Supplemental Appendix to "Corporate Discount Rates"

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Appendix A Figures and Tables

Figure A1
Number of Observations Per Firm

Panel A plots a histogram of the number of times that we observe a discount rate for a firm. The sample includes only firms for which we observe at least one discount rate. Conditional on observing more than one discount rate, we observe a discount rate an average of roughly 3.5 times. Panel B plots a histogram of the number of times that we observe a perceived cost of capital for a firm. Conditional on observing more than one perceived cost of capital, we observe a perceived cost of capital an average of roughly 3.5 times. The right-most bars combine all values greater than 15.

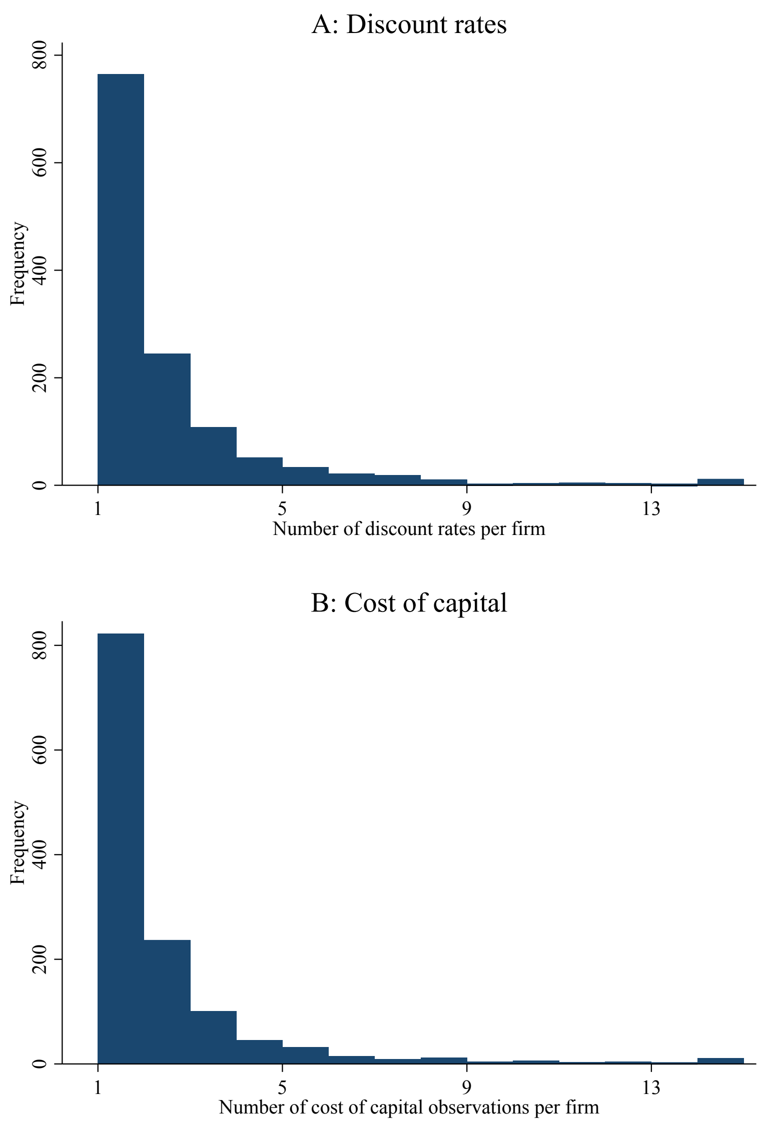


Figure A2
Observation Shares by Country

The figure plots the share of discount rate and perceived cost of capital observations by firms' country.

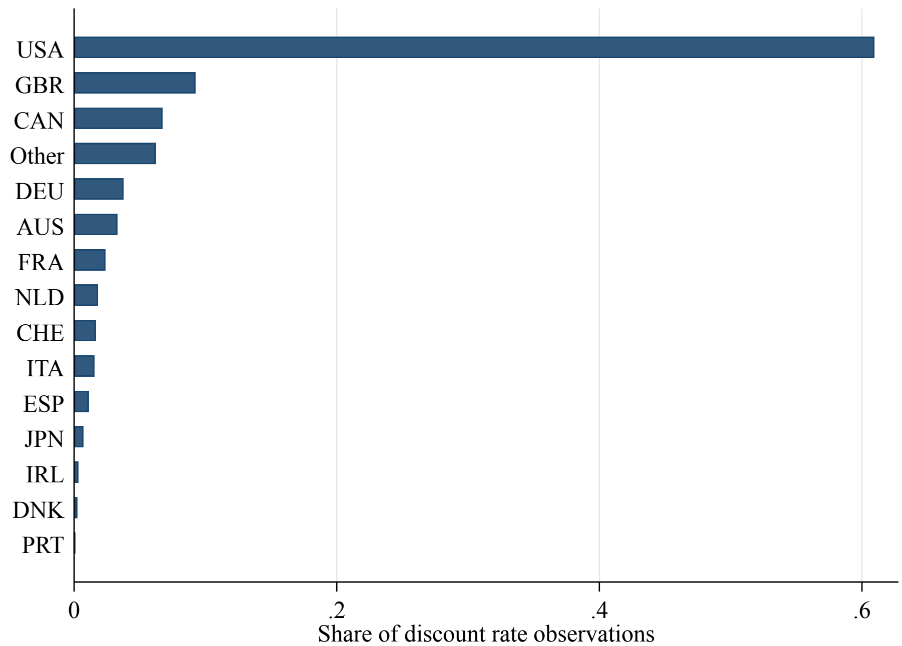


Figure A3
Industries Shares in Compustat and the New Dataset

The figure plots the share of firms in different industries in the Compustat universe for 2002 to 2021 (left-hand bar in each industry group in red) and in the sample of firms with at least one observed discount rate or perceived cost of capital (right-hand bars in blue).

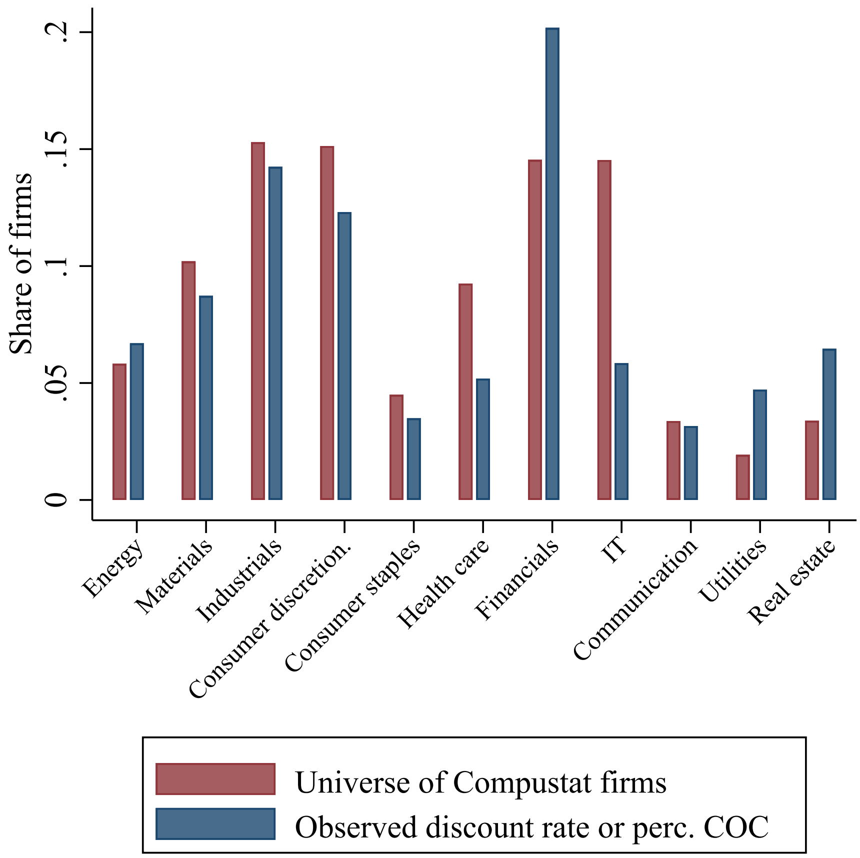


Figure A4
Difference in Discount Rates by Whether Firms Fully Account for Overhead

The figure illustrates the difference between discount rates not accounting for all overhead and discount rates accounting for all overhead over time. We calculate a three-year moving average of the annual average discount rate not accounting for overhead as well as the corresponding three-year moving average of the annual average discount rate accounting for all overhead. We plot the difference between the two series.

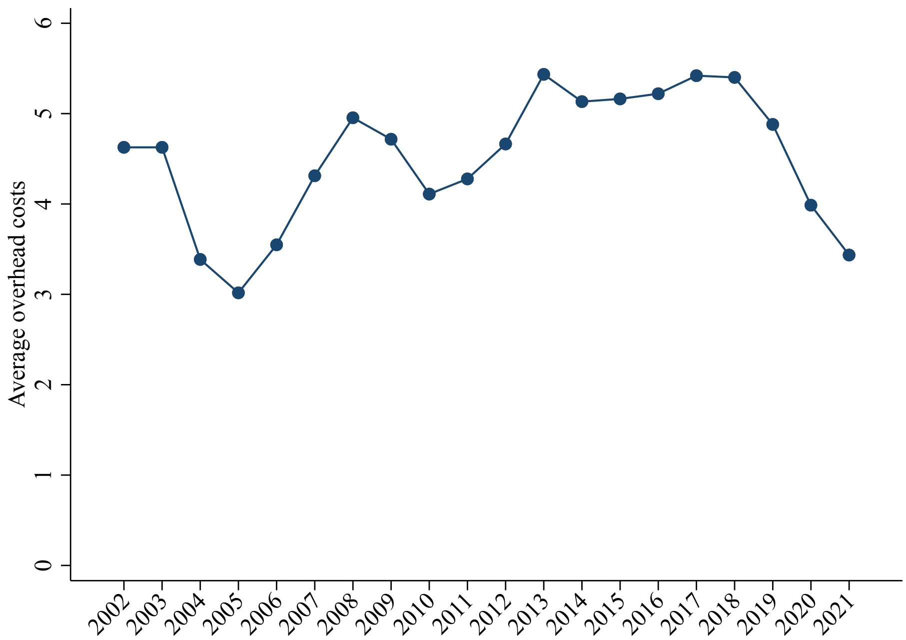


Figure A5
Robustness: Shares of Different Discount Rates and Perceived Costs of Capital

The figure reproduces Figure 5 using a restricted sample. We only include firms for which we observe two discount rates at least seven years apart to construct the share with different discount rates (which excludes about 40 percent of the observations from Figure 5). Similarly, we only include firms for which we observe two values of the perceived cost of capital at least seven years apart to construct the share with different perceived cost of capital. The restrictions ensure that the low share adjusting their discount rate over short horizons cannot be driven by differences in sample composition across the year bins on the horizontal axis.

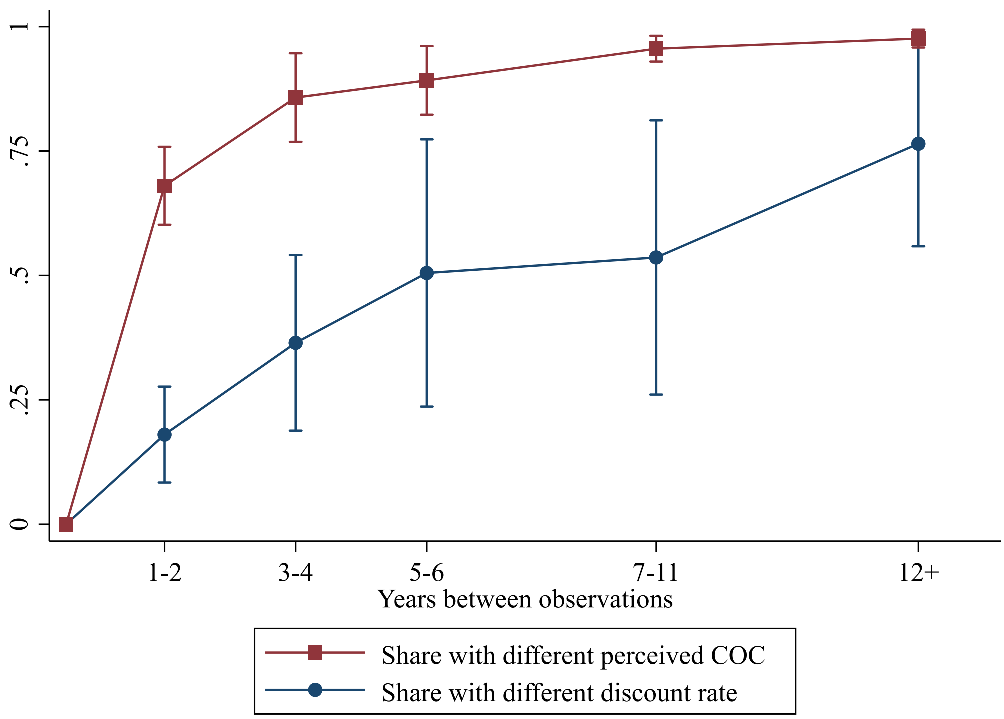
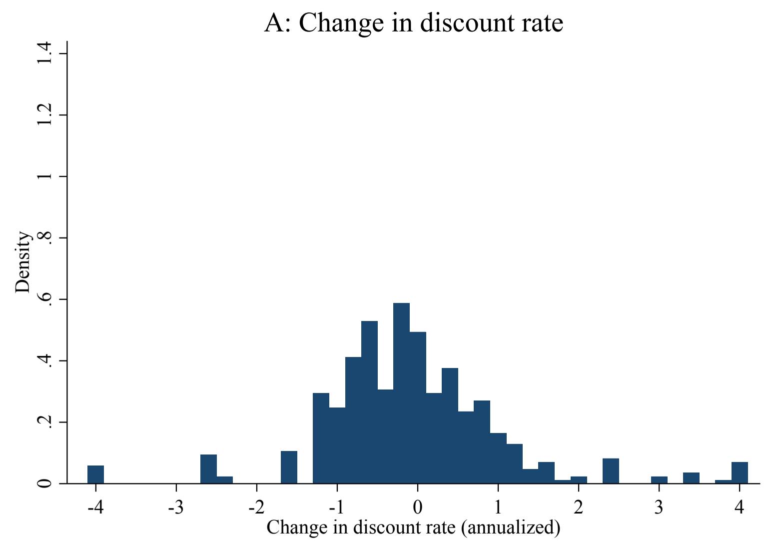


Figure A6
Non-Zero Changes in Discount Rates and the Perceived Cost of Capital

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.



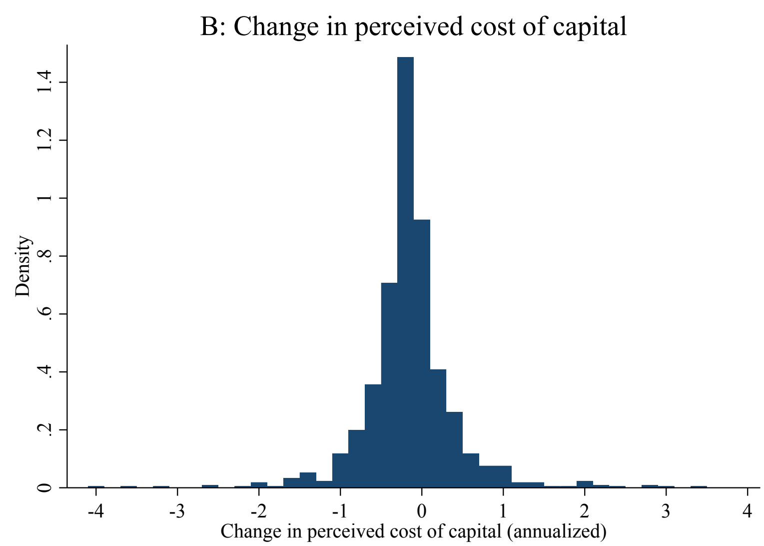


Figure A7
Simulation: The Transmission from the Cost of Capital to Discount Rates Over Time

This figure replicates Figure 4 by plotting average coefficients across 50,000 simulations of artificial data. The simulations are described in Appendix E.

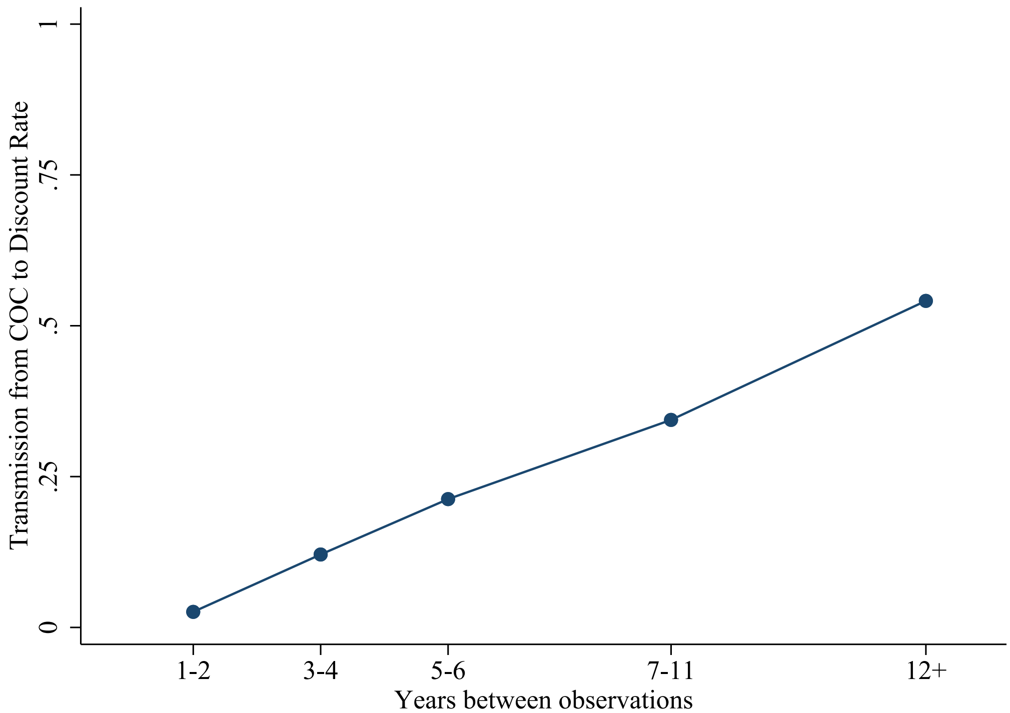


Figure A8
Simulation: Response of the Average Discount Rate to a Cost of Capital Shock

This figure plots the impulse response of the average discount rate in response to a shock to the perceived cost of capital based on the simulations described in Appendix E. We simulate the shock as a 1 percentage point increase in $\varepsilon_{i,0}^{\text{firm}}$ for all firms.

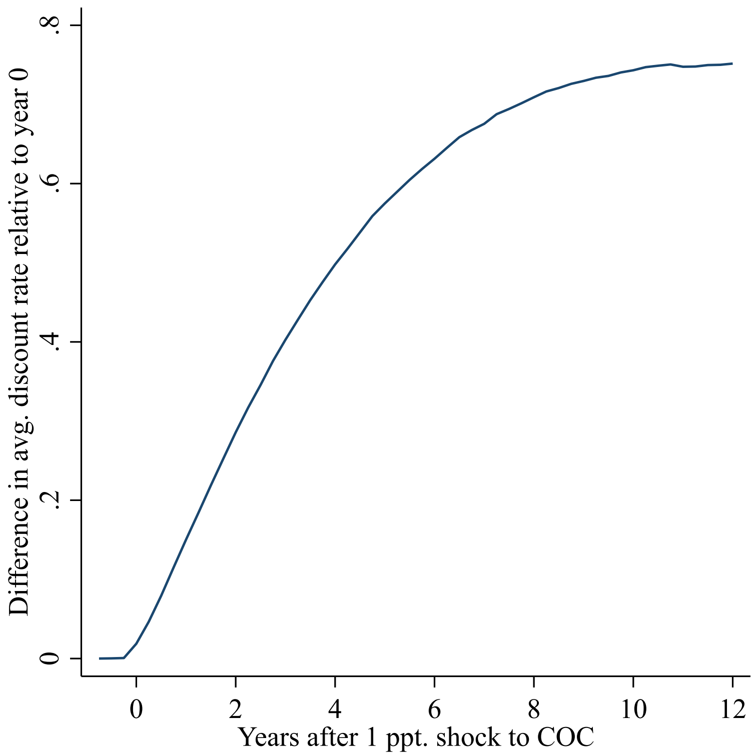


Figure A9
Simulation: Implied Evolution of Discount Rate Wedges

This figure shows the true discount rate wedge (as observed in the data) and the simulated wedge implied by the slow incorporation of the perceived cost of capital into discount rates. To calculate the implied wedge, we simulate a panel of firms for which the perceived cost of capital on average moves according to the time series underlying Figure 6 up to 2021 and then stays at the 2021 level going forward. We then impose that firms can only update their discount rates infrequently, such that we match the infrequent adjustment and slow transmission observed in Figures 4 and 5. Finally, we calculate the implied discount rate wedge arising from this combination of hypothetical discount rates and the observed average perceived cost of capital. The simulations are similar to the ones in Appendix E, except that we force the perceived cost of capital to evolve exactly like the empirically observed series, on average. We plot the wedge as the ratio of average discount rate to average perceived cost of capital in this figure (rather than as difference in levels) because the ratio does not depend on how we simulate the origin of the average level of the wedge.

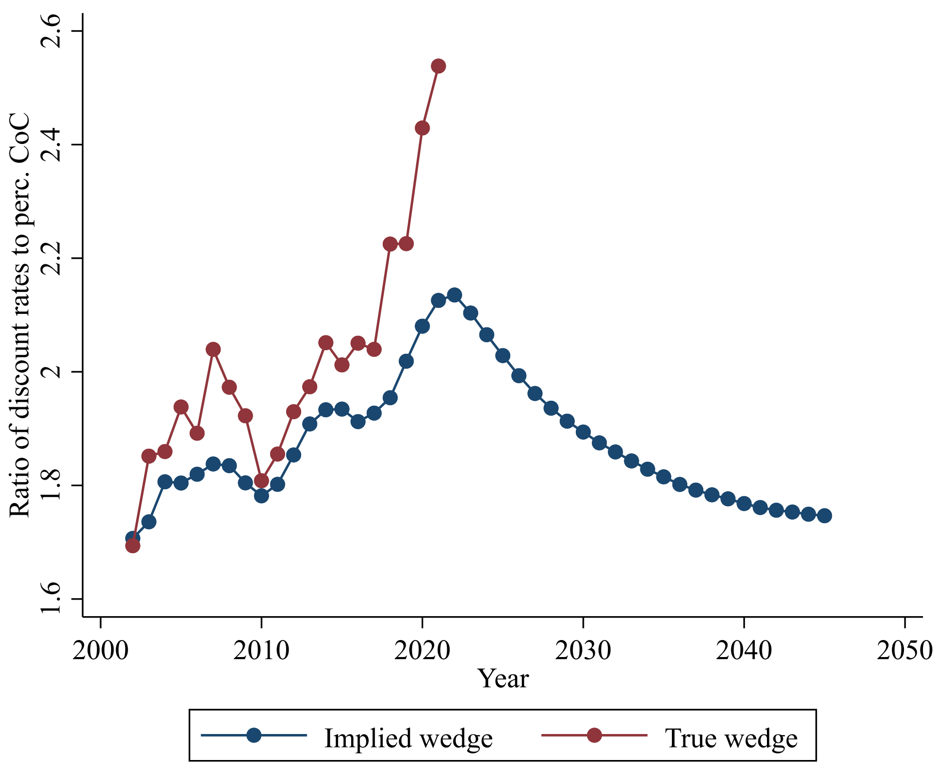


Figure A10
Discount Rate and the Perceived Cost of Capital in Surveys

This figure plots the average values of discount rates and perceived cost of capital from surveys where they are jointly observed (also reported in Sharpe and Suarez 2021 and Graham 2022).

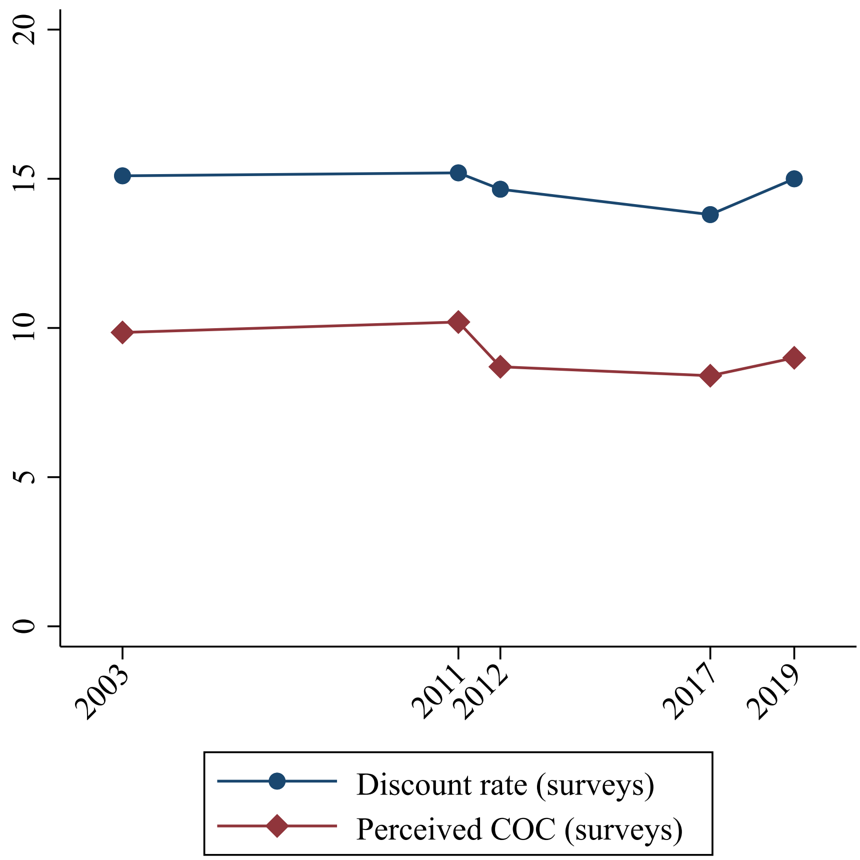


Table A1
Discount Rates and the Perceived Cost of Capital From 2010

The table reproduces Table 4 using observations from 2010 onward. For the regressions conditional on firm fixed effects, we residualize the outcome variable and the regressors using firm fixed effects for the whole sample and then use only the residualized variables for the period from 2010 in the regressions. This approach ensures that the firm fixed effects are estimated in a relatively longer sample.

	(1)	(2)	(3)	(4)	(5)	(6)
Perceived COC (observed)	0.74***	0.42***	0.43***			
	(0.11)	(0.12)	(0.11)			
Perceived COC (predicted)				1.14***	0.29*	0.33*
				(0.29)	(0.16)	(0.17)
Observations	214	214	214	1,505	1,505	1,505
FE	Country	Firm	Firm/quarter	Country	Firm	Firm/quarter
P(slope = 1)	0.018	0.000015	5.9e-06	0.63	0.000050	0.00024
Within R^2	0.19	0.34	0.36	0.029	0.016	0.019

Table A2
Investment and Discount Rates From 2010

The table reproduces Table 5 using only observations from 2010 onward. For the regressions conditional on firm fixed effects, we residualize the outcome variable and the regressors using firm fixed effects for the whole sample and then use only the residualized variables for the period from 2010 in the regressions. This approach ensures that the firm fixed effects are estimated in a relatively longer sample.

	(1)	(2)	(3)	(4)	(5)
Discount rate	-0.69***	-0.65***			-0.75**
	(0.23)	(0.21)			(0.30)
Discount rate wedge $\tilde{\kappa}$			-0.71***		
			(0.21)		
Discount rate and COC wedge $\tilde{\kappa} + \upsilon$				-0.66***	
				(0.21)	
Perceived COC (predicted)			0.53		3.99***
			(1.03)		(1.44)
Fin. COC (firm level)				-0.40	-1.42
				(0.77)	(1.26)
Tobin's Q					0.30
					(0.37)
Observations	895	895	895	895	792
FE	Firm	Firm/quarter	Firm/quarter	Firm/quarter	Firm/quarter
Within R^2	0.011	0.0096	0.015	0.010	0.030

Table A3
Realized Project Returns and Discount Rates

Some firms report a realized return of a specific project in the context of discussing their discount rate (see also Appendix D). The table reports results of panel regressions of the average realized project-level return reported by a firm in a quarter on the discount rate reported by the same firm in the same quarter. Column 1 includes fixed effects for firm country of listing. Column 2 additionally includes fixed effects for quarter and for whether the discount rate includes all corporate overhead costs. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm and quarter. Statistical significance is denoted by *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	(1)	(2)
	Rlzd. return	Rlzd. return
Discount rate	1.26***	1.19***
	(0.23)	(0.21)
Observations	211	211
FE	Country	Country/quarter/type
Within R^2	0.24	0.22

Table A4
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 $(\text{CAPEX}^i_{t+1} - \text{Depreciation}^i_{t+1})/\text{PPEN}^i_t$, winsorized at the 2.5$^{\text{th}}$ and 97.5$^{\text{th}}$ percentiles. 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. Tobin's Q and ROE are winsorized. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm and quarter. 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 $\tilde{\kappa} + \upsilon$	-0.56***	-0.72***	-0.70**
	(0.21)	(0.26)	(0.35)
Credit spread (scaled)	-0.57		-0.50
	(0.61)		(0.61)
Risk-free rate (scaled)	-0.99		-1.77
	(1.06)		(1.94)
Fin. cost of equity (scaled)		-0.82	-0.76
		(1.05)	(1.47)
Tobin's Q			-0.16
			(0.67)
ROE			0.17***
			(0.049)
Observations	1,472	1,472	1,219
FE	Firm	Firm	Firm
Within R^2	0.015	0.016	0.027

Table A5
Discount Rates and Expected Earnings Growth

The table reports results of panel regressions of firm-level discount rates on firm-level long-run expected earnings growth from the Institutional Brokers' Estimate System. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm and quarter. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)
Exp. earnings growth	-0.0014	-0.0020
	(0.0031)	(0.0039)
Observations	887	887
FE	Firm	Firm/quarter
Within R^2	0.00041	0.00072

Table A6
Asset Expansion and Corporate Discount Rates

The table reports results of panel regressions of firm-level asset expansion, measured using Compustat as $\text{Assets}^i_{t+1}/\text{Assets}^i_t$, winsorized at the 2.5^{th} and 97.5^{th} percentiles, 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 and is winsorized. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm and quarter. 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	-0.79**	-0.92***			-1.09**
	(0.33)	(0.34)			(0.54)
Discount rate wedge $\tilde{\kappa}$			-0.85**		
			(0.35)		
Discount rate and COC wedge $\tilde{\kappa} + \upsilon$				-0.92***	
				(0.34)	
Perceived COC (predicted)			-3.41		-2.04
			(2.09)		(3.48)
Fin. COC (firm level)				-1.59	0.47
				(1.39)	(1.89)
Tobin's Q					5.24***
					(0.84)
Observations	1,782	1,782	1,782	1,782	1,377
FE	Firm	Firm/quarter	Firm/quarter	Firm/quarter	Firm/quarter
Within R^2	0.0042	0.0057	0.0095	0.0063	0.13

Table A7
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. The net investment rate including intangibles is winsorized at the 2.5^{th} and 97.5^{th} percentiles. 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 and is winsorized. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm and quarter. 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	-0.32***			-0.44***
	(0.17)	(0.12)			(0.14)
Discount rate wedge $\tilde{\kappa}$			-0.30***		
			(0.11)		
Discount rate and COC wedge $\tilde{\kappa} + \upsilon$				-0.32***	
				(0.11)	
Perceived COC (predicted)			-0.85**		0.15
			(0.34)		(0.52)
Fin. COC (firm level)				-0.79***	-0.49
				(0.21)	(0.31)
Tobin's Q					0.47***
					(0.082)
Observations	1,359	1,359	1,359	1,359	1,211
FE	Firm	Firm/quarter	Firm/quarter	Firm/quarter	Firm/quarter
Within R^2	0.023	0.029	0.037	0.042	0.091

Table A8
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			3.43***	3.42***
			(0.54)	(0.72)
Year	-0.09***		-0.02	
	(0.01)		(0.02)	
Post-2002 indicator		-1.23***		-0.15
		(0.27)		(0.36)
Observations	30	30	30	30
R^2	0.72	0.62	0.70	0.68

Table A9
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, winsorized at the 2.5^{th} and 97.5^{th} percentiles. The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm and quarter. 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 $\tilde{\kappa}$	0.15***	
	(0.054)	
Discount rate and COC wedge $\tilde{\kappa} + \upsilon$		0.13***
		(0.046)
Observations	708	708
FE	Firm	Firm
Within R^2	0.023	0.021

Table A10
Differences in Discount Rates and Wedges Across Firms

The table reports results of panel regressions of discount rates, discount rate wedges, and discount rate and cost of capital wedges on three regressors. 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 first regressor is market power, measured using the accounting method in Baqaee and Farhi (2020). The second is risk, measured using option-implied volatility of equity. The third is financial constraints, measured using the index by Hadlock and Pierce (2010). The right-hand side variables are firm-level averages between 2000 and 2002 (in the case of risk, we use the firm-level average over all years in the sample if no data are available for 2000 to 2002). The dataset is at the firm-quarter level and runs from 2002 to 2021. Standard errors (in parentheses) are clustered by firm and quarter. The left-hand side variables are in percent. The three regressors are standardized, so that the coefficients estimate the impact of a 1 standard deviation increase. The specification includes fixed effects for firm country of listing, quarter, and whether the discount rate includes all corporate overhead costs. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1) Discount rate	(2) $\tilde{\kappa}$	(3) $\tilde{\kappa} + \upsilon$
Market power (2002)	1.03**	0.92**	0.95**
	(0.43)	(0.43)	(0.45)
Risk (2002)	1.64***	1.28***	1.17**
	(0.49)	(0.46)	(0.46)
Fin. constraints (2002)	0.67*	0.69**	0.68**
	(0.34)	(0.34)	(0.34)
Observations	810	810	810
FE	Country/quarter/type	Country/quarter/type	Country/quarter/type
Within R^2	0.10	0.080	0.073

Table A11
Robustness: Market Power (User-Cost Approach) and the Secular Evolution of Discount Rates and Wedges

The table replicates Table 6, 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	0.12**			0.11**			0.11**		
	(0.050)			(0.050)			(0.050)		
Market power (2002)*Perc. COC (country mean)		-0.44**			-0.36*			-0.38**	
		(0.18)			(0.19)			(0.19)	
Market power (2002)*Perc. COC (firm level)			-0.41**			-0.41**			-0.43**
			(0.18)			(0.18)			(0.19)
Observations	943	943	943	943	943	943	943	943	943
FE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Within R^2	0.12	0.038	0.059	0.057	0.026	0.087	0.054	0.026	0.099

Table A12
Robustness: Market Power (De Loecker et al. 2020 Measures) and the Secular Evolution of Discount Rates and Wedges

The table replicates Table 6, 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	0.17**			0.16**			0.17**		
	(0.078)			(0.075)			(0.072)		
Market power (2002)*Perc. COC (country mean)		-0.30			-0.26			-0.28	
		(0.20)			(0.20)			(0.21)	
Market power (2002)*Perc. COC (firm level)			-0.58**			-0.58**			-0.67**
			(0.28)			(0.28)			(0.28)
Observations	815	815	815	815	815	815	815	815	815
FE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Within R^2	0.16	0.038	0.049	0.10	0.020	0.077	0.11	0.021	0.10

Table A13
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 (averaged over 2000 to 2002 if available for those years and over all years with available firm-level data otherwise) 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 average risk in 2000-2002. 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 and quarter. The left-hand side variables are in percent. Risk is standardized, so that the coefficients estimate the impact of a 1 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	-0.092			-0.086			-0.093		
	(0.069)			(0.071)			(0.076)		
Risk (2002)*Perc. COC (country mean)		0.098			0.080			0.071	
		(0.17)			(0.14)			(0.14)	
Risk (2002)*Perc. COC (firm level)			0.19			0.19			0.14
			(0.16)			(0.16)			(0.16)
Observations	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167
FE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Within R^2	0.052	0.0054	0.014	0.036	0.021	0.098	0.030	0.024	0.10

Table A14
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 (averaged over 2000 to 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 average financial constraints in 2000-2002. 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 and quarter. The left-hand side variables are in percent. Financial constraints are standardized, so that the coefficients estimate the impact of a 1 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	-0.028			-0.029			-0.034		
	(0.024)			(0.025)			(0.027)		
Fin. constraints (2002)*Perc. COC (country mean)		-0.030			0.083			0.091	
		(0.10)			(0.094)			(0.10)	
Fin. constraints (2002)*Perc. COC (firm level)			0.18			0.18			0.33**
			(0.15)			(0.15)			(0.16)
Observations	1,373	1,373	1,373	1,373	1,373	1,373	1,373	1,373	1,373
FE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Within R^2	0.044	0.0021	0.027	0.0043	0.015	0.060	0.0037	0.017	0.067

Table A15
Firm Market Power and Investment Over Time

The table reports results of regressions of the firm-level capital stock (measured as log PPEN from Compustat) on firm-level market power (averaged over 2000 to 2002) interacted with calendar year. The table reports the slope coefficient on the interaction term. The dataset is at the firm-quarter level for US firms and runs from 2002 to 2019. Standard errors (in parentheses) are clustered by firm and quarter. Market power is standardized, so that the coefficients estimate the impact of a 1 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)
Market power (2002)*Year	-0.013*	-0.021**
	(0.0068)	(0.0095)
Observations	6,987	6,987
FE	Firm/quarter	Firm/quarter
Weight	None	Capital stock
Within R^2	0.013	0.033

Table A16
Additional Tests: Market Power and the Secular Evolution of Discount Rates and Wedges

The table reports additional tests based on the specifications in Table 6. 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 1 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 and quarter. The left-hand side variables are in percent. Market power is standardized, so that the coefficients estimate the impact of a 1 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) Discount rate	(2) $\tilde{\kappa}$	(3) $\tilde{\kappa} + \upsilon$	(4) Discount rate	(5) $\tilde{\kappa}$	(6) $\tilde{\kappa} + \upsilon$
Market power (2002)*Year	0.098*	0.088*	0.095*	0.093*	0.082*	0.085*
	(0.052)	(0.049)	(0.051)	(0.050)	(0.047)	(0.049)
Market power (2002)*Year*Intangibles ratio				0.00091	0.0012	0.0012
				(0.00078)	(0.00094)	(0.0012)
Observations	876	876	876	976	976	976
FE	Firm	Firm	Firm	Firm	Firm	Firm
Sample	No communication/health/utilities			Full	Full	Full
Within R^2	0.096	0.047	0.044	0.11	0.070	0.084

Table A17
Results from Simulations

The table reports regressions of discount rates on the perceived cost of capital. The first four columns show results from simulations described in Appendix E. The final two columns reproduce columns 4 and 5 from Table 4.

	Dependent variable: $\delta_{i,t}$					
	Simulations				Original data	
True $r_{i,t}^{\text{perc}}$	1.05	0.42				
	(0.05)	(0.07)				
Predicted $r_{i,t}^{\text{perc}}$			1.07	0.38	1.06	0.33
			(0.17)	(0.17)	(0.33)	(0.15)
FE	None	Firm	None	Firm	None	Firm

Table A18
Relation Between 2000-02 and Future Characteristics

The table displays coefficients from regressions of a future characteristic on the same characteristic averaged over 2000 to 2002. Standard errors are clustered at the firm level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1) Mkt. power 2005	(2) Mkt. power 2021	(3) Fin. constr. 2005	(4) Fin. constr. 2021	(5) Risk 2005	(6) Risk 2021
Mkt. power 2002	0.88***	0.90***				
	(0.033)	(0.065)				
Fin. constr. 2002			0.88***	0.76***		
			(0.017)	(0.027)		
Risk 2002					0.54***	0.39***
					(0.015)	(0.034)
Observations	1,202	790	3,173	2,483	1,429	796
R^2	0.64	0.35	0.83	0.65	0.59	0.22

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 compare the two rules using 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 A2 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 the expected return is above the discount rate. This rule can also be 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:

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

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 A2 and A4 are equivalent, as long as the firm sets the discount rate such that:

$$(1+\delta_t)^j = R^f_{t,t+j} - \text{Cov}_t\left[\text{M}_{t+j}, \text{Return}_{t,t+j}\right] R^f_{t,t+j}. \tag{A5}$$

To determine this discount rate, the firm can use information from asset markets. Assume that the firm just issues equity. By definition, the expected return to the financial asset of firm i over one period is equal to 1 plus the firm's "financial cost of capital," given by r^{fin}_{it}. The basic asset pricing equation implies that the expected return to the financial asset over the lifetime of the project is:

$$(1+r^{\text{fin}}_{it})^j = \mathbb{E}_t\left[R^i_{t,t+j}\right] = R^f_{t,t+j} - \text{Cov}_t\left[\text{M}_{t+j}, R^i_{t,t+j}\right] R^f_{t,t+j}. \tag{A6}$$

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 A2 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 liabilities (e.g., debt and equity). In such cases, r^{fin}_{it} 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 A2 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.

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 to the data collection. 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 after-tax discount rate and cost of capital. We note when managers refer to pre-tax discount rates (0.7 percent of discount rate observations) and pre-tax cost of capital (1.9 percent of cost of capital observations). We convert all observations into after-tax values in two steps. First, we estimate the average percentage point difference between after-tax and pre-tax observations, controlling for country-by-year fixed effects. Second, we then adjust the pre-tax values reported on the calls using this average difference.

Similarly, managers occasionally mention a "levered" discount rate (only 1.7 percent of discount rate observations), which is used in return calculations that do not take into account all the capital used to finance the investment. We convert all levered observations into unlevered values. Again, we estimate the average percentage point difference between levered and unlevered observations, conditional on country-by-year fixed effects, and then adjust the levered values using this 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 Context of Reported Discount Rates

We study the context in which discount rates are mentioned by assigning each paragraph with a reported discount rate to one of four categories, depending on whether the paragraph additionally mentions: (1) an expected return of a specific potential project, (2) expected returns of potential projects in general, (3) a realized return of a specific existing project, and (4) realized returns and profitability of existing projects in general. Only a handful of cases (where managers state the discount rate in isolation) do not fall into the four categories.

Paragraphs in category (1) typically compare the expected return of at least one specific potential investment project to the discount rate, for example by stating "this is just a really good project that far exceeds our 25 percent IRR threshold" or "you see an internal rate of return of 24 percent. That far exceeds our 15 percent hurdle rate." We find that 38 percent of paragraphs that contain a discount rate in our dataset fall into category (1).

Category (2) includes paragraphs where managers discuss in general terms the returns that they expect to generate from future projects, often in the context of explaining their approach to project selection, for instance by stating "our base expectations around any capital we invest is a minimum 15 percent internal rate of return" or "far fewer new store proposals are now achieving our 20 percent internal rate of return investment hurdle (...). So the reduction in capital expenditure on existing stores really reflects our discipline in sticking to our 20 percent IRR." Category (2) accounts for 41 percent of relevant paragraphs.

Category (3) includes paragraphs where managers mention the discount rate in relation to the realized return of existing projects, for instance, stating "the 14.5 percent internal rate of return on new business (...), it's well above our internal 11 percent hurdle rate." Category (3) accounts for 11 percent of relevant paragraphs.

Finally, category (4) accounts for the 9 percent of paragraphs where managers report realized returns of the firm and then use the discount rate to explain how future firm-level returns may evolve, for instance, stating "our IRR hurdle is a 15 percent rate of return. This year, our return on invested capital was in the neighborhood of 23.6 percent."

Appendix E Simulations of Discount Rates and the Perceived Cost of Capital

We conduct simulations of the relation between discount rates and the perceived cost of capital. The simulations allow us to assess the properties of our regressions and robustness to classical measurement error. The simulations also illustrate that the results in Figure 4 and Table 4 arise from the infrequent adjustments in discount rates.

We run 50,000 simulations using artificial data that are generated to resemble the data studied in the main paper. We conduct the analyses in Figure 4 and Table 4 using each set of artificial data and study the distribution of outcomes across the simulations.

Appendix E.1 Setup of Each Simulation

Each simulation starts by creating a balanced panel of 1,000 firms with 20 years of data (plus a ten-year burn-in period). We construct the perceived cost of capital based on two persistent processes. The first process determines the financial cost of capital, $r_{i,t}^{fin.}$, which is a function of standard variables such as the market beta, market risk premium, and interest rates. All these variables are observed by the econometrician, although with error. The second process, $r_{i,t}^{\text{firm}}$, is a zero-mean process capturing unobserved firm-specific variation. Both processes are AR(1) with normally distributed innovations:

$$r_{i,t}^{\text{firm}} = \phi^{\text{firm.}} r_{i,t-1}^{\text{firm}} + \varepsilon_{i,t}^{\text{firm}}$$

and

$$r_{i,t}^{\text{fin.}} = (1 - \phi^{\text{fin.}})\overline{r^{\text{fin.}}} + \phi^{\text{fin.}} r_{i,t-1}^{\text{fin.}} + \varepsilon_{i,t}^{\text{fin.}}.$$

We also simulate a long-term interest rate as a persistent AR(1) process,

$$r_t^{\text{int.}} = (1 - \phi^{\text{int}})\overline{r^{\text{int}}} + \phi^{\text{int}} r_{t-1}^{\text{int}} + \varepsilon_t^{\text{int}}.$$

Given the long-term interest rate and $r_{i,t}^{\text{fin.}}$, we calculate the aggregate risk premium, λ_t, which is the average cost of capital at time t across firms minus the interest rate at time t, $\lambda_t = \sum_i r_{i,t}^{\text{fin.}} - r_t^{\text{int.}}$. We then back out the implied firm-level beta, so that $r_{i,t}^{\text{fin.}} = r_t^{\text{int.}} + \beta_{i,t}\lambda_t$.

We construct the perceived cost of capital based on $r_{i,t}^{\text{firm}}$ and $r_{i,t}^{\text{fin.}}$. To generate the empirically observed persistence in the perceived cost of capital, we assume a Calvo-style friction, where only a certain fraction of firms, $\alpha^{\text{perc.}}$, can update their perceived cost of capital each period. Firms that are allowed to update their perceived cost of capital update it such that

$$r_{i,t}^{\text{perc.}} = r_{i,t}^{\text{firm}} + r_{i,t}^{\text{fin.}},$$

whereas firms that are not allowed to update keep the same value of the perceived cost of capital as last period.

We impose a similar Calvo-style friction to generate the observed infrequent adjustment in discount rates. We assume that only a certain fraction of firms, $\alpha^{\text{discount rate}}$, can update their discount rate each period. Firms that are allowed to update their discount rate update it such that,

$$\delta_{i,t} = \Lambda \times r_{i,t}^{\text{perc.}}$$

where the parameter Λ determines to what extent firms match their discount rate to the perceived cost of capital. Firms that cannot change their discount rate keep the same value as last period.

The simulations give rise to a balanced panel of the perceived cost of capital and discount rates. We next turn to matching the unbalanced nature of our data by removing most observations on the perceived cost of capital and discount rates. In doing so, we ensure that we have the same distribution of observations per firm as in our data.

Using the unbalanced panel of the perceived cost of capital, we estimate a Lasso regression similar to the one in the main paper. We use Lasso to construct the optimal out-of-sample estimate of the perceived cost of capital based on four inputs: the long-term interest rates, market betas, market risk premia, and the product of the risk premia and the market betas. We assume that market beta and risk premia are measured with persistent errors. We simulate these errors using an AR(1) processes similar to the one for the financial cost of capital.

Appendix E.2 Calibration of the Simulations

We calibrate the Calvo parameters to match the observed adjustment frequency in discount rates and the perceived cost of capital. We calibrate the processes for $r_{i,t}^{\text{firm}}$ and $r_{i,t}^{\text{fin.}}$ to replicate the observed behavior of the perceived cost of capital and the predicted value of the perceived cost of capital. We set the persistence parameters $\phi^{\text{fin.}}$ and ϕ^{firm} equal to 0.98 to match the persistence observed in the data. We calibrate the innovation for the processes to have standard deviations of $\sigma_{\varepsilon}^{\text{fin.}} = 0.00205$ and $\sigma_{\varepsilon}^{\text{firm}} = 0.0048$. These estimates ensure that the volatility of the perceived cost of capital equals 2.8 percent, as in the data. The volatility in the innovations of the measurement error in β and λ is 0.0006. The assumptions ensure that the volatility of the predicted value of the perceived cost of capital is 1.08 percent, as is the case empirically, and that the R^2 of the regression of $r_{i,t}^{\text{perc.}}$ on the predicted value $\widehat{r_{i,t}^{\text{perc.}}}$ is 15.4 percent, as in the data. To ensure stationary distributions over time, we start the cross-sectional distribution of all variables at the long-run average and impose a ten-year burn-in period for the simulations.

Appendix E.3 Results of the Simulations

Table A17 reports regressions identical to those in Table 4 of the main paper. The first four columns show regressions using the simulated data and the last two columns reproduce the results from Table 4 in the paper. For the simulated data, we report the average and standard deviation of slope coefficients across the 50,000 simulations.

Columns 1 and 2 use the true cost of capital on the right-hand side. The coefficient is 1.05 without fixed effects. When we include firm fixed effects in column 2, the slope coefficient drops to 0.42. This drop is similar in magnitude to the one observed in the data (columns 5 and 6).

Columns 3 and 4 use the predicted values on the right-hand side. The slope coefficient is 1.07 without firm fixed effects and 0.38 with firm fixed effects. The coefficient thus drops by almost the same magnitude as for the true values. The estimate with firm fixed effects in column 4 is marginally downward biased, consistent with a small degree of attenuation bias. The bias is, however, economically small. Almost all of the decrease in the slope coefficient due to firm fixed effects is due to the true dynamics, which are driven by the infrequent adjustment of discount rates.

In the simulations underlying Table A17, we have set the parameter Λ to 1.7. We do so because firms move their discount rates more than one-to-one with the cost of capital in the data, whenever they move their discount rate. A natural explanation for this pattern is that increases in the cost of capital arise in part from increases in risk and that firms add higher discount rate wedges (κ) in the presence of increased risk, leading to such a leverage effect. However, this choice of Λ is not important for our results. If we set $\Lambda = 1$, the slope coefficients are smaller, but the relative size of the coefficients is exactly the same. That is, including firm fixed effects continues to reduce the true slope coefficient by 60 percent (as in the data) and the bias arising from our prediction procedure remains modest.

The standard errors reported for the simulations are given by the standard deviation of the parameter estimates across simulations. The standard errors obtained from the simulations continue to reject the hypothesis that the slope coefficient is 1 when controlling for firm fixed effects.

We also confirm that the simulations generate the observed pattern in transmission over time. To this end, Figure A7 shows the simulation equivalent of Figure 4 in the paper. The figure displays the same upward slope in the coefficients, which is driven by the infrequent adjustment of discount rates.

Finally, one may ask what it takes for the slope coefficients not to be lower when using firm fixed effects. To answer this question, we run two additional simulations, one in which the sample period is very long and another one in which discount rates are adjusted frequently (but the sample remains short). In both of these simulations, we find that firm fixed effects have no influence on the slope coefficients. However, the sample length needs to be very long, 500 years or more, for the effect of the fixed effects to disappear. This finding illustrates that the infrequent adjustment of discount rates explains the low slope coefficient in samples that are relatively short.

Appendix F Details on the Model of Adjusted Q

In this section, we derive the relation between adjusted Q and Tobin's Q as well as the effect of discount rates on investment in a model of adjusted Q. The basic model is laid out in Section 6.1. The only modification that we make to the standard Q-model is that we allow for positive discount rate wedges and positive cost of capital wedges. Readers who are only interested in how we use the new data to quantify the model-implied effect of the discount rate on the net investment rate may like to jump straight to Appendix F.3

Appendix F.1 Optimal Investment Rate

We work out the optimal net investment rate and adjusted Q in a model of a firm on a balanced growth path. The profit function $\Pi_t(k_t)$ is homogeneous of degree 1 in k_t, so it can be written as:

$$\Pi_t(k_t) = \Pi_k k_t, \tag{A7}$$

where $\Pi_k > 0$ is a constant. As a result, the value function is homogeneous of degree 1 in k_t and can be written as:

$$V(\upsilon + \kappa, k_t) = (1 + \delta) q k_t, \tag{A8}$$

where q is a constant that measures the marginal value of capital in the eyes of the firm when future cash flows are discounted at rate δ. Hence, q is by definition the adjusted Q on the balanced growth path: $q = Q^{\text{Adjusted}}$.

We can rewrite the model of equation 12 in recursive form by substituting equations A7 and A8 into equation 12:

$$(1+\delta)qk_t = \max_{I_t} \quad \Pi_k k_t - I_t - \Phi(I_t, k_t, \xi) + qk_{t+1}. \tag{A9}$$

Taking the first-order condition for the right-hand side of equation A9 gives the optimal net investment rate, which is also the growth rate of the firm and which we label g to simplify notation going forward:

$$\frac{I_t}{k_t} - \xi = \frac{1}{\phi}(q-1) = g. \tag{A10}$$

Dividing both sides of equation A9 by k_t, while taking the optimal net investment rate g from equation A10 as given, renders an equation for adjusted Q:

$$(\delta - g)q = \Pi_k - \frac{I_t}{k_t} - \Phi(\frac{I_t}{k_t}, 1, \xi). \tag{A11}$$

Appendix F.2 Adjusted Q and Tobin's Q

Equation A11 already contains adjusted Q, the marginal value of capital in the eyes of the firm (i.e., using the discount rate δ). We next derive Tobin's Q, the marginal value of capital in the eyes of financial markets (i.e., using the discount rate $r^{\text{fin.}}$). To do so, we follow an analogous approach to the one we took to derive A11. We again take as given the net investment rate g, which is determined by the firm in equation A10. However, to derive Tobin's Q, we discount future cash flows in equation A9 using $r^{\text{fin.}}$ instead of δ. This then renders:

$$(r^{\text{fin.}} - g)Q^{\text{Tobin}} = \Pi_k - \frac{I_t}{k_t} - \Phi(\frac{I_t}{k_t}, 1, \xi). \tag{A12}$$

We follow previous work and term the inverse of $r - g$ the duration of firm's cash flows, which is observed in financial data as the price-earnings ratio of a firm (e.g., Gormsen and Lazarus 2023). This relation can also be directly derived from the Gordon growth model for asset prices:

$$\text{Dur} = \frac{1}{r^{\text{fin.}} - g}. \tag{A13}$$

We derive the relation between adjusted Q and Tobin's Q by taking the ratio of equations

A11 and A12. We then rewrite the ratio in terms of duration by inserting A13:

$$q = Q^{\text{Tobin}} \frac{1}{\text{Dur}(\upsilon + \kappa) + 1} = Q^{\text{Adjusted}}. \tag{A14}$$

Hence, adjusted Q is a scaled version of Tobin's Q, where the scaling factor depends on the duration of cash flows and wedges.

Appendix F.3 The Effect of the Discount Rate on the Net Investment Rate in the Model of Adjusted Q

We rewrite the firm's choice of optimal net investment rate (which we denote by $g = \frac{I_t}{k_t} - \xi$) by combining equations A10 and A11:

$$g = \delta - \sqrt{\frac{2(\xi + \delta - \Pi_k) + \delta^2 \phi}{\phi}}. \tag{A15}$$

We differentiate A15 with respect to an exogenous shock to the discount rate. This reveals how changes in the discount rate affect the net investment rate:

$$\frac{\partial g}{\partial \delta} = 1 - \frac{1 + \delta\phi}{\sqrt{\phi(2(\xi + \delta - \Pi_k) + \delta^2 \phi)}}. \tag{A16}$$

We can rewrite equation A16 in terms of duration:

$$\frac{\partial g}{\partial \delta} = -\frac{1}{\phi} \times \frac{\text{Dur}(1 + \phi r^{\text{fin.}}) - \phi}{1 + \text{Dur}(\kappa + \upsilon)}, \tag{A17}$$

using the definition of $\text{Dur} = \frac{1}{r-g}$ and replacing g as in equation A15.

We use our new data to measure the objects in equation A16. The average discount rate (of firms that fully account for overhead) in our data is 11.5 percent. The average duration of cash flows of listed US firms, using data from Compustat, is close to 20 years (van Binsbergen 2025). Following Philippon (2009), we assume an adjustment cost parameter typical of the literature of $\phi = 10$. Finally, assuming that the average financial cost of capital is 5.5 percent (Graham and Harvey 2018) and inserting these figures into equation A16, we find that the model-implied effect of the discount rate on the net investment rate is -0.95.

Appendix G The Persistence of Firm Characteristics Over Time

Table A18 displays coefficients from regressions of a future characteristic on the same characteristic averaged over 2000 to 2002. Standard errors are clustered at the firm level and displayed in parentheses.

The first row shows the coefficient from regressing market power in 2005 on market power in 2000-02. The coefficient is 0.88, indicating a strong and statistically significant association between market power in 2000-02 and in 2005. The association is also positive and significant at the end of our sample in 2021, as shown by the coefficient of 0.9 in the second column. There is thus a strong association over time between market power in 2000-02 and market power in later years.

We similarly find significant associations between the financial constraints index in 2000-02 and the index in 2005 (column 3) as well as between the financial constraints index in 2000-02 and the index in 2021 (column 4). Finally, the associations between risk in 2000-02 and risk in 2005 (column 5) as well as between risk in 2000-02 and risk in 2021 (column 6) are also positive and significant. The coefficients on risk are slightly lower than for the other two characteristics. This may indicate that there was more movement in firm-level risk than for other characteristics over our sample period, in particular over the period 2000 to 2005. However, the coefficients are significantly above 0, which indicates that our analysis is informative about the behavior of firms with greater risk through the sample period.

Nonetheless, we also repeat the analysis of Table A13 using the average firm-level risk over the years 2015 to 2021, since this is the period toward the end of our sample during which the discount rate wedge grew by the most. Risk was relatively stable throughout the 2015-21 period: the coefficient is 0.89*** (0.04) when regressing risk in 2021 on risk in 2015. Consistent with Table A13, we find no evidence that firms with higher risk increased their discount rates by more. We prefer using the 2000-02 values in the paper, however, because using averages over this period ensures that the analysis is immune to concerns about reverse causality.

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