)			(0.16)
Observations	1,142	1,142	1,142	1,142	1,142	1,142	1,142	1,142	1,142
FE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
R^2	0.97	0.96	0.96	0.96	0.96	0.96	0.95	0.95	0.96
Within R^2	0.056	0.0056	0.017	0.040	0.015	0.093	0.037	0.020	0.095

Table A10
Financial Constraints and the Secular Evolution of Discount Rates and Wedges

The table reports results of panel regressions of firm-level discount rates, discount rate wedges, and discount rate and cost of capital wedges on firm-level financial constraints in 2002 interacted with three different variables: calendar year, mean perceived cost of capital in the firm's country of listing, and the perceived cost of capital at the firm level (predicted as in Table 4). The specifications include these variables on their own as well as interacted with financial constraints in 2002. The table reports the slope coefficients for the interaction terms. The discount rate wedge $\tilde{\kappa}$ is the discount rate minus the perceived cost of capital (predicted as in Table 4). The discount rate and cost of capital wedge, $\tilde{\kappa} + \upsilon$, is the discount rate minus the CAPM-based financial cost of capital. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm. The left-hand side variables are in percent. Financial constraints are standardized, so that the coefficients estimate the impact of a one standard deviation increase, and measured using the index by Hadlock and Pierce (2010). Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Discount rate		$\tilde{\kappa}$	$\tilde{\kappa}$	$\tilde{\kappa}$	$\tilde{\kappa} + \upsilon$	$\tilde{\kappa} + \upsilon$	$\tilde{\kappa} + \upsilon$
Fin. constraints (2002)*Year	-0.022			-0.016			-0.021		
	(0.028)			(0.028)			(0.032)		
Fin. constraints (2002)*Perc. COC (country mean)		-0.083			0.071			0.064	
		(0.15)			(0.14)			(0.15)	
Fin. constraints (2002)*Perc. COC (firm level)			0.15			0.15			0.27
			(0.15)			(0.15)			(0.17)
Observations	1,328	1,328	1,328	1,328	1,328	1,328	1,328	1,328	1,328
FE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
R^2	0.97	0.97	0.97	0.96	0.96	0.97	0.96	0.96	0.96
Within R^2	0.043	0.0052	0.030	0.0017	0.0053	0.051	0.0013	0.0093	0.058

Appendix B Firms' Optimal Investment Decision According to the Textbook Model

In general, firms should use the stochastic discount factor to discount cash flows associated with investment projects. Textbooks nonetheless tend to present a simpler rule based on a discount rate. The idea behind both approaches is the same – to maximize shareholder value – and in many models, the two approaches leads to similar outcomes, as long as the firm is considering a representative project (i.e., the risk of the project is the same as the risk of the firm's existing assets). For illustrative purposes, we consider a simple project with uncertain returns. This project generates expected revenue $\mathbb{E}_t[\text{Revenue}_{t+j}]$ at time $t+j$ and costs Cost_t at time t.

Using the Stochastic Discount Factor The first decision rule is that the firm should accept the project if the net present value, discounted using the stochastic discount factor M_{t+j}, is positive:

$$\mathbb{E}_t\left[\text{M}_{t+j}\text{Revenue}_{t+j}\right] - \text{Cost}_t > 0. \tag{A1}$$

Using the definition of covariance, we can rewrite equation A1 as:

$$\mathbb{E}_t\left[\text{Return}_{t,t+j}\right] > R^f_{t,t+j} - \text{Cov}_t\left[\text{M}_{t+j}, \text{Return}_{t,t+j}\right] R^f_{t,t+j}, \tag{A2}$$

where $R^f_{t,t+j} = \mathbb{E}_t\left[\text{M}_{t+j}\right]^{-1}$ is the risk-free interest rate between t and $t+j$ and $\text{Return}_{t,t+j} = \frac{\text{Revenue}_{t+j}}{\text{Cost}_t}$ is the return to the project.

Using a Discount Rate The second rule is set out in Section 1 in the main paper. It states that the firm should invest if expected returns are above the discount rate. It is often formulated as saying that the firm should invest if the net present value of the project, discounted using a discount rate δ_t, is positive:

$$\sum_{s=0}^{\infty}(1+\delta_t)^{-s}\,\mathbb{E}_t[\text{Revenue}_{t+s} - \text{Cost}_{t+s}] = (1+\delta_t)^{-s}\,\mathbb{E}_t[\text{Revenue}_{t+j}] - \text{Cost}_t > 0. \tag{A3}$$

We can rewrite equation A3 as:

$$\mathbb{E}_t \left[\text{Return}_{t,t+j}\right] > 1 + \delta_t^j. \tag{A4}$$

The two rules in equations A1 and A4 are equivalent, as long as the firm sets the discount rate $1+\delta_t^j = R^f_{t,t+j} - \text{Cov}_t\left[\text{M}_{t+j}, \text{Return}_{t,t+j}\right]$.

To determine this discount rate, the firm can use information from asset markets. Assume that the firm just issues one financial asset (e.g., only equity). By definition, the expected return to the financial asset of firm i is equal to the firm's "financial cost of capital." The basic asset pricing equation implies that the financial cost of capital is:

$$1 + r_{it}^{\text{fin}} = \mathbb{E}_t\left[R^i_{t,t+j}\right] = R^f_{t,t+j} - \text{Cov}_t\left[\text{M}_{t+j}, R^i_{t,t+j}\right] R^f_{t,t+j}. \tag{A5}$$

If the covariance between the stochastic discount factor and the project return is identical to the covariance between the stochastic discount factor and the financial asset return (i.e., $\text{Cov}_t\left[\text{M}_{t+j}, R^i_{t,t+j}\right] = \text{Cov}_t\left[\text{M}_{t+j}, \text{Return}_{t,t+j}\right]$), then the rules in equations A1 and A4 are equivalent for a firm that sets the discount rate equal to its financial cost of capital. Intuitively, if the project under consideration exhibits the same risk profile as the firm's existing investments, then the financial cost of capital tells the firm how financial markets price the risk of the project.

Generalizations The above results generalize to firms with multiple assets (e.g., debt and equity). In such cases, r_{it}^{fin} is the weighted average cost of capital, where the expected return is separately estimated for each asset type and weights are calculated using the value of outstanding assets of that type relative to firm total assets, accounting for differential tax treatments of different assets.

The results can also be extended to investments with more complex cash flows. For instance, consider an investment consisting of multiple sub-projects, indexed by s, where each project requires a cost at time t and pays uncertain revenue in one period $t+j$. In that case, the firm could still apply a decision rule as in equations A1 and A4, by summing over each individual sub-projects s.

If $\text{Cov}_t\left[\text{M}_{t+j}, R^i_{t,t+j}\right] \neq \text{Cov}_t\left[\text{M}_{t+j}, \text{Return}_{t,t+j}\right]$, then firms cannot infer the riskiness of an individual project using expected returns on the firm's existing financial assets. Instead, firms should then adjust the discount factor by a project-specific risk premium. However, in practice, most firms use one common discount factor for all projects.

Appendix C Details on Measurement

Appendix C.1 Extraction of Paragraphs from Conference Calls

The Thomson One database contains transcripts of conference calls held since January 2002. We download all calls in English that were available on September 9, 2021. Using an automatic text search algorithm, we identify relevant paragraphs in all the calls that fulfill two criteria: first, they contain one of the terms "percent," "percentage," or "%" and second, they contain at least one keyword related to cost of capital, discount rates, and investment. The keywords are capital asset pricing model, cost of capital, cost of debt, cost of equity, discount rate, expect a return, expected rate of return, expected return, fudge factor, hurdle rate, internal rate of return, opportunity cost of capital, require a return, required rate of return, required return, return on assets, return on invested capital, return on net assets, weighted average cost of capital, weighted cost of capital. We also include abbreviations of the keywords in the search, for example, IRR. We identify roughly 74,000 such paragraphs.

We match the firm name listed on Thomson One to Compustat by using a fuzzy merge algorithm, checking each match by hand. Ultimately, we link 88 percent of paragraphs to a Compustat firm. We combine the relevant paragraphs into data entry sheets of 500 paragraphs each. To facilitate manual data entry, we include the date of the call, firm name, and blank columns for all financial figures of interest in the sheet. These figures are:

- discount rate
- hurdle rate
- hurdle premium over the cost of capital
- fudge factor over the cost of capital
- cost of debt
- weighted average cost of capital (WACC)
- opportunity cost of capital (OCC)
- cost of capital
- cost of equity
- required, expected, and realized internal rate of return (IRR)
- required, expected, and realized return on invested capital (ROIC)

- required, expected, and realized return on equity (ROE)
- required, expected, and realized return on assets (ROA)
- required, expected, and realized return on net assets

Appendix C.2 Data Entry Team

We read through each paragraph and enter the figures into the sheets. A total of 15 undergraduate research assistants contributed over the past two and a half years. The average team size at any point in time was 5. Our research team met on a weekly basis to discuss individual cases and to coordinate on consistent guidelines.

We train all assistants in how discounting cash flows and firm investment work. Each assistant reads roughly 2,000 randomly selected paragraphs for training, which we check and discuss. All paragraphs entering the final dataset were read at least twice, by different assistants, to minimize errors. The authors also checked all outlier observations in the distribution of discount rates and changes in discount rates.

Appendix C.3 Guidelines for Manual Data Entry

We establish clear rules for which figures should be recorded. For the main analysis of this paper, we are interested in discount rates (as hurdle rate, premium or fudge factor over the cost of capital, or required IRR) and the internally calculated, perceived cost of capital (as OCC or WACC). However, we include a larger set of terms, listed above, among the keywords and in the data entry sheets to ensure that our team differentiates required from expected and realized IRR as well as from various types of other returns. (The difference between how managers use the terms IRR and ROIC in practice is noteworthy. IRR usually refers to the marginal return on an individual project, while ROIC refers to operating profits relative to the entire value of capital on the firm's balance sheet.)

We do not record hypothetical numbers (e.g., "we may use a discount rate of x percent" or "imagine that we use a cost of capital of x") and figures given by someone outside the firm (e.g., an analyst on the call suggesting a specific cost of capital for the firm). The context of statements is often key, so automated text processing cannot easily replace human reading for this task. For instance, the abbreviation OCC may refer to the opportunity cost of capital but more often than not actually refers to Old Corrugated Cardboard, a term for cardboard boxes used in the transport and recycling industries.

We only measure discount rates when managers explicitly discuss them as part of an investment rule. This means, for example, that we do not record discount rates used to value firms' pension liabilities. We focus on discount rates and the cost of capital that represent investment rules of the firm, as opposed to specific figures related to individual projects. For instance, we do not record the interest rate for a particular bond issuance. The paragraphs in the data entry sheets are sorted by firm and date, which helps us to interpret statements from the same firm consistently. When managers list multiple discount rates (usually for different regions and industries), we enter the figures that are representative of most of the company's operations (e.g., US figures for a US company). We discuss all cases with multiple rates among the whole team.

Managers mostly discuss their unlevered, after-tax discount rate and cost of capital. We note when managers refer to levered and pre-tax discount rates (1.7 and 0.7 percent of discount rate observations, respectively) and to levered and pre-tax cost of capital (0 and 1.9 percent of cost of capital observations, respectively). We convert all observations into unlevered, after-tax values by estimating the average percentage point difference between levered and unlevered as well as after- and pre-tax observations, respectively, controlling for country-by-year fixed effects. We then adjusted the values for the respective average difference.

Managers sometimes specify a range rather than an actual value. We enter the average value in these cases. We do not record values when the range is very large or ambiguous. Managers sometimes give different realized returns depending on the time horizon (e.g., "we have achieved a 5 percent ROIC over the last five years and a 10 percent ROIC over the last ten.") We enter the most recent horizon for such cases. Realized returns referring to a previous episode unconnected to current years (e.g., "return in the 1990s") are not recorded.

Appendix D The Effect of Discount Rates on Investment in the Presence of Wedges

In this section, our aim is to calculate the effect of discount rates on investment in a standard Q-model, which is calibrated using typical assumptions. The only modification that we make to the standard Q-model is that we allow for positive wedges. The setup of the model is in Section 6.1 of the main paper. Equation 13 shows that the optimal investment rate depends on the marginal value of capital q_t. Equation 15 shows that, under standard assumptions,

q_t equals an adjusted version of Tobin's Q.

To calculate the effect of discount rates on investment, we insert equation 15 into the optimal investment equation 13 and then differentiate with respect to a shock to the discount rate that is exogenous to future cash flows and adjustment costs. At the steady state, we find that:

$$\frac{\partial \left(\frac{I_t}{k_t} - \xi \right)}{\partial \delta} = -\frac{1}{\phi} \times \frac{\text{Dur}}{(\upsilon + \kappa) \times \text{Dur} + 1}. \tag{A6}$$

Equation A6 shows that an increase in the discount rate decreases the firm's net investment rate. Two channels determine the strength of the effect. First, the duration of cash flows plays a role independent of the size of wedges. For instance, if wedges are zero ($\upsilon + \kappa = 0$), the denominator of the right-hand side of equation A6 equals one and the effect solely depends on duration and adjustment costs. Intuitively, the longer the duration of cash flows, the more strongly investment responds to discount rates. For instance, in the extreme hypothetical case where all cash flows accrue immediately after investing, discount rates play no role. The second channel increases with the size of wedges. Greater wedges shorten the duration of cash flows, which decreases the sensitivity of investment to discount rates.

We next quantify the effect of the discount rate implied by the model. Our newly measured data suggest that the average wedge $\kappa + \upsilon$ is around 5 percentage points. We additionally calculate that the average duration of cash flows of firms in Compustat is around 20 years (Gormsen and Lazarus 2023, van Binsbergen 2020). Finally, following Philippon (2009), we assume a typical adjustment cost parameter used in the literature of $\phi = 10$. As a result, the effect of discount rates on net investment is:

$$\frac{\partial \left(\frac{I_t}{k_t} - \xi \right)}{\partial \delta} = -\frac{1}{10} \times \frac{20}{0.05 \times 20 + 1} = -1.$$

Appendix E Details on the Adjusted Q Framework

Appendix E.1 Proof of Proposition 1

We know from equation 14 that

$$q_t = \frac{\partial V_t(\upsilon + \kappa, k_t)}{\partial k_{t+1}} = \frac{V_t(\upsilon + \kappa, k_t)}{k_{t+1}} = Q_t.$$

To estimate Q, we must calculate $V_t(\upsilon + \kappa, k_t)$. Note that $V_t(\upsilon + \kappa, k_t)$ is the value of future profits produced by capital, calculated using $r^{\text{fin.}} + \upsilon + \kappa$ as the discount rate. If we set $\upsilon + \kappa = 0$, we get the value of these profits calculated using the cost of capital as the discount rate, $V_t(0, k_t)$, which is also the value of the firm in financial markets. We can approximate both using the Gordon growth model

$$V_t(0, k_t) = \frac{E_t[CF_{t+1}]}{r^{\text{fin.}} - g},$$
$$V_t(\upsilon + \kappa, k_t) = \frac{E_t[CF_{t+1}]}{r^{\text{fin.}} + \upsilon + \kappa - g},$$

where g is the long-run growth rate of free cash flows and CF_{t+1} is the free cash flow next period. Both of these variables are unobserved.

We can calculate $V_t(\upsilon + \kappa, k_t)$ as

$$V_t(\upsilon + \kappa, k_t) = V_t(0, k_t)\frac{r^{\text{fin.}} - g}{r^{\text{fin.}} + \upsilon + \kappa - g} = V_t(0, k_t)\frac{1}{(\upsilon + \kappa) \times \text{Dur} + 1}, \tag{A7}$$

where Dur is the weighted average of the firm's future cash flows. In the Gordon growth model (Gormsen and Lazarus 2023):

$$\text{Dur} = \frac{1}{r^{\text{fin.}} - g}.$$

Finally, we calculate adjusted Q by inserting equation A7 into equation 14 and using that

$$Q^{\text{Tobin}} = \frac{V_t(0, k_t)}{k_{t+1}}.$$

Appendix F Model of Market Power and the Choice of Wedges

We introduce a very simple model that allows us to analyze the costs and benefits of discount rate wedges. We simplify the Q-model from Section 6.1 by assuming zero depreciation, no adjustment costs, and only two time periods. Output $Q(k)$ equals capital k, so that $Q(k) = k$. Profits in the simplified model are $\Pi(k) = P(k)Q(k)$ where $P(k) = k^{-\theta}$. The parameter θ increases with the extent of market power, where $0 < \theta < 0.5$. For simplicity, we set $\upsilon = 0$ and focus on the choice of the discount rate wedge κ.

We slightly modify the firm's objective function to allow for benefits from wedges. The key new assumption is that firms value each unit of profits by more if they have a higher discount rate wedge. Firms maximize:

$$\max_{k,\kappa} \quad \kappa \times \Pi(k) \tag{A8}$$

$$\text{s.t.} \quad \Pi'(k) = r^{\text{fin.}} + \kappa. \tag{A9}$$

The constraint reflects that the marginal return to capital $\Pi'(k)$ must equal the discount rate $r^{\text{fin.}} + \kappa$. In the absence of the first term κ in the objective function, the firm would choose the same optimal level of capital as in the adjusted Q-model of Section 6.1.

In setting the optimal wedge $\kappa*$, firms trade off two forces. On the one hand, a higher wedge increases the perceived value of a given set of profits. On the other hand, a higher wedge reduces investment and profits (i.e., a non-zero wedge violates the Lerner condition). This reduction in profits is smaller for firms with more market power, as they can obtain an increase in prices (and thus marginal returns) at a relatively lower reduction in output.

Given that the benefit of a wedge is symmetric with respect to market power but that the cost falls in market power, it is optimal for firms with more market power to use a higher wedge:

$$\frac{\delta\kappa*}{\delta\theta} > 0. \tag{A10}$$