Firms' Perceived Cost of Capital[*]

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Abstract

We analyze firms' perceptions of their cost of capital using hand-collected data. We show that firms with a higher perceived cost of capital invest less and earn higher returns on invested capital, suggesting that the perceived cost of capital determines the long-run allocation of capital. In inefficient markets, firms aiming to maximize their current market value should set their perceived cost of capital equal to the expected returns on their debt and equity. We strongly reject this market-value maximization benchmark, as little variation in firms' perceived cost of capital can be explained by variation in market-based expected returns. Alternatively, firms may aim to maximize their fair value, which is the value corrected for financial market inefficiencies. We find evidence in favor of this approach, as a fundamental risk benchmark explains half the variation in the perceived cost of capital. Most variation in the perceived cost of capital can be explained by firms incorporating investors' biased return expectations, which is inconsistent with firms maximizing their current market value. Using a quantitative model, we find that distortions in the perceived cost of capital can generate substantial capital misallocation and thereby reduce aggregate productivity.

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1 Introduction

One of the most important decisions faced by firms is determining how much to invest. In theory, firms should undertake only projects whose expected return exceeds the cost of capital. This rule is widespread in academic models, business school teaching, and corporate practice.

A fundamental challenge with applying this rule is that the cost of capital is unobserved and there is no unambiguous guidance on how it should be estimated. For example, one traditional academic recommendation is that firms should use the expected returns on their debt and equity in financial markets as their cost of capital. However, to implement this recommendation, firms need to estimate expected returns, which is difficult to do without bias. Moreover, the traditional recommendation is often motivated by the idea that financial markets are efficient, which is inconsistent with empirical evidence. Given that return perceptions are often biased and markets are inefficient, it is not clear how firms actually set their cost of capital. As a result, firms' internally perceived cost of capital—and hence their investment decisions—may deviate substantially from the benchmarks that have been proposed by researchers.

In this paper, we study firms' perceptions of their cost of capital based on hand-collected data. We find that firms with a higher perceived cost of capital have lower investment rates and higher returns on investment, consistent with firms basing their investment decisions on their perceived cost of capital. However, firms' perceived cost of capital cannot be explained by models in which firms maximize their current value in financial markets. Instead, the perceived cost of capital is better explained by firms maximizing their "fair value," which is the intrinsic value the firm would have absent mispricing. In addition, firms incorporate analysts' biased beliefs in their perceived cost of capital. This leads to deviations between the perceived cost of capital and benchmarks that would maximize market values or fair values. The deviations are large enough to materially influence the allocation of capital. In a general equilibrium model, the resulting capital misallocation lowers total factor productivity by 5% relative to a market-value benchmark, but only by 2% relative to a fair-value benchmark based on the Capital Asset Pricing Model (CAPM).

We start by analyzing how a firm should set its perceived cost of capital. We use a simple model of inefficient financial markets, in which prices deviate from intrinsic values because investors have biased beliefs. If a firm wants to maximize its current market value in this setting, the firm's perceived cost of capital should equal the "market-based cost of capital," which is the expected return on the firm's debt and equity in financial markets based on full-information rational expectations ("objective expected returns"). This approach ensures that firms maximize their current market value, but does not ensure that firms maximize their long-term value in inefficient markets. Instead, firms may seek to maximize the long-term, fair value of the company—the value of the firm absent mispricing. Firms can do so by using a "fair-value cost of capital," which depends on the fundamental risk of the firm. It may be calculated using the CAPM or other fundamental risk models, as we discuss below.

We measure firms' perceptions of their cost of capital using data from corporate conference calls between firm managers, financial investors, and analysts (see, e.g., Hassan et al. 2019 for the use of conference calls in economics). During these calls, managers sometimes share their internal perceptions of their cost of debt, equity, and total capital. We collect the data by manually reading call transcripts. The dataset on the perceived cost of capital contains around 1,500 large firms from 2002 to 2024. The sample is generally representative of the listed firm population except for a skew toward large firms. The firms for which we observe at least one perceived cost of capital account for roughly 40% of the total capital stock of Compustat firms in advanced economies.

The perceived cost of capital observed in our data is associated with the long-run allocation of capital across firms. We find that firms with a higher perceived cost of capital have higher returns on invested capital and lower investment rates. These findings suggest that the perceived cost of capital shapes capital allocation decisions in the long run, in line with conventional theory. We emphasize, however, that these findings refer to firms' long-run investment decisions. In the short run, changes in the perceived cost of capital do not immediately lead to changes in firm investment because of stickiness in firms' required returns on new investments (known as hurdle or discount rates, see Gormsen and Huber 2025). In the long run, however, the perceived cost of capital determines firms' required returns, and hence also their real investment decisions. In this paper, we focus on the long-run allocation of capital and therefore the properties of the perceived cost of capital.

We document stylized facts about which factors shape the perceived cost of capital. In the cross section of firms, the perceived cost of capital is related to a firm's market beta, leverage ratio, and size. There is little evidence that firms incorporate the value factor, in contrast to the recommendation of proponents of the market-value approach (Fama and French 1997). The perceived cost of capital is positively related to idiosyncratic volatility, even though idiosyncratic volatility is not positively related to the market-based cost of capital (i.e., the objective expected return). Cross-sectional and time-invariant differences across firms account for over 80% of the variation in the perceived cost of capital. In the time series, firms largely incorporate time variation in the equity risk premium and interest rates in their perceived cost of capital, in line with both the market-value and the fair-value approaches.

We next test directly if firms use the market-value or fair-value approaches to the cost of capital. The market-based cost of capital is the objective expected return on a firm's outstanding debt and equity. While there is no agreed upon estimate of ex ante objective expected returns, we can exploit a standard technique from asset pricing to test whether firms use objective expected returns as their perceived cost of capital: if firms use objective expected returns, the variation in the perceived cost of capital must be reflected in future realized returns. However, the data soundly reject this prediction. Only 20% of the variation in the perceived cost of capital can be justified by variation in objective expected returns. The remaining 80%, which we label "excess dispersion" relative to the market-value benchmark, cannot be justified by objective expected returns. The 80% excess dispersion reflects variation in the perceived cost of capital that should not exist according to models in which firms maximize current market value. The results are similar if we proxy for expected returns using the "implied cost of capital" instead of realized returns. The excess dispersion is robust across time periods, geographies, and types of firms.

The fair-value approach to the cost of capital is substantially better at explaining firms' perceptions than the market-value approach. According to the fair-value approach, firms should base their cost of capital on their fundamental risk. While fundamental risk is not unambiguously defined—it depends on the risk factors determining asset prices absent mispricing—a natural starting point is the CAPM model (Stein 1996). The fair-value cost of capital based on the CAPM explains around 50% of the variation in the perceived cost of capital. Firms could potentially include other fundamental risk factors besides just the CAPM. We consider the possibility that the Fama and French factors capture relevant fundamental risk, but including these factors lowers the explanatory power relative to the CAPM.

Our theoretical model also raises the possibility that firms use the biased return expectations of behavioral investors as their perceived cost of capital. Two mechanisms may give rise to such behavior. First, firms may attempt to follow the market-value approach, but share the biased beliefs of behavioral investors. In that case, firms may inadvertently use biased expected returns as the market-based cost of capital. Second, firms following the fair-value approach can, under certain assumptions, approximate the fair-value cost of capital using the subjective expected returns of behavioral investors. Specifically, we show in the theoretical model that the fair-value cost of capital approaches the subjective expected returns of behavioral investors as the share of rational investors diminishes (i.e., as markets become more inefficient). Hence, using biased return expectations as the cost of capital is inconsistent with the market-value approach, but could be consistent with the fair-value approach.

We take two approaches to testing whether the perceived cost of capital reflects the biased beliefs of behavioral investors. First, we construct an "analyst cost of capital" based on analysts' return expectations provided by the Institutional Brokers' Estimate System (IBES) and the sell-side firm Value Line. We find that the analyst cost of capital explains most of the variation in the perceived cost of capital. This finding holds both using the IBES and the Value Line data, and it is robust across time and geography.

Our second approach to testing behavioral beliefs is to study whether the perceived cost of capital incorporates the well-known bias of overreaction in beliefs (see Bordalo et al. 2022). In financial markets, this bias often leads investors to overextrapolate past returns, and to incorrectly believe that stocks with high past returns have high future returns (De Bondt and Thaler 1985, Lakonishok et al. 1994). We find that the perceived cost of capital reflects this bias, as firms with higher realized returns over the previous decade have a higher perceived cost of capital. Taken together, the findings show that firms' perceived cost of capital reflects the biased beliefs of behavioral investors. This finding is consistent with firms suffering from behavioral biases or implementing the fair-value approach, but inconsistent with firms maximizing current market value.

We end the paper by studying how the deviations in the perceived cost of capital from the market-based and fair-value benchmarks could distort the allocation of capital in the economy. Firms with too low a perceived cost of capital invest too much and firms with too high a perceived cost of capital invest too little, relative to the benchmark allocation. We quantify the impact of such misallocation through the lens of the framework by Hsieh and Klenow (2009). While the framework is stylized, it provides a useful way to gauge the economic magnitude of deviations in the perceived cost of capital (see also Giroud et al. 2022). In the framework, excess dispersion in the perceived cost of capital translates into lower aggregate TFP. We estimate TFP losses relative to different benchmarks, finding estimates around 5% relative to the market-based benchmark and 2% relative to the CAPM-based fair-value benchmark.

We verify that our results are not driven by measurement error in the perceived cost of capital. We can rule out that the data on firm perceptions are subject to general measurement error because we find no excess dispersion in the perceived cost of debt. We further verify that measurement error does not drive our results by using an instrumental variable approach. The strong relation between the firm-level perceived cost of capital and realized returns on invested capital also speaks against measurement error, as does the finding that most of the variation in the perceived cost of capital can be explained by analysts' subjective beliefs. In our data collection, we take care to only record explicit mentions of the firm-level cost of capital, rather than other objects related to financing, to avoid measurement error.

One may wonder if the market for corporate control could undo potential biases in managerial perceptions or eliminate the tendency for firms to use the fair-value approach. In principle, deviations from the market-based cost of capital lower equity prices, so an arbitrageur could take over the firm, impose the market-based cost of capital, and sell the firm at a profit. There are, however, limits to arbitrage (Shleifer and Vishny 1997) in the market for corporate control. For one, takeovers require large investments that may expose the arbitrageur to prohibitively large idiosyncratic risk. Moreover, takeover attempts can drive up equity prices and make potential deals unprofitable, particularly in inelastic markets (Gabaix and Koijen 2021). Finally, attempts to correct the cost of capital without a full takeover could be prevented by other investors if they share the biased beliefs of managers. This last argument is supported by the fact that the analyst-based cost of capital can account for all of the variation in the perceived cost of capital. (Moreover, it is rare that analysts on conference calls disagree with managers' perceptions of the cost of capital.)

Previous research on the perceived cost of capital relies on qualitative survey evidence about the methods used by firms to estimate their cost of capital. According to the Duke CFO Survey, 80% of large firms apply the CAPM, 70% additionally use multi-factor models, and 40% use historical returns (Graham and Harvey 2001, Graham 2022). Other surveys find similar results (Jacobs and Shivdasani 2012, Mukhlynina and Nyborg 2016, Jagannathan et al. 2016). Firm investment decisions are consistent with firms using the CAPM and simplified factor models (Krüger et al. 2015, Hommel et al. 2025). These findings leave open how exactly firms apply and combine different approaches, whether firms act "as if" certain factors mattered, and how quantitatively important different factors actually are. More generally, there is no evidence on the relation between expected returns and the perceived cost of capital as well as the implications for misallocation and macro-finance models.[1]

2 Theory: Cost of Capital in Inefficient Markets

In this section, we use a simple model of inefficient capital markets to study the perceived cost of capital. The perceived cost of capital is the return that the firm believes it has to provide to investors. This rate depends on the state of financial markets and the objective of firms.

The cost of capital has traditionally been defined in the context of an efficient market. In this context, the cost of capital is clearly defined as the objective expected return on firms' outstanding debt and equity. The reason is that using the objective expected return as the cost of capital maximizes the current market value of the firm, which is firms' objective in efficient markets. But in inefficient markets, the objective of the firm is more ambiguous, and so is the proper definition of the cost of capital. The purpose of this section is to define firms' cost of capital in inefficient markets.

In our model, asset prices are influenced by behavioral investors with irrational beliefs about future payouts and returns. The behavioral investors distort prices and expected returns away from the fair value implied by firms' riskiness. Firms can choose to maximize either their current value in inefficient markets or their "fair value" implied by their fundamental riskiness. We show that if firms want to maximize their market value, they should use objective expected returns as their cost of capital, even though prices are inefficient. But if firms want to maximize their fair value, they should use a "fair return" as their cost of capital. The fair return is based on the fundamental risk of the firm and determined by the CAPM in our model.

[1]Previous work has studied the quantitative importance of one factor, the market beta, for firms' discount rates (i.e., required returns, or hurdle rates, but not the perceived cost of capital), finding mixed results (Poterba and Summers 1995, Jagannathan et al. 2016, Cho and Salarkia 2020).

The behavioral investors have subjective return expectations that deviate from objective expected returns, so using these subjective return expectations would be suboptimal for firms that follow the market-value approach. The subjective expected returns also deviate from the fair cost of capital if there are rational investors in the market, so it is not generally optimal for firms to use the subjective return expectations even under the fair-value approach. However, the subjective expected returns converge towards the fair cost of capital as the rational investors leave the market, so in inefficient markets with very few rational investors, the use of subjective return expectations can be a useful approximation to the fair-value approach.

The model relates to Stein (1996) who similarly argues that firms should base their cost of capital on objective expected returns if they want to maximize current market value and on fundamental risk (i.e., the CAPM) if they want to maximize fair value. Relative to Stein, we introduce an equilibrium model of asset prices with heterogeneous agents that allows us to study how subjective expected returns of different investors relate to objective expected returns and the fair value return.

2.1 Model of Asset Prices and Expected Returns

We consider an overlapping generations model with investors who live for two periods. The model of asset prices is similar in spirit to the overlapping generations model in De Long et al. (1990). At the beginning of each period t, investors $i = A, B$ are born with wealth W_i and invest in securities $j = 1, \ldots, J$. Security j pays dividends D_t^j, has $x^{*,j}$ shares outstanding, and trades at an endogenous price P_t^j. Agent A (arbitrageur) has rational expectations about future prices and dividends whereas agent B (behavioral) has irrational expectations. Young investors choose portfolios at time t to maximize their utility:

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

where γ_i is the risk aversion, Ω_t is the variance-covariance matrix of the payout next period, $P_{t+1} + D_{t+1}$, and E_t^i denotes expected values as perceived by agent i.

The arbitrageur A has full-information rational expectations. We refer to these as objective expectations and denote them E_t^{O} such that $E_t^A[P_{t+1} + D_{t+1}] = E_t^{\mathrm{O}}[P_{t+1} + D_{t+1}]$. The behavioral investor B has irrational views on the expected value of future payouts. B overestimates future values by κ_t^j, scaled by the current price, such that

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

where $DIA()$ transforms the vector κ_t into a diagonal matrix.[2] The series κ_t^j are deterministic.[3] The first order condition for investor i at time t is

$$x_{t,i} = \frac{1}{\gamma_i}(\Omega_t)^{-1}\left(E_t^i[P_{t+1} + D_{t+1}] - (1 + r^f)P_t\right). \tag{1}$$

Market clearing implies equilibrium prices

$$P_t = DIA\left(1 + r^f - \tilde{\kappa}_t\right)^{-1}\left(E_t^{\mathrm{O}}[P_{t+1} + D_{t+1}] - \gamma\Omega_t x^*\right), \tag{2}$$

where $1/\gamma = 1/\gamma_A + 1/\gamma_B$ and $\tilde{\kappa}_t = \kappa_t \frac{\gamma}{\gamma_B}$.

The objective expected returns associated with the prices in equation (2) can be expressed through a sentiment-adjusted CAPM:

$$E_t^{\mathrm{O}}[r_{t+1}^j] = r^f - \tilde{\kappa}_t^j + \beta_t^j \lambda_t, \tag{3}$$

where $\tilde{\kappa}_t^j$ captures distortions in objective expected returns from mistakes in B's expectations, β_t^j is the market beta of firm j, and $\lambda_t = E_t^{\mathrm{O}}[r_{t+1}^M] - r^f + \tilde{\kappa}_t^M$ is the market risk premium under objective expectations. Firms with high κ^j have lower expected returns because the behavioral investors are overly optimistic about the future value of these firms and buy them aggressively. This demand pressure leads to elevated prices and objectively lower expected returns.

For the subsequent analysis, it is useful to define the expected returns that would have arisen if investors made no mistakes about a given firm's expected payout (i.e., $\kappa_t^j = 0$). We refer to these as the "fair return," because they reflect the expected returns justified by the fundamental risk alone. We define the fair expected return for

[2]Alternative formulations of the bias, such as B overestimating future values by κ_t^j not scaled by the current price (as in De Long et al. 1990), lead to similar results.

[3]This contrasts with De Long et al. (1990) who model stochastic biases in demand. Making the biases stochastic generates noise trader risk premia that ensure that noise traders and behavioral investors do not lose money and that they therefore remain in the market over time.

firm j at time t as the expected return that arises if we set $\kappa_t^j = 0$ in (2):

$$E_t^{\mathrm{O}}[r_{t+1}^{\text{fair value},j}] = r^f + \tilde{\beta}_t^j \tilde{\lambda}_t, \tag{4}$$

where $\tilde{\beta}_t^j$ and $\tilde{\lambda}_t$ are the betas and risk premia obtained under the fair-value price. The main difference between fair and actual expected returns is that the mispricing term κ_t^j disappears, such that expected returns now follow the CAPM. The beta and market risk premium also differ slightly due to the effect of κ_t^j on prices (see Stein 1996 for a discussion of how fair-value betas differ from betas observed in financial markets).

The behavioral investor B believes expected returns are distorted away from the CAPM, but in the opposite direction of the objective expected returns:

$$E_t^{\mathrm{B}}[r_{t+1}^j] = r^f + \hat{\kappa}_t^j + \beta_t^j \lambda_t^B, \tag{5}$$

where $\hat{\kappa}_t^j = \kappa_t^j \frac{\gamma}{\gamma_A}$ and λ_t^B is the risk premium under agent B's expectations. The arbitrageur A trades against B by tilting away from high-κ stocks, which pushes prices below the fair value perceived by B. Agent B accordingly thinks that the expected return on these stocks are higher than the CAPM justifies.

2.2 Investment Rules

Each firm chooses whether to undertake an investment project. The project under consideration is representative of the firm in terms of risk and sentiment. Since the sentiment adjustment for expected returns in (3) can be represented by a risk factor, this assumption is equivalent to assuming that the project is representative of the firm in terms of all risks determining objective expected returns. We assume that each project is too small to influence the pricing of risk in the economy.

We study how the firm should decide whether to undertake the project. The optimal decision rule depends on the firm's objective function. We derive the firm's investment rule under two objective functions: when the firm aims to maximize its current value in financial markets and when the firm aims to maximize its fair value based on fundamental risk.[4]

[4]Theoretical models often describe firms' optimal investment rules in terms of the stochastic discount factor (SDF). We show in Appendix B that rules based on an SDF can equivalently be represented as rules based on the cost of capital of the project. Moreover, if the project under

Investment rule 1: market-value approach The first investment rule arises when the firm aims to maximize its current market value. The firm can measure how much undertaking the project changes its current market value by calculating the net present value (NPV) of the project in financial markets. This market-based NPV of firm j's project is

$$\mathrm{NPV}_t^{\mathrm{market},j} = \sum_{k=0}^{\infty} \frac{E_t^{\mathrm{O}}[CF_{t+k}^j]}{\delta_{t+k}^{\mathrm{market},j}}, \tag{6}$$

where CF_t^j is the cash flow associated with firm j's project at time t and

$$\delta_{t+k}^{\mathrm{market},j} = 1 + E_t^{\mathrm{O}}[r_{t,t+k}^j] \tag{7}$$

is the discount rate for the k'th cash flow. The market-based NPV uses the objective expected return on firm j as the cost of capital of the project.

To maximize current market value, firms undertake all projects with a positive market-based NPV. The firm should therefore use the objective expected return if it wants to maximize its current market value. This choice of cost of capital implies that firms may invest in projects that offer a lower expected return than the fair return of the project given its fundamental riskiness. Intuitively, firms exploit the behavioral investors' willingness to buy shares in high-κ firms at excessively high prices—because of excessively high cash flow expectations—which allows the firm to raise capital at a rate below the risk-based benchmark.

Investment rule 2: fair-value approach Firms use a different cost of capital if they want to maximize the fair value of the firm, based on fundamental risk alone. The fair value is the value financial markets would have assigned to the firm if all investors had rational expectations about a given firm ($\kappa_t^j = 0 \; \forall \; t$). Firms maximize the fair value by calculating the fair NPV of the project:

$$\mathrm{NPV}_t^{\text{fair value},j} = \sum_{k=0}^{\infty} \frac{E_t^{\mathrm{O}}[CF_{t+k}^j]}{\delta_{t+k}^{\text{fair value},j}}, \tag{8}$$

consideration has the same risk as the firm's assets overall, the optimal discount rate in frictionless models is the cost of capital of the firm. It is not generally optimal to use just one cost of capital for the whole firm, since risk differs across projects of the same firm, but many firms nonetheless use just one cost of capital in practice. See also Section 3.

where

$$\delta_{t+k}^{\text{fair value},j} = 1 + E_t^{\text{O}}[r_{t,t+k}^{\text{fair value},j}], \tag{9}$$

and invest in all projects with positive fair NPV. The fair NPV uses the fair return from (4) as the cost of capital. This return would have been the objective expected return of the project absent mispricing in financial markets (i.e., if B had rational expectations). In that sense, the fair return reflects only the fundamental risk properties of the project. In our simple model, the fair return is set by the CAPM, but models with other preferences could lead to other factor models for the fair return. By undertaking only projects with positive fair NPV, the firm ensures that the objective expected returns of all investment projects exceed the returns investors would require if they had rational expectations.

The objective of fair-value maximization differs from the more standard market value objective. Firms may use the fair-value approach for at least three reasons. First, they may want to act in the best interest of their investors, without exploiting their behavioral biases. Using the fair-value approach ensures that investors get rewarded in line with the fundamental risk of their investment. Second, managers may pursue the fair-value approach due to career concerns. Over time, investors will be able to calculate the average realized returns on the projects undertaken by managers. It could reflect poorly on the managers if the realized returns on projects are consistently lower than the fair returns, and could make it difficult for managers to find future employment or investors.

Finally, firms may use the fair-value approach if they want to maximize long-run market value and expect investor sentiment to be transitory. The fair-value approach ensures that firms do not undertake a project that is only profitable given transitory distortions to asset prices, and which investors will regret investing in shortly after. If the sentiment is expected to disappear at a future time T, our model predicts that the fair returns and objective expected returns are identical at T. In this case, firms can use the fair return to capture the future expected return, ensuring that investors in the future will also be happy with the past project choices.

Subjective return expectations and the cost of capital We discuss under which circumstances firms would use only the subjective expected return of behavioral investor B, given by (5), as the cost of capital.

Using the subjective expected return is inconsistent with the market-value approach as it does not maximize current value. This is because the subjective expected return always deviates from the objective expected return in (3), so the subjective expected return always deviates from the market-based cost of capital.

Using the subjective expected return is also generally inconsistent with the fair-value approach, except for a special case. The fair-value cost of capital is given by the CAPM, which differs from B's subjective expected return by the term $\hat{\kappa}_t^j = \kappa_t \frac{\gamma}{\gamma_A}$ (see equation 5). This term goes to zero as the risk tolerance of the rational investor A goes to zero (the risk aversion γ_A goes to infinity), which is to say that the fair cost of capital converges to B's subjective expected returns as the rational investor disappears. Formally:

$$\delta_{t+k}^{\text{fair value},j} \to 1 + E_t^B[r_{t,t+k}^j] \quad \text{as} \quad \gamma_B/\gamma_A \to 0. \tag{10}$$

Hence, if assets are priced only by behavioral investors, their subjective expected return equals the fair rate and can be used as the fair-value cost of capital. Intuitively, in the absence of an investor A, investor B alone prices markets and sets prices such that the expected returns (under their subjective beliefs) are equal to the fair rate.

Subjective return expectations can thus be useful because they can make it possible for firms to observe the fair-value cost of capital without knowing fundamental risk (in this model, fundamental risk is given by the CAPM, but in practice, firms may not know how investors perceive fundamental risk). The requirement for using subjective beliefs is that they align with fundamental risk. Empirical evidence suggests that subjective return expectations indeed align with subjective risk perceptions (Jensen 2022), although imperfectly so. We also caution that, in our model, subjective expectations are a poor measure of fundamental risk if there is a non-negligible mass of rational investors. Moreover, subjective expectations may not converge to the fair cost of capital in richer models of behavioral demand. If behavioral demand, for instance, gives rise to noise trader risk premia, as in De Long et al. (1990), then subjective expected returns no longer converge towards the fair cost of capital as the rational investor disappears.[5]

[5] In this case, if there are no rational investors, behavioral investors would price assets such that their subjective beliefs reflect both fundamental risk (which belongs in the fair cost of capital) and the noise trader risk (which does not belong in the fair cost of capital).

3 Measurement and Data Description

We assemble a new firm-level dataset by merging data on the key object of interest—the perceived cost of capital—with data on asset prices, exposure to risk factors, and capital investment.

3.1 Key Object in the Measurement

We are mainly interested in analyzing the firm-level cost of capital. This cost of capital captures the funding cost of a project that is representative of the overall firm, in the sense that the project has the same riskiness as the average project of the firm. Most firms calculate and know their firm-level cost of capital and use it as a starting point for their internal investment rules (e.g., Trahan and Gitman 1995, Graham and Harvey 2001, Gormsen and Huber 2025). According to many academic benchmarks, the firm-level perceived cost of capital should be related to firm-level expected returns in financial markets.

Using the firm-level cost of capital as the basis, firms typically set required returns on investment, called discount rates or hurdles rates. These discount rates capture the minimum expected returns that firms are willing to accept on new investment projects and are used in actual investment decisions. Discount rates may not equal the perceived cost of capital because they may incorporate additional factors, such as the specific risks of individual new projects, the real option value of individual projects, exaggerated cash flow expectations provided by division managers, or financial constraints. However, discount rates and the perceived cost of capital are strongly correlated in the cross section of firms and comove in the long run, implying that the perceived cost of capital ultimately determines discount rates and capital allocation (see Section 4.1).

Some firms use discount rate or cost of capital numbers that are division-specific to account for differences in projects across firm divisions. In the cases where firms discuss division-specific numbers, we collect the numbers separately but do not use them in our analysis in this paper. Our focus is the firm-level perceived cost of capital, which is meant to capture only the funding cost of the representative project of the firm and can be directly compared to firm-level expected returns in financial markets.

Firms usually base their firm-level perceived cost of capital on the textbook formula for the weighted average cost of capital (WACC), which in turn depends on firms' perceptions of the firm-level cost of debt and cost of equity:

$$r_{i,t}^{\text{WACC}} = \omega_{i,t} \times (1-\tau) \times r_{i,t}^{\text{debt}} + (1-\omega_{i,t}) \times r_{i,t}^{\text{equity}}, \tag{11}$$

where $r_{i,t}^{\text{WACC}}$ denotes the weighted average cost of capital of firm i at time t, ω is the percentage of debt finance (leverage), τ is the tax rate, and $r_{i,t}^{\text{debt}}$ and $r_{i,t}^{\text{equity}}$ are the firm-level perceived cost of debt and equity.

The conference call data allow us to measure firms' perceptions of their $r_{i,t}^{\text{WACC}}$, $r_{i,t}^{\text{debt}}$, and $r_{i,t}^{\text{equity}}$.

3.2 Measuring the Perceived Cost of Capital

Firms do not typically report a perceived cost of capital in official financial reports, whereas survey data are mostly anonymized and cannot easily be matched to firm characteristics and asset prices. We overcome these challenges by relying on data from earnings calls, investor conferences, and similar events, which we jointly call "conference calls." We build on the data collection in Gormsen and Huber (2025) and describe details in Appendix C.

Most listed firms hold quarterly conference calls to inform analysts and investors about their strategy. Firm managers occasionally disclose an internal estimate of their cost of capital on these calls, which we term the perceived cost of capital. The calls are relatively high-stakes settings, so managers have incentives to report accurate numbers if those numbers can be challenged and cross-checked by analysts and investors (Hassan et al. 2019). Indeed, analysts and investors often ask managers detailed questions about how past realized investment decisions relate to their cost of capital and statements from conference calls appear as evidence in securities lawsuits (Rogers et al. 2011). We verify in Section 4.1 that the perceived cost of capital measured on the conference calls predicts future investment rates and realized returns on invested capital.

We search through all transcripts of calls available on databases provided by Refinitiv and FactSet for the years 2002 to early 2024. We download paragraphs where managers mention at least one of 22 keywords.[6] Together with a team of research

[6]The keywords include 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

assistants, we manually read through roughly 160,000 downloaded paragraphs and collect all instances where firms state the "cost of capital," the "weighted average cost of capital," or the "WACC" for the whole firm. We ensure that our main analysis in this paper only focuses on the cost of capital observations for the whole firm. The collected data do not include instances where firms discuss hypothetical values (e.g., "imagine a cost of capital of x%"), where outsiders posit a cost of capital or ask suggestive question (e.g., "am I correctly assuming that your cost of capital is x%?"), or where managers discuss rates associated with specific debt issuances (e.g., "the yield associated with the new bond issuance is x%.") Firms almost always discuss the after-tax cost of capital, but we convert the few pre-tax values to after-tax values.

In addition to the perceived cost of capital, we also collect firms' perceived cost of debt, perceived cost of equity, and the discount rates (i.e., the required returns or hurdle rates) used by firms to assess the net present value of new investment projects. To identify discount rates, we rely on explicit manager statements about the minimum required internal rate of return that they want to earn on new investment projects.[7]

We manually match firm names from the conference call data to a Compustat firm key. This match then allows us to add firm-level asset prices from the Center for Research in Security Prices and firm-level exposure to 153 equity factors, assembled by Jensen et al. (2023).

3.3 Sample of Firms with a Perceived Cost of Capital

A total of 1,517 distinct firms report at least one perceived cost of capital on a conference call in the period 2002 to early 2024. The matches to Compustat, asset prices, and factor exposures leave 1,395 distinct firms in the sample.

Firms with a reported perceived cost of capital account for a relatively large share of the capital stock of all listed firms. The total capital stock (property, plant, equipment in Compustat) held by firms with at least one reported perceived cost of capital accounts for 38% of the total capital stock held by all firms in Compustat worldwide.[8] We observe a perceived cost of capital for 34 of the 100 largest firms

return, return on assets, return on invested capital, return on net assets, weighted average cost of capital, weighted cost of capital. We also include abbreviated keywords, for example, WACC.

[7]We separately collected other rates (such as realized and expected IRR) and ratios (such as required, realized, and expected ROA, ROIC, ROE) to ensure that the perceived cost of capital and discount rate were clearly differentiated from these other objects.

[8]We mainly conduct cross-sectional analyses in this paper, so the share of firms appearing with a

worldwide (by assets averaged over the sample period 2002 to 2024) and for 41 of the 100 largest U.S. firms. Large firms are overrepresented in the sample in part because they hold conference calls more regularly. The sample includes well-known firms, such as AT&T, Bank of America, Disney, Exxon, Home Depot, Intel, JPMorgan Chase, Mastercard, Nestle, Novartis, UnitedHealth, and Visa.

We observe the perceived cost of capital in exactly one quarter for around half of the firms in the sample and in more than one quarter for the other half of firms, as shown in Figure A1. A histogram of the number of years that lie between observations of the perceived cost of capital for the same firm is in Figure A2. On average, observations for the same firm lie 4.3 years apart. The majority of firms adjust their perceived cost of capital regularly over time, rather than keeping it unchanged, as documented in Figure A3. For observations that lie up to one year apart, 58% of firms report a different perceived cost of capital. Over horizons exceeding three years, around 90% of firms report a different perceived cost of capital.

Surveys suggest that the vast majority of large firms calculate a perceived cost of capital and use it as input to their discount rates and investment decisions (e.g., Trahan and Gitman 1995, Graham 2022). We observe the perceived cost of capital only for a subset of firms for several reasons. First, we require an unambiguous statement about the cost of capital at the firm level in the context of a capital budgeting keyword. Some firms discuss hypothetical values and financing costs for specific issuances, but the information may not be precise enough or in the context of a keyword, leading us to omit the information.

Another reason is that many firms do not mention their cost of capital on conference calls. Most mentions of the perceived cost of capital occur when the CEO or CFO describes their financing and investment strategy. Instead of reporting the cost of capital, firms may alternatively describe their strategy by discussing specific investment projects, their investment approach in general terms, or specific financing arrangements, including issuances and buybacks. Firms also often report expected balance sheet figures and earnings ratios, such as future returns on invested capital, to shed light on their plans. From the point of view of the analysts and investors on the calls, this type of information can be sufficient to clearly characterize a firm's strategy. Additionally reporting the firm-level perceived cost of capital may not provide incremental information, so it does not always appear on conference calls. For

perceived cost of capital at least once in the dataset is the relevant statistic.

our purposes, the perceived cost of capital is useful because it captures a quantitative determinant of a firm's long-run investment that can be directly linked to theory and evaluated against academic benchmarks.

We analyze the characteristics of firms with a reported perceived cost of capital by regressing an indicator (scaled by 100) for whether the firm reported at least one perceived cost of capital on characteristics of the firm (averaged over the sample period), controlling for country fixed effects. The sample in this regression includes all firms in Compustat where the relevant characteristics are observed. Increasing the asset size of a firm by 100% raises the propensity to report a perceived cost of capital by 2.2 percentage points, as shown in Table A1. However, there is no evidence that firms with different investment rate (a proxy for growth of the capital stock), leverage (a proxy for financing choices and risk), Tobin's Q (a proxy for investment opportunities), the return on equity (a proxy for profitability), assets-to-sales (a proxy for the asset intensity of the production function), and balance sheet reporting month (a proxy for different accounting practices) are more likely to report a perceived cost of capital, conditional on size. The coefficients on the non-size characteristics are economically small and statistically insignificant. For example, a one standard deviation increase in the net investment rate lowers the probability of reporting a perceived cost of capital by an insignificant 0.02 percentage points.

We also consider whether firms are more likely to report the perceived cost of capital when they experience unusual shocks. We regress an indicator (scaled by 100) for whether the firm reported a perceived cost of capital in a given year on the characteristics of the firm in that year. We additionally control for country-by-year fixed effects and firm fixed effects, which ensures that we analyze only variation in the reporting timing of the same firm, relative to other firms in the same country. The coefficients on the firm characteristics in Table A2 are small and insignificant, implying that firms are not more likely to report a perceived cost of capital during years when their characteristics are unusually high or low.

3.4 Summary Statistics

The mean perceived cost of capital is 8.7%, with substantial variation ranging from 5.2% at the 5$^{\text{th}}$ percentile to 13% at the 95$^{\text{th}}$ percentile, as shown in Table 1 and Figure A4. Around half of the observations of the perceived cost of capital are from

U.S. firms, as reported in Figure A5. The distribution of most industries in the sample is similar to the Compustat universe, shown in Figure A6. Firms in the industrials and utilities industries are slightly overrepresented in the sample, but the results below are robust to excluding these industries.

The average perceived cost of debt is lower than the perceived cost of capital, whereas the perceived cost of equity is higher, in line with textbook predictions on their relative riskiness. We also calculate an "imputed" perceived cost of equity at the firm level, based on the perceived cost of capital reported by the firm, which we do not use in the main analysis but in a few additional tests. We calculate it by solving the WACC formula (11) for the cost of equity, using as inputs the perceived cost of capital, the cost of debt measured using interest expenses over total debt in Compustat, and leverage (book debt divided by the sum of book debt and the market value of equity).

The mean discount rate, used internally by firms to evaluate investment projects, is 15.3%. The levels of the perceived cost of capital and the discount rate cannot be directly compared because some firms do not account for overhead in the discount rate they report on surveys and conference calls (see Gormsen and Huber 2025 for details).

4 Data Validation and Stylized Facts

We verify that the perceived cost of capital determines the allocation of capital across firms. We then document stylized facts about the behavior of the perceived cost of capital across firms and time.

4.1 Data Validation using Investment Returns and Rates

In conventional models of long-run capital allocation, a firm's perceived cost of capital influences the firm's required return on new investment projects, known as the firm's discount rate. A firm with a higher perceived cost of capital has a higher discount rate and thus invests in projects that, on average, offer higher expected returns. As a result, the higher a firm's perceived cost of capital, the higher the firm's average return on invested capital and the lower its investment rate (as fewer projects offer returns above the higher perceived cost of capital). We verify that the long-run allocation of capital across firms indeed varies with the perceived cost of capital in line with these predictions.

We begin by studying whether the firm-level return on invested capital (ROIC), calculated using Compustat, is associated with the firm-level perceived cost of capital reported on conference calls. The ROIC captures the average realized return on a firm's invested capital. The coefficient in column (1) of Table 2 implies that a firm's ROIC is, on average, 0.9 percentage points higher when the perceived cost of capital is 1 percentage point higher, compared to other firms in the same country and quarter. The coefficient is statistically different from zero at the 1 percentage point level. The relation between the ROIC and the perceived cost of capital is 1 in a competitive model with constant returns to scale as in Section 7.1. The estimated coefficient is statistically not different and economically close to this benchmark of 1.

In column (2), we include proxies for firm-level investment opportunities, profitability, production functions, and accounting timing (using Tobin's Q, the return on equity, assets-to-sales ratio, balance sheet reporting month) in the specification. In column (3), we additionally control for potential determinants of the firm's financing cost and expected returns in financial markets (using market value, market beta, market risk premium, and financial cost of debt). The coefficient remains similar, implying that the perceived cost of capital influences investment returns beyond other financial factors.

We also find that a firm's net investment rate is, on average, 0.8 percentage points lower when the perceived cost of capital is 1 percentage point higher, as reported in column (4) of Table 2. The coefficient is different from zero at the 5 percentage point level. A simple Q-model calibrated as in Philippon (2009) predicts a coefficient around -1, as detailed in Gormsen and Huber (2025). The estimated coefficient is thus consistent with the Q-model. The coefficient remains similar including the controls in columns (5) and (6).

The results in Table 2 are based on cross-sectional regressions, comparing different firms to each other at the same point in time. The results of these regressions imply that the levels of investment returns and investment rates vary systematically with the perceived cost of capital across firms. However, the coefficients do not reveal whether changes in a firm's perceived cost of capital immediately affect the investment decisions of that firm in the short run. The perceived cost of capital affects investment insofar as it affects the discount rate. Recent work by Gormsen and Huber (2025) shows that changes in a firm's perceived cost of capital have weak effects on the firm's discount rate over horizons below 2 years, but strong effects over horizons exceeding 10 years. When the perceived cost of capital changes, it takes the average firm many years to update its discount rate. This slow incorporation implies that firm investment hardly responds to shocks to the cost of capital in the short run. In comparison, over long horizons, changes in the perceived cost of capital are strongly incorporated into the discount rate.

Given the strong long-run incorporation, the perceived cost of capital determines the levels of investment returns and rates, and thereby the allocation of capital across firms, as shown in Table 2. The focus of this paper is the long-run allocation of capital, and thus the properties of the perceived cost of capital.[9]

4.2 Stylized Drivers and the Perceived Cost of Capital

We analyze to what extent the perceived cost of capital reflects stylized cross-sectional drivers of financial returns that are traditionally discussed in the literature. According to Modigliani and Miller (1958), firms with higher leverage should have a lower cost of capital due to a higher tax shield (see equation 11), independent of whether firms calculate a market-based or a fair-value cost of capital. Firms that follow a market-value approach should, according to Fama and French (1997), also incorporate the market, size, and value factors, as exposure to these factors determines cross-sectional variation in expected returns. Firms that follow a fair-value approach should only incorporate these factors to the extent they capture fundamental risk.

Figure 1 illustrates the relevance of leverage, market beta, size, and value for cross-sectional variation in the perceived cost of capital. In the top-left panel, we plot the perceived cost of capital for quintiles of firms based on leverage. The perceived cost of capital averages 9% for firms with the lowest leverage and 8.5% for firms with the highest leverage, which is consistent with the benefits of the tax shield.[10]

The remaining three panels plot the results for market beta, size, and value. The perceived cost of capital increases by around 1.5 percentage points going from low to high beta firms. This relatively large increase is in line with past surveys, according to which many firms use market betas as one input into their perceived cost of capital

[9] In contrast, the focus of Gormsen and Huber (2025) is to document the slow incorporation of the perceived cost of capital into discount rates.

[10] Leverage increases from around 0.1 to 0.6 when going from the bottom to top group. If we assume a tax rate of 20% and a cost of debt of around 4.66% (the average in our sample), the difference in the tax shield should be around $0.5 \times 0.2 \times 4.66\% = 0.47$ percentage points.

(e.g., Graham and Harvey 2001, Jacobs and Shivdasani 2012, Mukhlynina and Nyborg 2016). The strong relation is consistent with firms using a fair-value cost of capital, as CAPM betas are often considered a measure of fundamental risk. In contrast, the results are hard to reconcile with the market-value approach: it is a well-known fact that the security market line is flat, and sometimes downward sloping, implying market betas are not positively related to objective expected returns and hence the market-based cost of capital (Frazzini and Pedersen 2014, Baker and Wurgler 2015). Indeed, in the upcoming Section 5.1, we document that most of the variation in the perceived cost of capital is unrelated to variation in the market-based cost of capital, and that market betas are an important source of this pattern.

There is a meaningful size effect in the cost of capital, as larger firms have substantially lower cost of capital than small firms (bottom left corner of Figure 1). To the extent that managers believe small firms are riskier than larger firms, this finding is consistent with the fair-value approach to the cost of capital. It may also appear consistent with the market-value approach, as small firms have historically had high expected stock returns, but this effect has mostly disappeared since the turn of the millennium. The size effect may be surprising in light of past survey evidence, according to which managers do not explicitly account for size premia (Graham and Harvey 2001), but is consistent with the fact that financial analytics firms, like Duff & Phelps, account for size premia.[11]

There is essentially no value effect in the cost of capital, as shown in the bottom right panel of Figure 1. This finding contrasts with the large asset pricing literature on the value premium, which finds that value firms have higher expected returns than growth firms. If firms follow the market-value approach, they should incorporate the value factor, as advocated by Fama and French (1997). The absence of a value effect in the perceived cost of capital is inconsistent with the market-value approach. The absence is, however, consistent with the fair-value approach, as the value effect is unrelated to standard measures of fundamental risk (Lakonishok et al. 1994, Asness et al. 2013).

We find similar patterns using multivariate regressions in Table A3. The perceived cost of capital significantly increases in market beta and decreases in size and leverage. The value effect is insignificant.

Going beyond the four stylized drivers, we study which firm characteristics from a

[11] See the Kroll Cost of Capital Navigator, https://www.kroll.com/en/cost-of-capital.

broader set of potential predictors are associated with the perceived cost of capital. We consider the 153 characteristics identified by Jensen et al. (2023), which are based on the equity risk factor literature, as well as an indicator for U.S. versus European firms. The characteristics are measured in cross-sectional percentiles relative to firms in the same country and quarter.

We allow a Lasso procedure to select the characteristics that best describe the perceived cost of capital. Figure 2 plots the loadings of the perceived cost of capital on each of the 11 characteristics selected by the Lasso. The loadings tell us how much the perceived cost of capital increases when a firm goes from the bottom to the top of the cross-sectional distribution of the given characteristic, keeping the other characteristics constant. For instance, the loading on the CAPM means the perceived cost of capital is around 1.5 percentage points higher for firms with the highest market beta than those with the lowest beta. The Lasso additionally selects three variables related to leverage, namely the debt-to-market value of the firm, the net debt-to-price of the firm, and assets to book equity, all with the expected negative sign. Market equity, proxying for size, is selected with the expected negative sign.

The Lasso also selects firm age, access to external finance, idiosyncratic volatility, and the European dummy (due to the lower nominal interest rate during our sample period) as relevant characteristics. The presence of idiosyncratic risk deserves special attention. Idiosyncratic risk has been shown to be related to expected stock returns (Ang et al. 2006), but with the opposite sign of what we find in Figure 2: firms with higher idiosyncratic volatility tend to have lower expected stock returns, but we find that firms with higher idiosyncratic volatility have higher perceived cost of capital. The positive role of idiosyncratic risk is also hard to reconcile with the fair-value approach, as idiosyncratic risk is orthogonal to systematic risk and should not matter for the fair-value cost of capital. The positive loadings on the Kaplan-Zingales index and age are similarly surprising, as both characteristics are associated with higher expected returns (Lamont et al. 2001, Jiang et al. 2005), and neither are known to be negatively related to fundamental risk.[12] Taken together, the results are hard to reconcile with the market-value approach, as very few factors enter the perceived cost of capital with the same sign as the market-based cost of capital.

[12]Another driver of cross-sectional variation in the perceived cost of capital is firm "greenness," as documented by Gormsen et al. (2025). We do not consider greenness here because it is not part of the characteristics in the dataset of Jensen et al. (2023).

We use the Lasso model to construct a database of predicted values for the perceived cost of capital, as detailed in Appendix F. By using the Lasso, we also estimate predicted values for firm-quarter observations where we do not observe the perceived cost of capital. The resulting database contains 250,000 firm-quarter observations of predicted values, both for the perceived cost of capital and also for discount rates, and is available at costofcapital.org.

Having studied cross-sectional variation in the perceived cost of capital, we now summarize variation over time in the average perceived cost of capital. We relate the average perceived cost of capital to stylized drivers of time variation in financial markets that are traditionally discussed in the literature. For simplicity, we use the earnings yield plus expected inflation as a proxy for time variation in the cost of equity and the long-term government interest rate as a proxy for time variation in the cost of debt (this approach abstracts from credit risk).

Figure 3 shows a downward trend in the average perceived cost of capital that moves almost one-to-one with the earnings yield in the left panel (the ranges and spacing of the two y-axes are identical). We observe a similarly close relation between the average perceived cost of debt in the U.S. and the long-term Treasury rate in the right panel (with a level difference driven by credit risk). The regressions in Table A4 confirm these conclusions. We regress the firm-level perceived cost of capital on the country-level earnings yield and the long-term government rate. By including firm fixed effects, we analyze only variation over time. Firms are, on average, financed with 2/3 equity and 1/3 debt, so if the proxies capture the cost of equity and debt perfectly, we expect slopes of 2/3 on the equity yield and $1/3 \times$ the tax rate on the interest rate. The coefficients in the U.S. sample in column (1) are 0.63 and 0.33, respectively, relatively close to this benchmark. The coefficients in the global sample in column (2) are slightly lower.[13]

Taken together, the results on time variation broadly confirm the findings in Gormsen and Huber (2025) using an updated sample: the average firm incorporates time variation in stylized drivers into their perceived cost of capital. However, the R^2 in all regressions is far from 1, implying much unexplained cross-sectional variation

[13]The coefficients on the earnings yield plus expected inflation may lie below 2/3 because fluctuations in the earnings yield do not purely capture fluctuations in the cost of equity in financial markets, but also reflect fluctuations in expected real growth rates (much of corporate earnings are reinvested by firms). Earnings yields are nonetheless often used as a rough proxy for long-run expected stock returns.

in how firms behave. In the remainder of the paper, we focus on this cross-sectional variation.

5 Testing Theories of the Cost of Capital

We formally test whether firms follow the market-value approach or the fair-value approach to the cost of capital.

5.1 Testing the Market-Value Approach to the Cost of Capital

The market-value approach implies that the perceived cost of capital should equal the objective expected return on firms' outstanding debt and equity (see Section 2.2).

A method to test the market-value approach An empirical challenge is that the objective expected return is unobserved, making it difficult to assess whether the perceived cost of capital equals the market-based cost of capital at any point in time. But standard asset pricing methods allow us to use realized returns on firms' outstanding debt and equity to assess whether the perceived cost of capital is at least an unbiased estimate of the expected return, a necessary condition for the two to be equal.

Following the model from Section 2, the market-based cost of capital is defined as

$$r_{i,t}^{\text{market-based}} = \omega_{i,t} \times (1-\tau) \times \mu_{i,t}^{\text{debt}} + (1-\omega_{i,t}) \times \mu_{i,t}^{\text{equity}}, \tag{12}$$

where $\mu_{i,t}^{\text{equity}}$ is the expected long-run return on the firm's equity and $\mu_{i,t}^{\text{debt}}$ is the expected return on the firm's debt.

An ideal regression would project the market-based cost of capital on the perceived cost of capital for firm i at time t,

$$r_{i,t}^{\text{market-based}} = \beta_0 + \beta_1 r_{i,t}^{\text{perc.}} + \varepsilon_{i,t}. \tag{13}$$

For the perceived cost of capital to equal the market-based cost of capital, the slope coefficient β_1 in (13) must be one: when firms perceive their cost of capital to be one percentage point higher, the market-based cost of capital must, on average, be one percentage point higher (i.e., the perceived cost of capital must be an unbiased estimate of the market-based cost of capital). Moreover, if $r_{i,t}^{\text{market-based}}$ is measured without error, the error terms $\varepsilon_{i,t}$ are all zero and the R^2 is one.

The empirical challenge in implementing (13) is that the objective expected return underlying $r^{\text{market-based}}$ is unobserved. A standard approach in asset pricing is to replace the unobserved expected return on the left-hand side with an ex post realized return (Fama and French 1988, Campbell and Shiller 1988). The realized return consists of the ex ante expected return plus a realized error term. Since the error term is, by definition, uncorrelated with ex ante expectations, it does not influence the slope coefficient β_1 in (13). We can therefore use the realized return on the left-hand side to test if $\beta_1 = 1$, a necessary condition for $r_{i,t}^{\text{perceived}}$ to equal $r_{i,t}^{\text{market-based}}$.

To implement this approach for the cost of capital, we define the realized return between period t and $t+j$ for firm i as $r_{i,t+j}^{\text{equity, realized}} = \mu_{i,t}^{\text{equity}} + e_{i,t+j}^{\text{equity}}$, where $\mu_{i,t}^{\text{equity}}$ is the expected return at time t and $e_{i,t+j}^{\text{equity}}$ is the unexpected error. We analogously define $r_{i,t+j}^{\text{debt, realized}} = \mu_{i,t}^{\text{debt}} + e_{i,t+j}^{\text{debt}}$ as realized debt return. Finally, we define a new variable for the cost of capital $r_{i,t+j}^{\text{realized}}$, in which we replace the cost of debt and equity with the realized returns:

$$
\begin{aligned}
r_{i,t+j}^{\text{realized}} &= \omega_{i,t} \times (1-\tau) \times r_{i,t+j}^{\text{debt, realized}} + (1-\omega_{i,t}) \times r_{i,t+j}^{\text{equity,realized}} && (14)\\
&= r_{i,t}^{\text{market-based}} + \omega_{i,t} \times e_{i,t+j}^{\text{debt}} + (1-\omega_{i,t}) \times e_{i,t+j}^{\text{equity}}, && (15)
\end{aligned}
$$

where the second equality follows from (12) as long as j is sufficiently large, so the equation captures long-run returns.

The slope coefficient β_1 in the regression

$$
r_{i,t+j}^{\text{realized}} = \beta_0 + \beta_1 r_{i,t}^{\text{perc.}} + \eta_{i,t}, \tag{16}
$$

is the same as in regression (13) because the error terms in the realized returns are orthogonal to time-t expectations. Testing whether $\beta_1 = 1$ thus allows us to test whether $r_{i,t}^{\text{perc.}}$ is equal to $r_{i,t}^{\text{market-based}}$.

The slope coefficient β_1 also reveals the share of variation in the perceived cost of capital that can be justified by variation in the market-based cost of capital. To derive this interpretation, we write

$$
r_{i,t}^{\text{perc.}} = r_{i,t}^{\text{market-based}} + \upsilon_{i,t}, \tag{17}
$$

where $r_{i,t}^{\text{market-based}}$ is the market-based cost of capital and $\upsilon_{i,t}^{\text{market-based}}$ reflects deviations from this benchmark. We can then write the variance of $r_{i,t}^{\text{perc.}}$ as

$$\operatorname{var}\left(r_{i,t}^{\text{perc.}}\right) = \underbrace{\operatorname{cov}\left(r_{i,t}^{\text{perc.}}, r_{i,t}^{\text{market-based}}\right)}_{\text{market-based variation}} + \underbrace{\operatorname{cov}\left(r_{i,t}^{\text{perc.}}, \upsilon_{i,t}^{\text{market-based}}\right)}_{\text{excess variation}}. \tag{18}$$

The first term on the right-hand side of (18) reflects variation in the perceived cost of capital that is justified by variation in the market-based cost of capital (i.e., variation in expected returns on debt and equity). The second term reflects variation that is not justified by variation in the market-based cost of capital. We refer to the latter variation as "excess dispersion" relative to the market-value approach. This term captures variation in the perceived cost of capital that should not exist according to the market-based benchmark.

Dividing both sides of (18) by the variance of the perceived cost of capital yields

$$1 = \underbrace{\frac{\operatorname{cov}\left(r_{i,t}^{\text{market-based}}, r_{i,t}^{\text{perc.}}\right)}{\operatorname{var}\left(r_{i,t}^{\text{perc.}}\right)}}_{\gamma^{\text{market-based}}} + \underbrace{\frac{\operatorname{cov}\left(\upsilon_{i,t}^{\text{market-based}}, r_{i,t}^{\text{perc.}}\right)}{\operatorname{var}\left(r_{i,t}^{\text{perc.}}\right)}}_{\gamma^{\text{excess}}}, \tag{19}$$

where $\gamma^{\text{market-based}}$ and γ^{excess} denote the share of the variance in the perceived cost of capital that reflects market-based and excess dispersion, respectively. The share $\gamma^{\text{market-based}}$ arithmetically equals the slope coefficient β_1 from regressions (13) and (16). In turn, the excess dispersion share γ^{excess} equals $1 - \beta_1$.

In our empirical analysis, we directly estimate the excess dispersion share. We define the forecast error in the perceived cost of capital as $r_{i,t}^{\text{perc.}} - r_{i,t+j}^{\text{realized}}$. By substituting $r_{i,t+j}^{\text{realized}}$ using (16) and recognizing that $\gamma^{\text{excess}} = 1 - \beta_1$, we can write the forecast error as:

$$r_{i,t}^{\text{perc.}} - r_{i,t+j}^{\text{realized}} = \beta_0 + \gamma^{\text{excess}} \times r_{i,t}^{\text{perc.}} + \xi_{i,t}, \tag{20}$$

This equation is our main regression specification. If there is no excess dispersion, the coefficient in this regression is zero.

Testing the market-value approach using realized return regressions To implement the variance decomposition approach, we need to calculate realized equity returns over a horizon at which expected returns determine the cost of equity. In principle, the cost of equity is the expected stock return over the same horizon as the duration of investments, often considered to be 10 years or more.[14] However, to maximize the number of observations, we will calculate realized returns over a 1-year horizon. The short horizon improves the statistical properties of our tests, and the choice is conservative for our estimates: if expected stock returns are constant over time, the horizon is irrelevant; if expected returns mean-revert over time, as is often assumed, using too short a time horizon results in upward biased slope coefficients in (16) (see Appendix D). Our choice of horizon is thus conservative in that it may overestimate $\gamma^{\text{market-based}}$ and underestimate γ^{excess} .

We could similarly rely on realized returns to measure the cost of debt. However, since debt includes many different bonds and types of bank debt, it is convenient to directly calculate a proxy for expected rather than realized debt returns. We use interest expenses (including coupon payments on bonds) over total debt in Compustat to proxy for the cost of debt. This measure is simplified and neglects, for instance, default risk. We will later verify that this measure captures most of the relevant variation in the perceived cost of debt and that the estimated excess dispersion does not arise from our measurement of the cost of debt.

Panel A of Table 3 presents estimates of γ^{excess}. In the first column, we regress the forecast error $r_{i,t}^{\text{perceived}} - r_{i,t+j}^{\text{realized}}$ on the perceived cost of capital of the same firm in the same quarter, as in equation (20). The estimate is 0.79, implying that 79% of total variation in the perceived cost of capital reflects excess variation. While we strongly reject the hypothesis of no excess dispersion in the perceived cost of capital (i.e., we reject a slope of 0), we cannot reject the hypothesis that the market-value approach justifies no variation at all in the perceived cost of capital (i.e., we do not reject a slope of 1). Later in this section, we pursue an alternative approach based on the implied cost of capital (ICC) that rejects a slope of 1.

Column (2) analyzes only cross-sectional variation by adding quarter-year fixed effects. The slope coefficient increases to 0.91. The estimate highlights a substantial disconnect between cross-sectional variation in the perceived and the market-based cost of capital.

[14]In theory, the horizon should equal the horizon of the investment. In many models, like the Q model, the horizon is equal to the duration of the cash flows, which is close to 30 years for many firms. In practice, investment horizons are substantially shorter. Firms on average report in surveys that they believe the appropriate horizon for the cost of capital is 10 years, and accordingly use the 10-year Treasury rate as the risk-free rate when calculating the cost of capital.

Testing the market-value approach using realized portfolio returns We confirm our results using an alternative portfolio-based approach. This approach alleviates potential concerns about inference in the firm-level panel of overlapping returns, as the statistical properties of the portfolio-based tests are similar to those of the original portfolio analyses by Fama and French (1992).

Our portfolio approach sorts stocks into three different portfolios based on their ex ante perceived cost of capital. Each month, we rank all firms based on the most recently observed estimate of the perceived cost of capital and sort them into three groups. We require observations of the perceived cost of capital to be no more than 60 months old; varying this threshold does not influence our results. For each group, we calculate the average realized stock returns over the subsequent month and the imputed perceived cost of equity. Each portfolio has around 110 firms on average each month, and never less than 40, leading to well-diversified portfolios.

In the first row of Table 4, we report that all three portfolios have similar realized returns, on average around 10 to 11% annually. Column (4) reports the returns to the long-short portfolio that invests one dollar in the high-portfolio and shorts one dollar in the low-portfolio. The realized return is close to zero, consistent with the weak predictive power over stock returns reported above. The next row reports the imputed perceived cost of equity for each portfolio. The imputed perceived cost of equity increases linearly, and the long-short portfolio has a perceived cost of equity of around 6.5%.[15]

For the purposes of our tests, the important question is whether the realized returns are equal to the perceived cost of equity. We strongly reject this hypothesis. The third row shows that the difference is monotonically decreasing for the three portfolios sorted on the perceived cost of capital. For the long-short portfolio in column (4), the difference is around 6.5 percentage points. The difference is 4 standard errors away from zero, leading to p-values well below 1%. These patterns are visualized in Figure 4. The figure shows that, in this portfolio analysis, none of the variation in the perceived cost of capital reflects variation in the market-based cost of capital, leading to even stronger economic rejections than the analysis in Table 3.

The inference in these regressions is similar to the standard analysis in empirical

[15]The imputed perceived cost of equity is measured with noise, but because we sort the portfolios on firms' perceived cost of capital, the noise does not influence the portfolio averages shown in the table. Using the perceived cost of capital in these regressions leads to the same conclusion.

asset pricing that studies the difference in realized returns for different portfolios. The standard asset pricing tests study the null of no difference in realized returns across portfolios, which is often hard to reject in short samples, but it is rejected when the spread in returns is sufficiently high (relative to the volatility of stock returns). Unlike the standard analysis in empirical asset pricing, we are effectively testing whether a return spread is equal to 6.5 percentage points, not 0 percentage points, which is an easier hypothesis to reject in our setting. The high t-statistics we observe on our tests are thus consistent with traditional asset pricing tests.

As discussed in Section 4.2, part of the excess dispersion in the perceived cost of capital is likely to arise from the relation between market betas and the perceived cost of capital documented in Figure 1. Market betas are strongly related to the perceived cost of capital, but betas are mostly unrelated to objective expected returns and hence the market-based cost of capital (Frazzini and Pedersen 2014, Baker and Wurgler 2015). To further explore this point, we study excess dispersion along the variation in the perceived cost of capital that is driven by market betas. We find that the excess dispersion for this part of the perceived cost of capital is 2.89 (Table A5 column 1). That is, along variation in market betas, there is almost 3 times as much variation in the perceived cost of capital as the market-value approach predicts.[16] We further explore the role of market betas in Section 5.2.

Testing the market-value approach using the implied cost of capital We now test the market-value approach using "the implied cost of capital." This approach has more statistical power than the one based on realized returns, but requires additional assumptions.

The implied cost of capital calculates the expected long-run stock return of a firm as implied by current valuations and expectations among investors. The implied cost of capital is a noisy predictor of market-based expected returns (Lee et al. 2021). In a global sample of stock returns of 4,500 firms between 1976 and 2021, we find that our implied cost of capital measure predicts future returns with a slope coefficient of 0.50 (p-value of 0.00), meaning that 50% of the variation in the implied cost of capital is noise not justified by expected returns. Assuming that the implied cost of capital is equal to the market-based expected return plus noise that is uncorrelated with firms'

[16] Another way of stating this result is that the security market line implied by the perceived cost of capital is much steeper than the security market line implied by realized returns.

perceptions, we can use the implied cost of capital to uncover the amount of excess dispersion in the perceived cost of capital relative to the market-value approach. Our approach follows the strand of literature in asset pricing that uses the implied cost of capital as a measure of long-run expected stock returns (see Pástor et al. 2022 and Eskildsen et al. 2024 for recent examples).

Following Eskildsen et al. (2024), we construct the implied cost of capital by averaging four accounting measures of the cost of capital, two based on the residual income models of Gebhardt et al. (2001) and Claus and Thomas (2001) and two based on the dividend discount models of Easton (2004) and Ohlson and Juettner-Nauroth (2005). The implied cost of capital captures only the implied cost of equity, so we use the same measures for the cost of debt, leverage, and taxes as in the previous subsection.

Columns 3 and 4 in Panel A of Table 3 report estimates of γ^{excess} based on the implied cost of capital. The slope coefficient in column 3 is 0.76, close to the estimate from realized returns. Adding quarter-year fixed effects slightly increases the coefficient to 0.84 in column 4. The standard errors are substantially smaller than for realized returns because the implied cost of capital is an expected return, which is less volatile than a realized return. We now reject the hypothesis that there is no relation between the market-based and perceived cost of capital (i.e., we reject a coefficient of 1).

The excess dispersion is remarkably consistent across types of firms and years. Figure A7 shows heterogeneity across firms. The figure reports excess dispersion for subsamples defined by splitting the sample at the median for five different characteristics: market value, book-to-market, dependence on external finance, issuance, and market beta. The top row shows that excess dispersion is slightly lower for firms with above-median market size, consistent with large firms being more sophisticated. The size difference is the only dimension of heterogeneity that is statistically significant (at the 5% level). Figure A8 shows excess dispersion estimated for different years. The excess dispersion is stable over the sample and statistically significant in all individual years.

5.2 Testing the Fair-Value Approach to the Cost of Capital

The fair-value approach to the cost of capital implies that firms estimate the cost of equity only using fundamental risk factors.

Testing the fair-value approach to the cost of capital requires taking a stance on which fundamental risk factors managers perceive. A long literature in asset pricing recovers "risk factors" based on realized stock returns, but these may arise from mispricing rather than fundamental risk (Kozak et al. 2018, Pedersen 2019). Our approach is to first test a common definition of the fair-value cost of capital based on the CAPM, which arises in our theoretical model of Section 2 and Stein (1996). We subsequently consider a more exotic estimate of the fair-value cost of capital from the Fama and French (2015) five-factor model.

To test the CAPM-based fair-value cost of capital, we first estimate the cost of equity based on the CAPM. We assume a constant risk premium of 6%, calculate betas in rolling five-year regressions of weekly data, and use the long-term government interest rate in the country at time t as the risk-free rate. These assumptions are close to those maintained by many finance practitioners. We have tried a wide range of alternative approaches to estimating the CAPM and find similar, and if anything, greater excess dispersion than using our baseline approach. We continue to calculate the cost of debt, leverage, and tax shield as in the previous subsection.

The estimate in column 1 of Panel B of Table 3 shows that the CAPM-based, fair-value cost of capital justifies 50% of the variation in the perceived cost of capital. The excess dispersion is marginally higher when including year fixed effects in column 2, potentially because part of the variation captured by the CAPM fair-value cost of capital is driven by time variation in interest rates. Overall, the fair-value cost of capital based on the CAPM explains a substantially larger part of the variation in the perceived cost of capital than the market-based cost of capital. This finding lends support to the fair-value theory of the perceived cost of capital: managers base their perceived cost of capital more on fundamental risk factors than objective expected stock returns.

While the CAPM-based fair-value cost of capital has more explanatory power than the market-value approach, it still does not explain all of the variation in the perceived cost of capital. One possibility is that the rest of the variation in the perceived cost of capital is driven by other fundamental risk factors, not just the market factor. To assess this possibility, we calculate a fair-value cost of capital based on the Fama and French five-factor model, which augments the market factor with four additional risk factors. This is the most recent of the factor models proposed by Fama and French to explain stock returns through fundamental risk. According to Fama and French, it should determine the cost of capital (Fama and French 1997). To calculate the cost of equity based on the five-factor model, we multiply a firm's exposure to each of the five risk factors by the risk premia for the associated factor (estimating risk premia as the average historical return on the factor), and use the short-term interest rate in the country as the risk-free rate (following Fama and French's definition of the five-factor model).

The results in columns 3 and 4 of Panel B show that incorporating the additional four factors raises excess dispersion by 17 percentage points relative to the CAPM-based approach. This deterioration relative to the CAPM-based cost of capital largely arises because one of the risk factors—the "investment factor"—is reflected in the perceived cost of capital with the wrong sign. Hence, the Fama and French five-factor model justifies less variation in the perceived cost of capital than the CAPM-based approach.

Overall, the results provide support for the CAPM-based fair-value approach to the cost of capital, as it explains the perceived cost of capital better than the market-value approach and the Fama and French-based approach. Through the lens of the model in Section 2, managers appear to follow a fair-value approach to their cost of capital and perceive the market factor as capturing fundamental risk but the Fama and French risk factors as capturing behavioral mispricing (see Bordalo et al. 2025).

5.3 Further Decomposition and Measurement Error Concerns

The perceived cost of capital cannot be fully explained by the market-based or the fair-value approaches to the cost of capital. In this subsection, we provide more evidence on the sources of excess dispersion and rule out that the results are driven by measurement error.

Excess dispersion is driven by the perceived cost of equity Excess dispersion in the perceived cost of capital reflects excess dispersion in either the perceived cost of debt or the perceived cost of equity. Since we observe both separately on the conference calls, we can estimate excess dispersion in each separately by projecting the forecast error in the perceived cost of equity on the perceived cost of equity, and analogously for the cost of debt. We calculate the forecast error in the perceived cost of equity using the implied cost of capital (described in Section 5.1). The forecast error in the perceived cost of debt is based on the interest rate expense measure (also as in Section 5.1).

Figure 5 shows that the excess dispersion in the perceived cost of equity is around 80%, similar to the excess dispersion in the overall perceived cost of capital. In contrast, the excess dispersion in the perceived cost of debt is only 13%. This finding may reflect that the cost of debt is substantially easier to estimate than the cost of equity. The excess dispersion in the overall perceived cost of capital is thus driven by perceptions about the cost of equity, rather than the cost of debt.

Beyond the greater excess dispersion, the cost of equity is also conceptually more important to the overall cost of capital. For one, the average firm is mostly financed with equity, giving the cost of equity a greater weight in the overall cost of capital. In addition, the perceived cost of equity is more dispersed than the perceived cost of debt (see Table 1), so it accounts for more variation in the overall perceived cost of capital. Taken together, the excess dispersion in the perceived cost of capital is therefore close to the excess dispersion in the perceived cost of equity.

Excess dispersion is driven by firm-level effects The majority of the excess dispersion is not driven by firms adjusting the perceived cost of capital with a delay, but instead by firm-specific factors. Specifically, we restrict the sample to observations where the firm reported another perceived cost of capital in the same year or the year before, and where that other perceived cost of capital was not exactly the same as the observation in the sample. Using only this restricted sample, we find that the estimated excess dispersion is 0.7, statistically different from zero, and similar to the full sample result. Hence, the degree of excess dispersion is large even for firms that have recently updated their perceived cost of capital. This finding is consistent with the fact that firm fixed effects explain 80% of the variation in the perceived cost of capital (in the sample of firms reporting multiple times). Even though firms regularly adjust their perceived cost of capital (see Figure A3), the average levels around which they change are vastly different.

Consistent with the important role of firm-level effects, the perceived cost of capital is highly persistent across firms. Figure A9 shows the within-firm persistence in the perceived cost of capital. Over the first few years, the perceived cost of capital converges back towards the mean, but the convergence settles after a few years at what appears to be more permanent firm-level differences.

Measurement error concerns One may be concerned that the estimates of excess dispersion are driven by measurement error in the perceived cost of capital. In that case, the results would overstate the excess dispersion. However, we argue that there is unlikely to be a substantial amount of measurement error. For one, managers are expected to know their perceived cost of capital and defend it in front of analysts. Moreover, we collect the data manually and examine all records multiple times, minimizing the risk that numbers are entered incorrectly. We record potential project-specific cost of capital numbers separately from the firm-level cost of capital that our analysis is based on, making potential measurement error from confusing project-specific and firm-level perceptions unlikely (discussions of a project-specific cost of capital are rare, as explained in Section 3.2).

The clearest evidence against measurement error is the fact that we find almost no excess dispersion in the perceived cost of debt. If the excess dispersion mechanically reflected measurement error, we would find excess dispersion in both the perceived cost of debt and equity. As a result, measurement error can only affect our excess dispersion estimates if the error were only in the perceived cost of equity and capital, but not in the cost of debt. Given that we record them using identical procedures, it is not clear how such specific measurement error could arise.

We also follow an instrumental variable approach to alleviate measurement error concerns. In Table A5, we run two-stage regressions where we instrument variation in the perceived cost of capital with different firm-level characteristics. These estimates cannot be driven by classical measurement error. The table considers three different sets of instruments: (1) the market beta; (2) market, size, and value characteristics from Fama and French (1993); (3) the predicted cost of capital from the multi-factor model in Section 4.2. We find substantial excess dispersion using all three sets of instruments.

In Section 4.1, we find that the perceived cost of capital relates to real outcomes with a magnitude close to that predicted by theory, whereas other measures of financing costs and expected returns do not affect this relation. Both these findings further support the notion that there is little measurement error in the perceived cost of capital.

Finally, in the upcoming section, we show that all of the variation in the perceived cost of capital can be explained by the variation in analysts subjective expectations about returns, which further alleviates measurement error concerns.

6 Subjective Beliefs and the Cost of Capital

We now explore the third possibility raised by our theoretical model of Section 2, namely that firms' perceived cost of capital aligns with the subjective return expectations of behavioral investors.

Two mechanisms may give rise to this alignment. First, firms may attempt to follow the market-value approach, but share the biased beliefs of behavioral investors. As a result, firms may inadvertently use their subjective expected returns instead of the objective expected returns when they estimate their market-based cost of capital. In this case, the use of subjective expected returns in the cost of capital would be suboptimal.

Second, firms following the fair-value approach may, in certain cases, approximate the fair-value cost of capital by the subjective expected return of behavioral investors. As shown in equation (10) of the theoretical model, the fair-value cost of capital approaches the subjective expected returns of behavioral investors as the risk capacity of rational investors goes to zero. At the limit, the use of subjective expected returns as the cost of capital could in principle be justified by the fair-value approach, but it requires a negligible share of rational investors in the market.

6.1 Subjective Analyst Expectations and the Perceived Cost of Capital

We first use analyst beliefs to measure the subjective expectations of behavioral investors. Analyst expectations of stock returns are known to be biased—both in the time series and the cross section (Engelberg et al. 2020, Keloharju et al. 2022)—as analysts believe most of the excess volatility in prices reflects variation in expected cash flows (Bordalo et al. 2024, 2025). This type of bias is also held by the behavioral agent in our theoretical model of Section 2, making analyst expectations well suited for our tests.[17]

We calculate a firm-level cost of capital implied by the expectations of financial analysts. Using price targets from either IBES or Value Line, we calculate the annualized expected return to the firm's equity at the time the target was released. The IBES targets are for one-year horizons, while Value Line provides price targets

[17] Greenwood and Shleifer (2014) show that this type of bias applies broadly across investor types, see also Giglio et al. (2019) and Nagel and Xu (2023).

for three- to five-year horizons. We then use the resulting expected stock return as the cost of equity in the analyst cost of capital, r^{analyst}:

$$r_{i,t}^{\text{analyst}} = \omega_{i,t} \times (1 - \tau) \times \mu_{i,t}^{\text{debt}} + (1 - \omega_{i,t}) \times E_t^{\text{analysts}}[r_{i,t}^{\text{equity}}], \tag{21}$$

where $E_t^{\text{analysts}}[r_{i,t}^{\text{equity}}]$ is the analysts' expected return on firm i's outstanding equity at time t. We continue to calculate all the other terms in the cost of capital—the cost of debt, leverage, and taxes—as in Section 5.1.

We find that the analyst-based cost of capital justifies almost all the variation in the perceived cost of capital. For the IBES expectations in column 1 of Table 5, the slope coefficient is close to zero when regressing the deviation between the analyst-based cost of capital and the perceived cost of capital on the perceived cost of capital. This finding implies that almost all of the variation in the perceived cost of capital is accounted for by the analyst-based cost of capital, and that there is no excess dispersion relative to the analyst benchmark. The IBES results are similar when including quarter-year fixed effects in column 2. We include country fixed effects in all the IBES analyses to account for different methods used by IBES across countries. We find similar results when considering the Value Line expectations in columns 3 and 4 of Table 5. The Value Line expectations are only available for U.S. firms, so there are fewer observations.

Figure 6 plots the analyst-based cost of capital for three portfolios sorted on the ex ante perceived cost of capital (following the methodology in Section 5.1). The analyst-based cost of capital increases almost one-to-one with the perceived cost of capital for the three portfolios. However, the figure also highlights that the level of the analysts-based cost of capital (left y-axis) is around 11% on average, while the perceived cost of capital (right y-axis) is 8.6% on average.

Figure A10 plots the excess dispersion separately for each year starting from 2010. The figure shows that the excess dispersion is stable around zero over the sample. Figure A11 shows that the results also hold when we consider the cost of equity in isolation, in an exercise similar to that in Figure 5.

The results suggest that firms that perceive a 1 percentage point higher cost of capital have a 1 percentage point higher cost of capital in the eyes of the analysts, on average. The result does not imply that analyst and firm perceptions are exactly equal. As illustrated in Figure 6, the level of the analyst-based cost of capital is higher than the perceived cost of capital.[18] Moreover, the correlation between the analyst-based cost of capital and firms' perceived cost of capital is 0.3. The correlation, however, has to be interpreted with caution because it in large part reflects classical measurement error in the analyst cost of capital, which lowers the correlation but not estimates of excess dispersion.

6.2 Overextrapolation and the Perceived Cost of Capital

We also link the perceived cost of capital to one of the most prominent biases in subjective beliefs, namely that of overreaction. The overreaction bias often leads investors to overextrapolate from past returns: investors tend to think that high past returns lead to high future returns (Greenwood and Shleifer 2014), despite the empirical tendency for long-term reversal rather than continuation (De Bondt and Thaler 1985, Lakonishok et al. 1994). If managers suffer from the same bias when forming expectations about stock returns, we should expect firms with higher past returns to have higher perceived cost of capital.

Consistent with overextrapolation bias, we find that firms with higher past returns report a higher perceived cost of capital. Figure 7 shows past returns for five value-weighted portfolios of firms sorted on the perceived cost of capital. Firms with the lowest perceived cost of capital have the lowest returns over the past five years, and firms with the highest cost of capital have the highest past returns. Here, we conduct a purely cross-sectional analysis by measuring past returns as CAPM alpha, so net of past market returns. The finding thus implies that firms with relatively higher returns in the past, relative to the past market return, expect relatively higher returns going forward and set a higher perceived cost of capital. (Since our focus is cross-sectional variation, the finding does not directly address "aggregate" extrapolation, that is, overextrapolation of the average firm to past market returns.)

The cross-sectional extrapolation is statistically significant, as shown in Table 6. The table reports regressions of the perceived cost of capital on past realized alpha or raw returns. The loading on past alpha is statistically significant at the 1% level at both the five- and ten-year horizons. The loading on past returns is significant at the 5% level.

[18] It is well known that the level of analyst expectations is excessively high; in contrast, the average perceived cost of capital is more consistent with interest rates and the historical equity risk premium.

The effect is, however, modest in economic magnitude. Table 6 shows that a 1% higher past return leads to only around 0.01% higher perceived cost of capital. So, the managers are far from full extrapolation. This modest economic magnitude is consistent with the fact the multi-factor model in Section 4.2 does not pick past returns as one of the predictors of the perceived cost of capital, suggesting that the effect is modest relative to other factors.

Taken together, the findings on subjective beliefs suggest that the perceived cost of capital reflects behavioral biases in beliefs. The findings are inconsistent with the market-value approach, as the use of biased return expectations does not maximize current market value. The finding could reflect mistakes by firms when calculating the market-value cost of capital. It is also possible that firms use biased return expectations to approximate a fair-value cost of capital, although there is limited evidence suggesting that firms with high past returns are more exposed to fundamental risk (Lakonishok et al. 1994, Asness et al. 2013).

Finally, one may wonder whether managers use their cost of capital as a signaling device, trying to convince analysts that they are safe and should have a low discount rate. However, the average perceived cost of capital is high relative to standard estimates of expected returns (Table 1), making it unlikely that firms on average try to signal safety. The analysis of within-firm timing in Section 3.3 also showed that firms are not more likely to report their cost of capital when their profitability and Tobin's Q are low (see Table A2), which would be periods where the returns to signaling a low cost of capital are relatively high. More generally, the lack of predictable timing in the reporting of the perceived cost of capital is difficult to align with a signaling motive. Finally, the perceived cost of capital shapes the investment decisions of firms (see Table 2), so signaling would come with costly distortions to capital allocation.

7 Cost of Capital Distortions and the Allocation of Capital

In this section, we study how deviations from the marked-based and fair-value cost of capital distort the allocation of capital in the economy. Section 4.1 shows that firms' perceived cost of capital shapes the allocation of capital, which means that excess dispersion in the perceived cost of capital leads to capital misallocation.

We quantify the magnitude of such misallocation using the stylized framework of Hsieh and Klenow (2009). We purposely choose a simple benchmark model, so we can provide a transparent first step toward understanding the implications of distortions in the perceived cost of capital.

Relative to the market-based framework, we find that excess dispersion in the perceived cost of capital lowers total factor productivity (TFP) by around 5%. But relative to the fair-value benchmark, there is less excess dispersion in the perceived cost of capital and less misallocation, leading to a lower TFP loss of around 2%. The results in this section are about long-run capital allocation, but do not inform how changes to the cost of capital affect capital allocation in the short run (see Section 4.1, Gormsen and Huber 2025, Fukui et al. 2025).

7.1 Model of Misallocation

We build on the framework of Hsieh and Klenow (2009).

Assumptions The model features monopolistic competition between heterogeneous firms. Firms produce differentiated products that are combined into sector outputs, which in turn are combined into a final good. The final good Y is produced by a representative firm without market power:

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

where Y_s is the output of sector s and the sectoral output elasticities θ_s sum to one.

The output of sector s is a CES aggregate of the output Y_{si} produced by firms $i = 1, .., M_s$ in the sector:

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

with σ denoting the elasticity of substitution of products in the sector. Each firm produces output using a Cobb-Douglas function

$$Y_{si} = A_{si} K_{si}^{\alpha_s} L_{si}^{1-\alpha_s},$$

where A_{si} is total factor productivity (TFP) of firm i in sector s, K_{si} and L_{si} are capital and labor of firm i in sector s, and α_s is the output elasticity of capital in sector s. Output is produced one period after paying the inputs to production.

Firms face a perceived cost of capital $r_{si}^{\text{perc.}} = (1+\tau_{si}) \times r_{si}^{\text{benchmark}}$, where $r_{si}^{\text{benchmark}}$ is either the market-based or the fair-value cost of capital plus the depreciation rate δ_{si}. The term τ_{si} captures deviations between the benchmark and perceived cost of capital. We assume that τ_{si} is independent of $r_{si}^{\text{benchmark}}$ and that TFP and the perceived cost of capital are jointly log-normally distributed. All firms pay the same wage w for labor. Total capital and labor are in fixed supply, and P, P_s, and P_{si} denote the product prices of the final good, sectoral output, and firm-level output, respectively.

Firms maximize profits, π_{si}, as[19]

$$\pi_{si} = P_{si} Y_{si} - wL - r_{si} K. \tag{22}$$

Solution Total output is

$$Y = \prod_{s=1}^{S} \left(\text{TFP}_s K_s^{\alpha_s} L_s^{1-\alpha_s} \right)^{\theta_s}, \tag{23}$$

where L_s and K_s are labor and capital employed in sector s and

$$\text{TFP}_s = \left[\sum_{i=1}^{M_s} \left(A_{si} \frac{\overline{\text{TFPR}_s}}{\text{TFPR}_{si}} \right)^{\sigma-1} \right]^{\frac{1}{\sigma-1}} \tag{24}$$

is TFP of sector s. TFPR_{si} is firm-level total factor revenue productivity, defined as firm-level TFP, A_{si}, times the price of the product produced by the firm, P_{si}. TFPR_{si} can also be expressed as

$$\text{TFPR}_{si} = \frac{\sigma}{\sigma-1} \alpha_s^{-\alpha_s} \left(\frac{w}{1-\alpha_s} \right)^{1-\alpha_s} \left((1+\tau_{si}) \times r_{si}^{\text{benchmark}} \right)^{\alpha_s}. \tag{25}$$

$\overline{\text{TFPR}_s}$ is the geometric average of TFPR across firms in sector s. Absent deviations between the benchmark and the perceived cost of capital, TFPR within a sector depends on the benchmark cost of capital, as shown in (25). Deviations between the benchmark and the perceived cost of capital cause TFPR to deviate from the

[19] This formulation abstracts from the fact that the cost of capital also influences the discount rate applied to the profits $P_{si} Y_{si}$. If it takes a period to produce using K and L, output must be discounted by $1 + r_{si}$. Abstracting from this term is conservative as it lowers the estimated TFP loss.

benchmark and reduce sectoral TFP.

We are interested in quantifying the effect of cost of capital distortions on TFP relative to two benchmarks, the market-based cost of capital and the fair-value cost of capital. For each of these benchmarks, the TFP loss can be quantified based on the variance of the perceived cost of capital relative to the variance of the benchmark cost of capital. For a given benchmark, let $\text{TFP}_s^{\tau=0}$ denote TFP of sector s absent any distortions to the cost of capital ($\tau_{si} = 0 \forall s, i$). Given (24) and (25) as well as the joint log-normality of r_{si} and A_{si}, the sectoral TFP loss arising from distortions in the perceived cost of capital is given by

$$\log\left(\text{TFP}_s\right) - \log\left(\text{TFP}_s^{\tau=0}\right) = -\Lambda \times \left(\text{var}\left(\log(r_{si}^{\text{perc.}})\right) - \text{var}\left(\log(r_{si}^{\text{benchmark}})\right)\right). \quad (26)$$

The constant Λ is given by $2\Lambda = \sigma(\alpha^s)^2 + \alpha^s(1-\alpha^s)$.

7.2 Estimates of the TFP Loss due to Misallocation

Expression (26) allows us to quantify the TFP loss due to excess dispersion in the perceived cost of capital. We set the elasticity of substitution between products in a sector, σ, to 3 in our baseline calibration, in line with recent work that puts it between 3 and 10 (Broda and Weinstein 2006, Hendel and Nevo 2006, Hsieh and Klenow 2009). We set the capital share, α, to 0.33 (e.g., Karabarbounis and Neiman 2019). The choices of σ and α are conservative, since they are low relative to empirical estimates, and lower values imply smaller TFP losses.

We observe the variance of the perceived cost of capital directly in the data. This leaves us to calculate the variance of the two benchmarks for the cost of capital.

TFP loss relative to market-based benchmark In order to estimate the variance of the market-based benchmark, $\text{var}\left(\log(r_i^{\text{market-based}})\right)$, we need to estimate the market-based cost of capital and hence long-run expected stock returns.

Before explaining how we estimate this variance in long-run expected returns, we note that the literature has found some evidence that this variation is smaller and statistically weaker than the variation in short-run expected returns (see, e.g., Keloharju et al. 2021 and Daniel et al. 2020 for discussions of long-run expected returns). Keloharju et al. (2021) argue that there is close to no variation in long-run expected returns. Moreover, our sample is skewed towards large firms, which exhibit less variation in expected equity returns than small firms (see, e.g., Fama and French 1993 for the value effect). So, the existing evidence suggests that the variance of the market-based cost of capital could be modest.

We take two approaches to quantifying $\text{var}\left(\log(r_i^{\text{market-based}})\right)$. The first approach assumes that the perceived cost of capital equals the market-based cost of capital plus an orthogonal error. Under this assumption, we can calculate the market-based cost of capital as the predicted value from the regression equation (16). With the market-based cost of capital in hand, we can then calculate the variance of the log of the market-based cost of capital. Since the relevant market-based cost of capital is in real terms and includes depreciation, we add in depreciation rates (using Compustat data) and subtract 2% inflation before taking logs. This methodology implies that the variance of the market-based cost of capital is modest, since the market-based cost of capital only accounts for 20% of the variance of the perceived cost of capital (see the estimates in Table 3).

Our second approach to quantifying $\text{var}\left(\log(r_i^{\text{market-based}})\right)$ assumes that the implied cost of capital equals the market-based cost of capital plus noise. We similarly made this assumption in Section 5.1 when estimating excess dispersion based on the implied cost of capital. The assumption allows us to calculate the market-based cost of capital as the predicted value using forecasting regressions akin to (16), except the predictor variable is now the implied cost of capital. We observe the implied cost of capital since 1976, so we can use a long sample and implement the predictive regressions using 10-year realized returns (see Appendix E for details). Once we have this estimate of the market-based cost of capital, we again add depreciation, subtract 2% inflation, and take the variance of the log of the sum.

Our two approaches to estimating the variance of the market-based cost of capital lead to largely similar estimates (Table 7). For both approaches, we find a TFP loss of around 5% using the baseline calibration of $\sigma = 3$. If we instead set $\sigma = 4$, the TFP loss grows to 7%. While the precise TFP loss is uncertain and depends on the calibration, the estimates highlight that deviations from the market-based cost of capital could be a quantitatively relevant contributor to the large capital misallocation that has been found in the literature (David et al. 2016, Restuccia and Rogerson 2017, David and Venkateswaran 2019).[20]

[20] In untabulated results, we find that the misallocation based on discount rates (i.e., required returns to capital) used in firm investment decisions and reported on conference calls as distinct

The misallocation results speak most directly to the distribution of capital among the large listed firms in our dataset. The results abstract from potential distortions to firms' expected cash flow estimates, which have been analyzed in a large complementary literature (see Gennaioli et al. 2016, Bordalo et al. 2022). The results also do not account for the potential endogeneity of firm-level productivity to the perceived cost of capital (e.g., due to R&D investments), which could further worsen aggregate productivity. In related work, David et al. (2022) argue that variation in firm-level risk helps to explain capital allocation across firms, whereas our results should be interpreted as misallocation in excess of variation justified by firm-level risk. van Binsbergen and Opp (2019) analyze whether individual risk factors can contribute to the allocation of capital, whereas we assess misallocation due to deviations between the market-based and perceived cost of capital.

TFP loss relative to fair-value benchmark We calculate $\text{var}\left(\log(r_i^{\text{fair-value}})\right)$ based on the CAPM. We do not directly use the CAPM-based fair-value cost of capital from Section 5.2, as this may suffer from classical measurement error, so estimates of the variance would be biased. We instead follow a procedure similar to the one we used for the market-based benchmark. We assume that the perceived cost of capital is equal to the CAPM plus an orthogonal error. We can then calculate the fair-value cost of capital as the predicted value from a regression of the CAPM-based fair-value cost of capital (from Section 5.2) on the perceived cost of capital. As with the market-based cost of capital, the relevant benchmark cost of capital includes depreciation and is in real terms, so we add depreciation and subtract 2% inflation.

The TFP loss relative to the fair-value approach is 2.4%, as shown in Panel B of Table 7. This estimated loss is substantially lower than the loss relative to the market-based benchmark.

8 Conclusion

The perceived cost of capital plays a key role in all parts of economics studying the allocation of capital as well as the link between financial markets and the real economy. In this paper, we study how firms should set their perceived cost of capital given that

objects from the perceived cost of capital (see Section 4.1) is larger than the misallocation based on the perceived cost of capital.

financial markets are inefficient; what firms actually do; and how firm perceptions can matter for real outcomes.

We analyze new hand-collected data on firms' perceived cost of capital. We initially demonstrate that firms reporting a higher perceived cost of capital have lower investment rates and higher returns on invested capital, confirming that the measured perceived cost of capital shapes the distribution of capital across firms.

We study theoretically how firms should set their perceived cost of capital and, thereby, their long-run investment rules. The right approach depends on firms' objectives. Under the market-based approach, firms want to maximize their current market value in inefficient financial markets. In that case, the perceived cost of capital should equal the expected return on firms' outstanding debt and equity. Under the fair-value approach, firms want to maximize their fair value based on fundamental risk alone, and the perceived cost of capital should equal a fair-value benchmark, such as the CAPM.

Our evidence rejects that firms implement the market-based approach. Instead, a fair-value approach based on the CAPM explains half of the variation in the perceived cost of capital. The majority of variation in the perceived cost of capital can be attributed to firms incorporating the biased return expectations of financial analysts. The finding is inconsistent with the market-value approach, but consistent with firms perceiving that financial markets are extremely inefficient or with firms having a biased view of expected returns.

How firms set their perceived cost of capital has large effects on aggregate real outcomes. Using a quantitative model, we show that the deviations between the perceived cost of capital and the market-based approach would reduce TFP by around 5% in a model where the market-based approach is optimal. In comparison, the deviations from the fair-value approach generate only a 2% TFP loss in a model where the fair-value approach is optimal. Taken together, the findings suggest that firms' perceptions are of first-order importance to aggregate outcomes, but are distorted relative to market-based and fair-value benchmarks, potentially leading to substantial aggregate losses.

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Table 1
Summary Statistics of the Conference Call Data

This table reports summary statistics at the level of firm-quarter observations. The perceived cost of capital, the perceived cost of debt, the perceived cost of equity, and the discount rate are directly observed in the conference call data and reported in percent. The levels of the perceived costs and the discount rate cannot be directly compared because some firms do not account for overhead in the discount rate (see Gormsen and Huber 2025 for details). The perceived cost of equity (imputed) is the value for the perceived cost of equity imputed from the firm's reported perceived cost of capital. We calculate it using the formula for the WACC (see equation 11), using as inputs the perceived cost of capital reported on conference calls (for the WACC), leverage observed in Compustat, and the financial cost of debt. The financial cost of debt is measured as interest payments over total debt in Compustat. The sample includes the years 2002 to early 2024.

	(1)	(2)	(3)	(4)
VARIABLES	N	mean	p5	p95
Perceived cost of capital	3,480	8.67	5.17	13
Perceived cost of debt	6,419	4.68	1.79	9
Perceived cost of equity	415	10.5	5.38	15.5
Perceived cost of equity (imputed)	3,282	10.7	3.18	18.9
Discount rate	3,665	15.3	8	25

Table 2
Capital Allocation and the Perceived Cost of Capital

This table reports panel regressions of firm-level real outcomes on the firm-level perceived cost of capital. In columns (1) to (3), the left-hand side variable is the return on invested capital (ROIC). We calculate the ROIC using Compustat as [earnings before interest] over [long-term book debt plus book equity minus cash]. In columns (4) to (6), the left-hand side variable is the net investment rate, defined as [capital expenditure minus depreciation] over [lagged property, plant, and equipment]. Tobin's Q is the market-to-book value of debt and equity. The return on equity is income before extraordinary items over book equity. Asset / sales is lagged assets divided by sales, a proxy for the asset intensity of production. Dec. fiscal reporting is an indicator for whether the firm reported their annual financial statement in December of the given year. Leverage is book debt over assets. Market beta is estimated in rolling five-year regressions of weekly data, in line with the approach taken by most practitioners. The market risk premium is the earnings yield minus the long-term government interest rate plus 4. The market risk premium is 6 if the earnings yield is unobserved (only relevant outside the U.S.). The financial cost of debt is interest payments over total debt in Compustat. Standard errors are double clustered at the firm and quarter-year level. Statistical significance is denoted by *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
	Return on invested capital			Investment rate		
Perceived cost of capital	0.88***	0.81***	0.90***	-0.78**	-0.78**	-0.67*
	(0.23)	(0.22)	(0.24)	(0.36)	(0.34)	(0.37)
Observations	2,531	2,531	2,504	2,744	2,744	2,714
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tobin's Q	No	Yes	Yes	No	Yes	Yes
Return on equity	No	Yes	Yes	No	Yes	Yes
Assets / sales	No	Yes	Yes	No	Yes	Yes
Dec. fiscal reporting FE	No	Yes	Yes	No	Yes	Yes
Leverage	No	No	Yes	No	No	Yes
Log market value	No	No	Yes	No	No	Yes
Market beta	No	No	Yes	No	No	Yes
Market risk premium	No	No	Yes	No	No	Yes
Fin. cost of debt	No	No	Yes	No	No	Yes
R^2	0.14	0.22	0.23	0.10	0.11	0.11

Table 3
Excess Dispersion in the Perceived Cost of Capital

This table presents estimates of excess dispersion for the market-based (Panel A) and the fair-value (Panel B) approaches to the cost of capital. In Panel A, we project forecast errors in the perceived cost of capital on the perceived cost of capital. In Panel A, the forecast errors are defined as the difference between the perceived cost of capital and either the cost of capital based on realized returns as measured in equation (15) (columns 1 and 2 of Panel A) or the implied cost of capital (columns 3 and 4 of Panel A). In Panel B, the forecast errors are relative to two fair-value estimates of the cost of capital: the CAPM-based cost of capital (columns 1 and 2 of Panel B) and the Fama-French cost of capital (columns 3 and 4 of Panel B). All variables are defined in Sections 5.1 and 5.2. Standard errors are clustered at the firm and quarter-year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

Panel A: Excess dispersion relative to market-based benchmarks

	$\upsilon_{i,t+1}^{\text{realized}} = r_{i,t}^{\text{perc.}} - r_{i,t+j}^{\text{realized}}$		$\upsilon_{i,t+1}^{\text{ICC}} = r_{i,t}^{\text{perc.}} - r_{i,t}^{\text{ICC}}$	
$r_{i,t}^{\text{perc.}}$	0.79***	0.91**	0.76***	0.83***
	(0.30)	(0.28)	(0.042)	(0.041)
Observations	2,590	2,590	2,365	2,365
Quarter-year FE	No	Yes	No	Yes
P(slope = 1)	0.48	0.75	0	0
R^2	0.0057	0.25	0.29	0.36

Panel B: Excess dispersion relative to fair-value benchmarks

	$\upsilon_{i,t+1}^{\text{CAPM}} = r_{i,t}^{\text{perc.}} - r_{i,t}^{\text{CAPM}}$		$\upsilon_{i,t+1}^{\text{FF5}} = r_{i,t}^{\text{perc.}} - r_{i,t}^{\text{FF5}}$	
$r_{i,t}^{\text{perc.}}$	0.50***	0.53***	0.67***	0.69***
	(0.036)	(0.036)	(0.063)	(0.060)
Observations	3,282	3,282	3,236	3,236
Quarter-year FE	No	Yes	No	Yes
P(slope = 1)	0	0	0	0
R^2	0.17	0.25	0.096	0.20

Table 4
Time Series Averages of Portfolios Sorted on Perceived CoC

This table reports time series averages for portfolios sorted on the perceived cost of capital. We sort firms into portfolios as follows. Each month, we rank all firms based on their most recently reported perceived cost of capital (going at most five years back), and sort into three equal-sized groups. For each group (portfolio), we calculate the average realized return over the subsequent month as well as the average perceived cost of equity. The average perceived cost of equity is imputed as described in Table 1. The portfolio weights are refreshed and balanced every month. The first three columns show results for each of the three portfolios. The fourth columns shows results for a long-short portfolio that is long the portfolio of firms with high perceived cost of capital and short the portfolio of firms with low perceived cost of capital. All returns are annualized. The sample includes 2005 to 2024. The average number of firms in each portfolio is 114, and never less than 40. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)
	Portfolios sorted on Perc. CoC			
	Low Perc. CoC	Medium Perc. CoC	High Perc. CoC	High - low
Realized returns	0.11***	0.11***	0.10**	-0.0049
	(0.038)	(0.039)	(0.047)	(0.016)
Imputed perc. CoE	0.074***	0.099***	0.14***	0.062***
	(0.00012)	(0.00021)	(0.00017)	(0.00021)
Difference	0.033	0.0089	-0.034	-0.067***
(Realized ret. - perc. Coe)	(0.038)	(0.039)	(0.047)	(0.016)
Observations	240	240	240	240

Table 5
Excess Dispersion Relative to Analyst Beliefs

This table reports excess dispersion in the perceived cost of capital, measured relative to the cost of capital perceived by analysts. We measure an analyst cost of capital using analysts' subjective expectations of stock returns as the cost of equity (see Section 6). We consider expected stock returns from IBES or Value Line. The IBES sample is global. We include country fixed effects in all the IBES analyses to account for different methods used by IBES across countries. The Value Line sample is U.S. only. Standard errors are clustered at the firm and quarter-year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

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

Table 6
The Perceived Cost of Capital and Past Returns

This table reports results of regressions of the perceived cost of capital on past realized alpha and return. The realized alpha is calculated as the past realized return, minus the market beta times the past realized market risk premium. All specifications include country and quarter-year fixed effects. Standard errors are clustered at the firm and quarter-year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	Perceived cost of capital			
Past 5-year alpha	0.011***			
	(0.0039)			
Past 10-year alpha		0.029***		
		(0.0080)		
Past 5-year return			0.0093**	
			(0.0039)	
Past 10-year return				0.019**
				(0.0085)
Observations	2,437	2,148	2,437	2,148
R^2	0.217	0.225	0.216	0.219

Table 7
Effects of Deviations in the Perceived Cost of Capital on Capital Allocation and Total Factor Productivity

This table quantifies the aggregate TFP loss under various definitions of the benchmark cost of capital. The quantification follows equation (26),

$$\log\left(\text{TFP}_s\right) - \log\left(\text{TFP}_s^{\tau=0}\right) \approx -\Lambda \times \left(\text{var}\left(\log(r_{si}^{\text{perc.}})\right) - \text{var}\left(\log(r_{si}^{\text{benchmark}})\right)\right). \quad (27)$$

We calculate the variance of the log of the benchmark cost of capital in multiple ways. In Panel A, we consider the market-based benchmark. We calculate the market-based cost of capital as predicted values from predictive regressions of the cost of capital based on realized returns as measured in equation (15) on either $r^{\text{perc.}}$ or r^{ICC} (see Appendix E for details). In Panel B, we consider the fair-value benchmark. We calculate the fair-value cost of capital based on the CAPM. The constant Λ is a function of the elasticity of substitution, σ, and the capital share, α^s, which we set to 3 and 0.33, respectively. We account for depreciation using Compustat data and assume an expected inflation rate of 2%.

Panel A: TFP loss relative to market-based benchmark	
Benchmark: $\text{var}\left(\log(r^{\text{market-based}}\right)$ inferred from $r^{\text{perc.}}$	5.23%
Benchmark: $\text{var}\left(\log(r^{\text{market-based}}\right)$ inferred from r^{ICC}	5.20%
Panel B: TFP loss relative to fair-value benchmark	
Benchmark: $\text{var}\left(\log(r^{\text{fair-value}}\right)$ based on CAPM	2.39%

Figure 1
Stylized Drivers and the Perceived Cost of Capital

This figure shows the average perceived cost of capital for firms sorted into quintiles of four firm-level characteristics. The characteristics are leverage, market beta, size, and book-to-market value. Leverage is book debt divided by the sum of book debt and the market value of equity. Market beta is estimated in rolling five-year regressions of weekly data, in line with the approach taken by most practitioners.

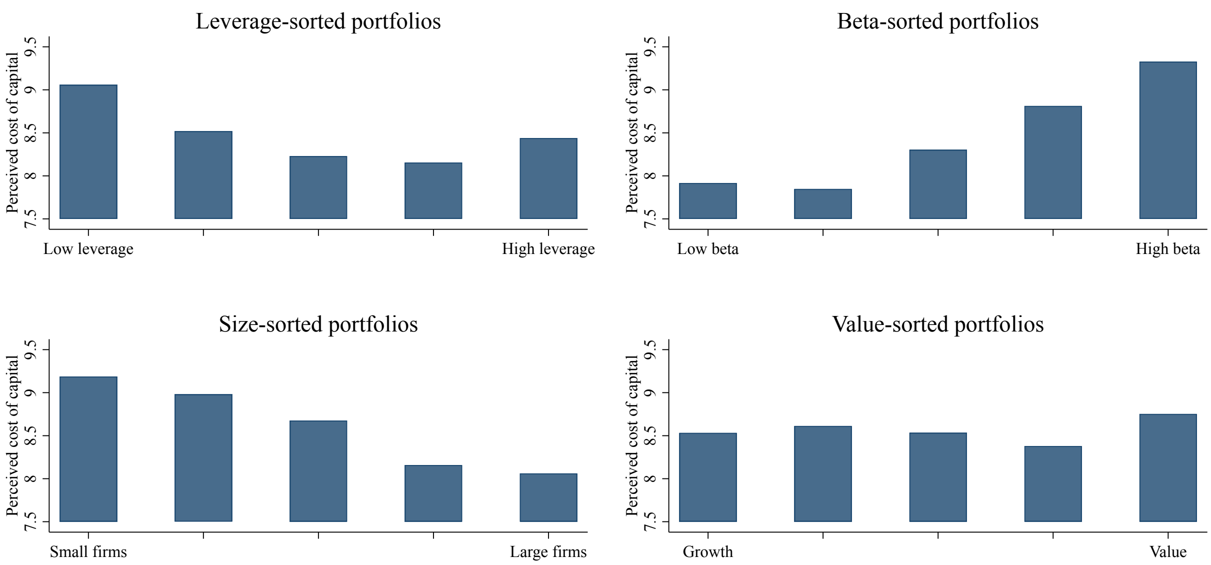


Figure 2
Firm Characteristics Associated with the Perceived Cost of Capital

This figure shows slope coefficients from regressions of predicted values of the firm-level perceived cost of capital on the variables selected by the Lasso procedure. The dependent variable in the Lasso regression is the firm-level perceived cost of capital in a given quarter. The set of possible explanatory variables includes firm exposure to the 153 characteristics in Jensen et al. (2023)—which are based on equity risk factors studied in the literature—as well as a dummy for U.S. versus European firms. The firm-level characteristics are measured in cross-sectional percentiles of the universe of firms in the same country and same year, ranging from 0 (lowest) to 1 (highest). The left-hand side is measured in percentage points, so a loading of 1 means that the perceived cost of capital is predicted to be 1 percentage point higher for firms with the highest characteristics relative to firms with the lowest. The sample includes firms in Europe and the U.S. between 2002 and 2024.

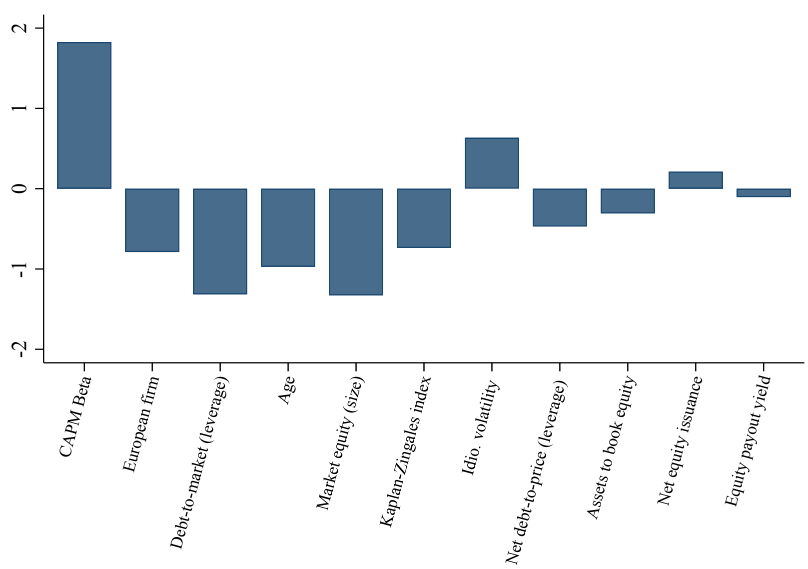


Figure 3
Time Variation in the Average Perceived Cost of Capital

In the left-hand figure, we plot the average perceived cost of capital of U.S. firms along with the U.S. earnings yield plus expected long-run inflation from the Michigan survey. In the right-hand figure, we plot the average perceived cost of debt of U.S. firms along with the long-term Treasury yield.

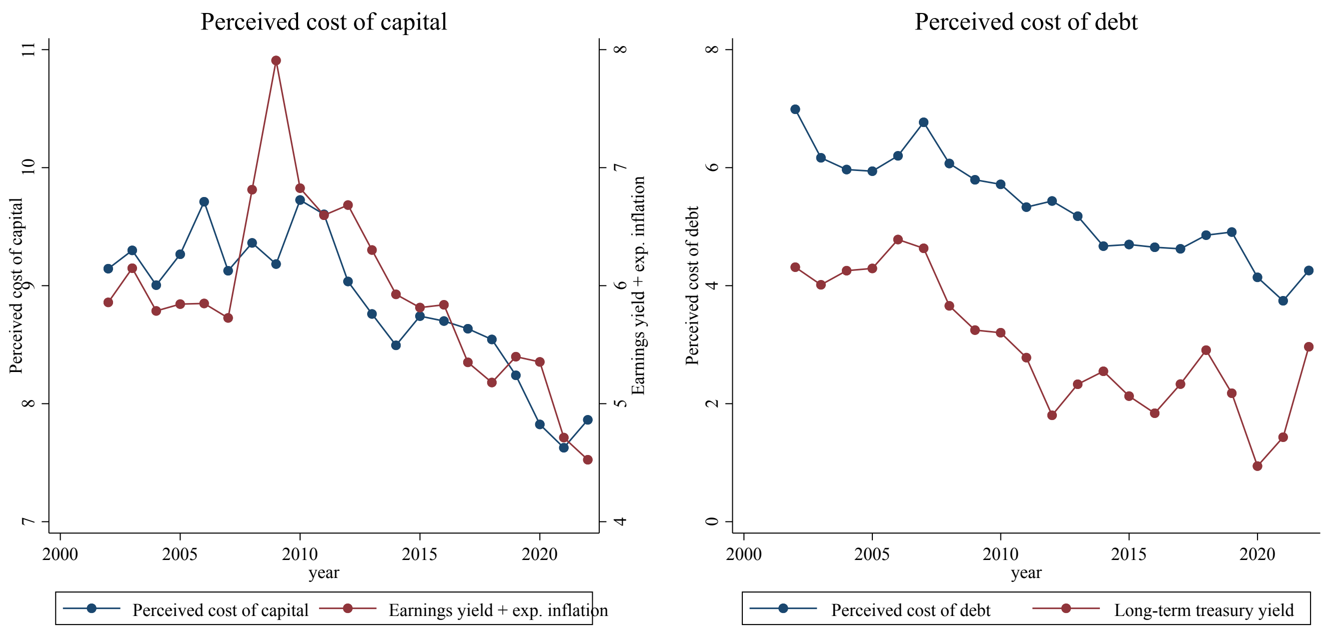


Figure 4
Returns to Portfolios Sorted on the Perceived Cost of Capital

This figure shows time series averages for portfolios sorted on the perceived cost of capital. We sort firms into portfolios as follows. Each month, we rank all firms based on their most recently reported perceived cost of capital (going at most five years back), and sort into three equal-sized groups. For each group (portfolio), we calculate the average realized returns over the subsequent month as well as the average perceived cost of equity. The average perceived cost of equity is imputed from the perceived cost of capital, as described in Table 1. The portfolio weights are refreshed and balanced every month. The sample includes 2005 to 2024. The average number of firms in each portfolio is 114, and never less than 40. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

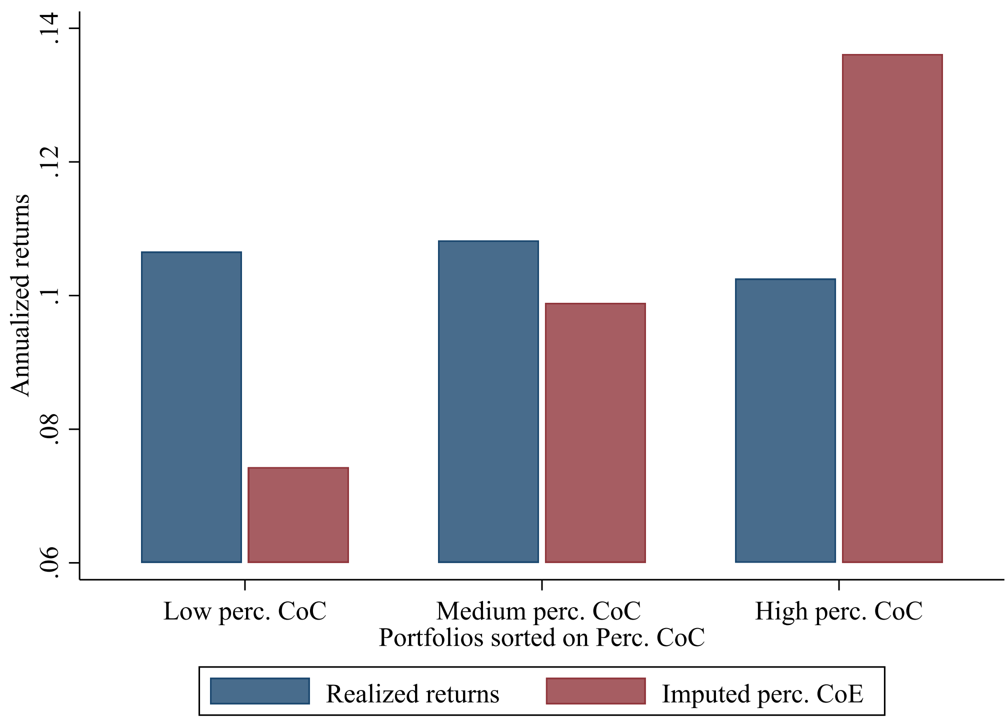


Figure 5
Excess Dispersion in the Perceived Cost of Capital, Equity, and Debt

This figure shows the fractions of the overall variance of the perceived cost of capital, equity, and debt that constitute excess dispersion. Excess dispersion in a perceived cost equals the slope coefficient in a regression of the error in the perceived cost on the perceived cost (see Section 5.1). The error in the perceived cost of capital is estimated using the implied cost of capital method, as in Table 3. The error in the perceived cost of equity is calculated relative to the implied cost of equity. The error in the perceived cost of debt is calculated relative to the same measure of the market-based cost of debt as the one used for the cost of capital. Standard errors are double clustered at the firm and year level. The bars represent 95% confidence intervals.

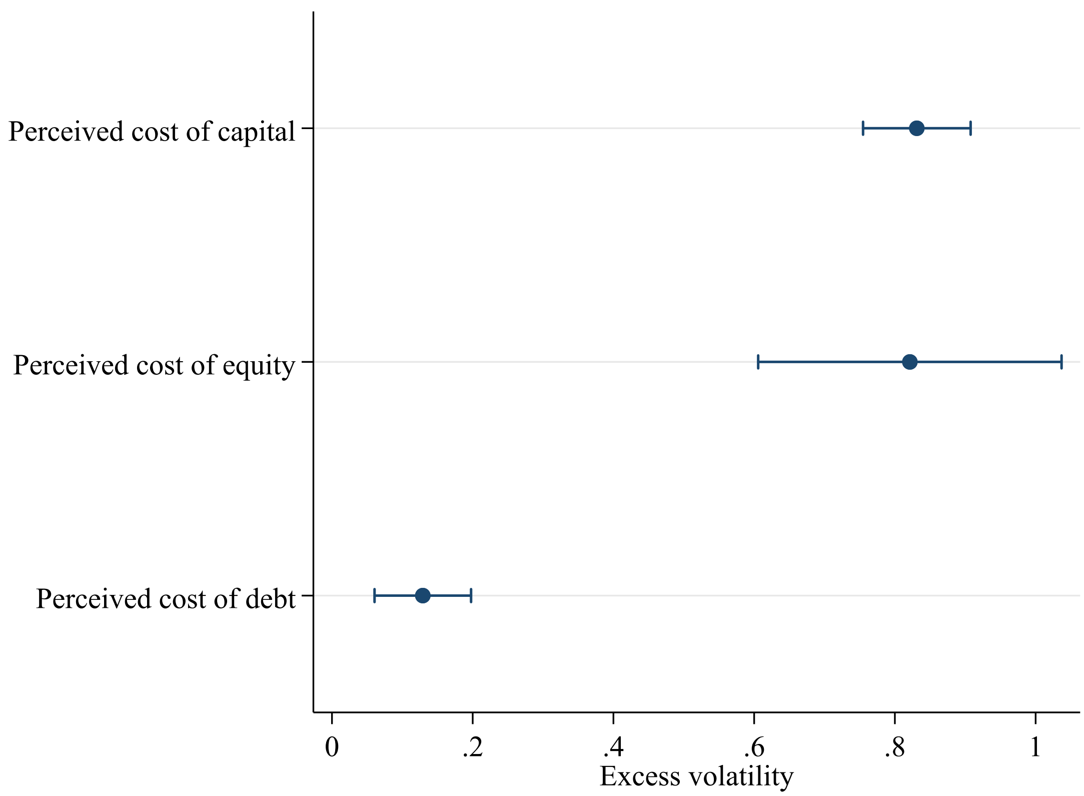


Figure 6
Analysts' Cost of Capital for Portfolio Sorted on Perceived Cost of Capital

This figure shows time series averages for portfolios sorted on the perceived cost of capital. We sort firms into portfolios as follows. Each month, we rank all firms based on their most recently reported perceived cost of capital (going at most five years back), and sort into three equal-sized groups. For each group (portfolio), we calculate the average analyst-based cost of capital based on IBES and Value Line data (defined in equation 21). We also calculate the average perceived cost of capital for each portfolio. The portfolios weights are refreshed and balanced every month. The sample includes 2005 to 2024. The average number of firms in each portfolio is 114, and never less than 40. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

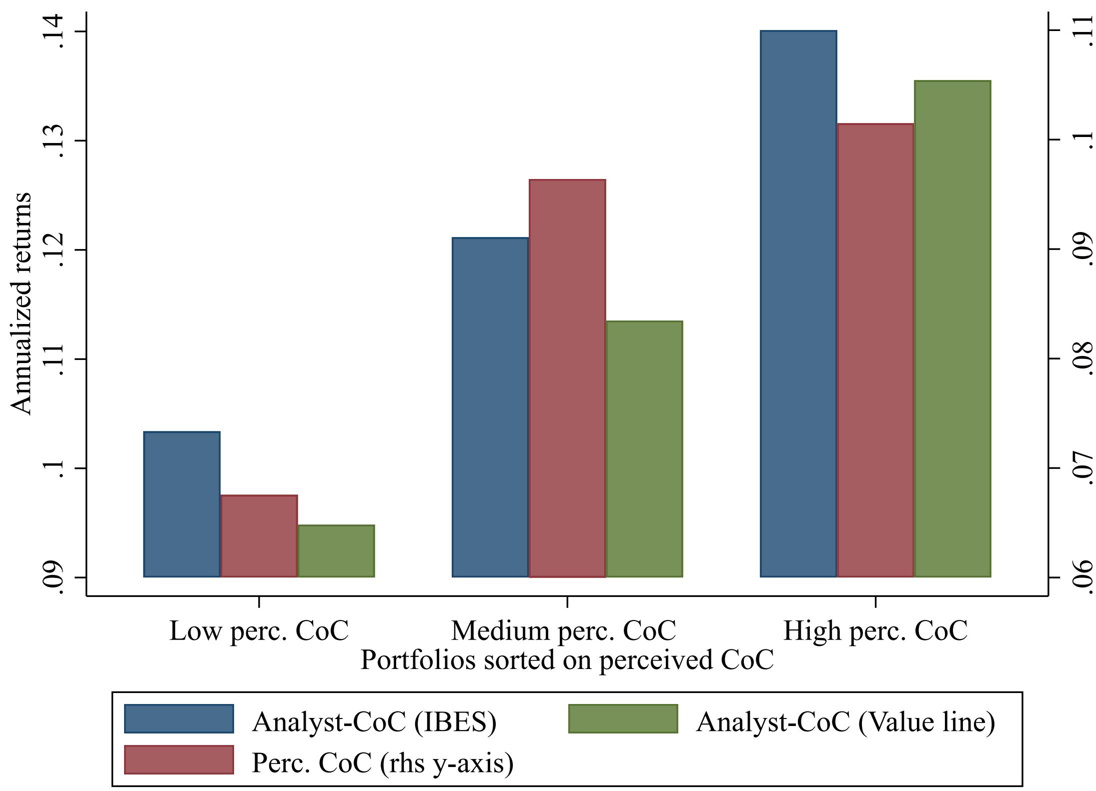
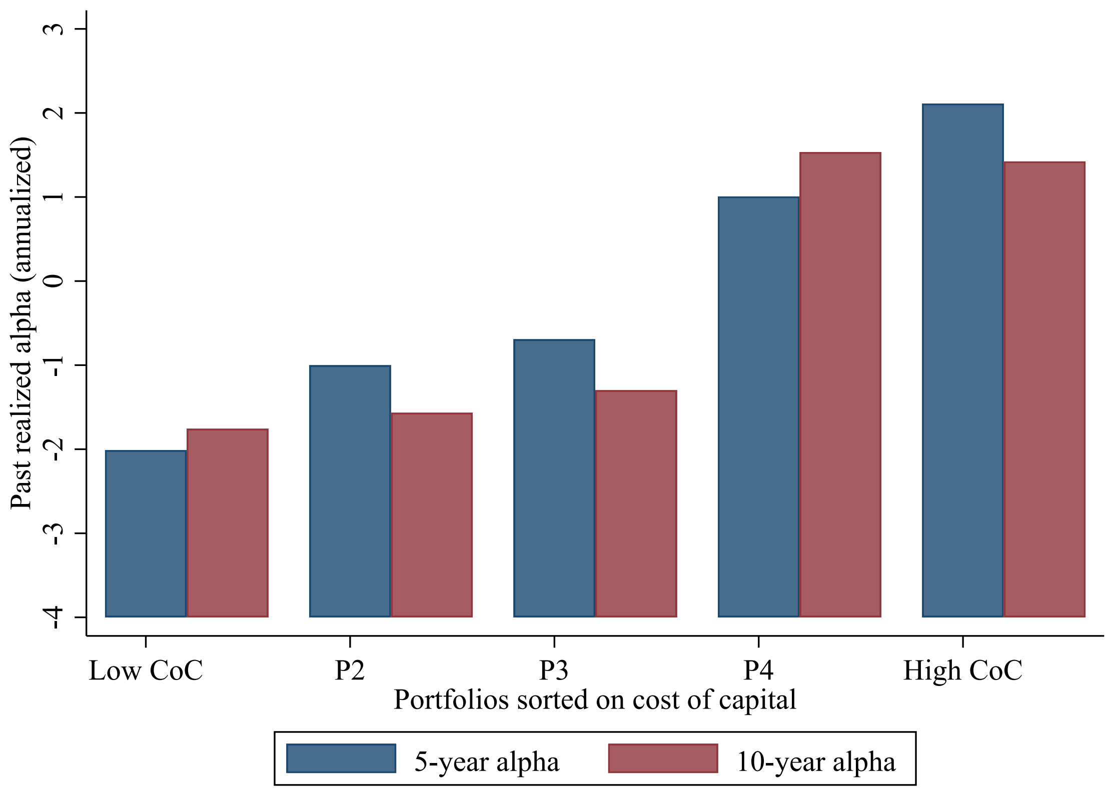


Figure 7
The Perceived Cost of Capital and Past Returns

This figure shows past CAPM alpha for five portfolios of firms sorted on their perceived cost of capital. The CAPM alpha is calculated as the average return over the five or ten years leading up to the observation of the perceived cost of capital, minus the market beta of the firm times the average realized market risk premium over the same period. The returns and alphas are annualized and normalized to equal zero on average. Portfolio returns are weighted by the market cap of the firm at the time of the observation of the perceived cost of capital.



Online Appendix to
"Firms' Perceived Cost of Capital"

Appendix A Figures and Tables

Figure A1
Number of Observations Per Firm

The figure plots a histogram of the number of times that we observe a perceived cost of capital for a firm. Each bin has a width of 1. Conditional on observing more than one perceived cost of capital, we observe a perceived cost of capital an average of 3.9 times. The right-most bars combine all values greater than 15.

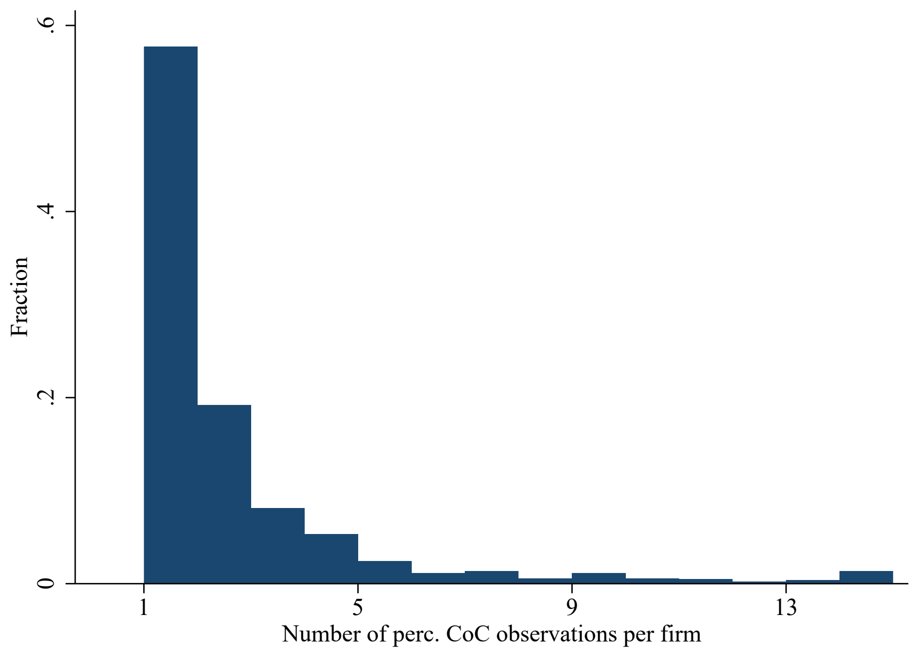


Figure A2
Number of Years Between Observations of the Same Firm

The figure plots a histogram of the number of years that lie between observations of the perceived cost of capital for the same firm. Each bin has a width of 0.5 years. On average, observations for the same firm lie 4.3 years apart. The right-most bars combine all differences greater than 15 years.

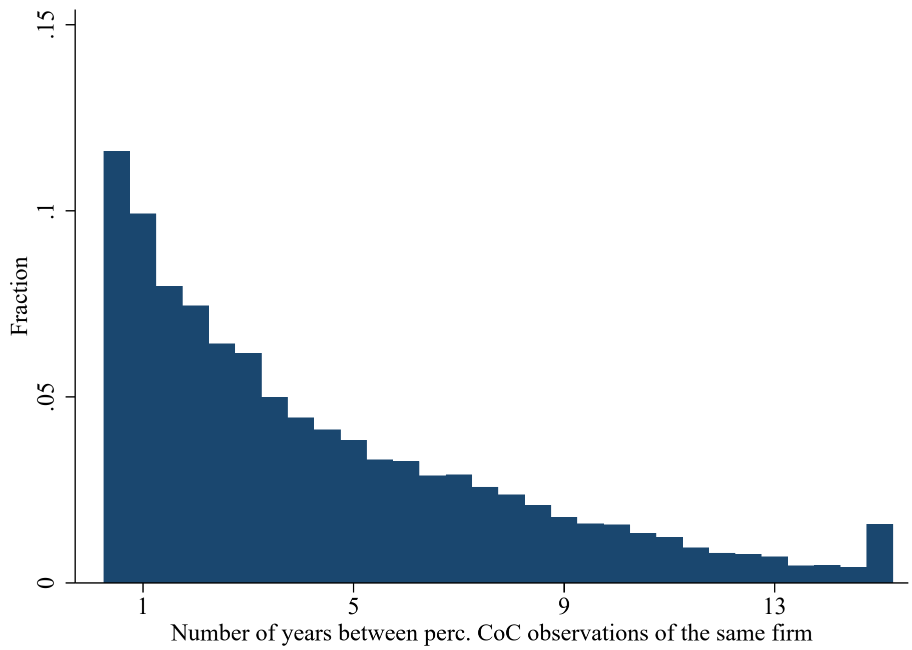


Figure A3
Share of Firms with Adjusted Perceived Cost of Capital

The coefficients are estimated by regressing an indicator for whether a firm has a different perceived cost of capital between two observations on indicators for the number of years between the two observations. The first coefficient implies that 58% of firms report a different perceived cost of capital for observations that lie up to one year apart. The second coefficient implies that 74% of firms report a different value for observations greater than one year and at most two years apart. The regression sample contains all within-firm differences in the perceived cost of capital observed in the dataset (i.e., all differences between observations of the same firm). The vertical lines measure 90% confidence intervals. Standard errors are clustered by firm and quarter of the later observation.

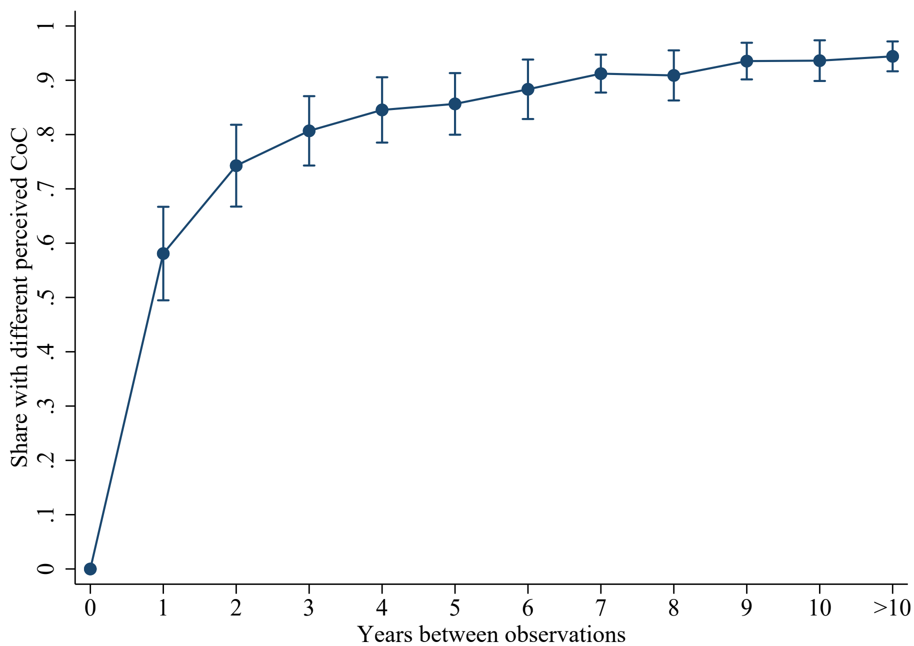


Figure A4
Histogram of the Perceived Cost of Capital

This figure shows a histogram of the perceived cost of capital observed on conference calls.

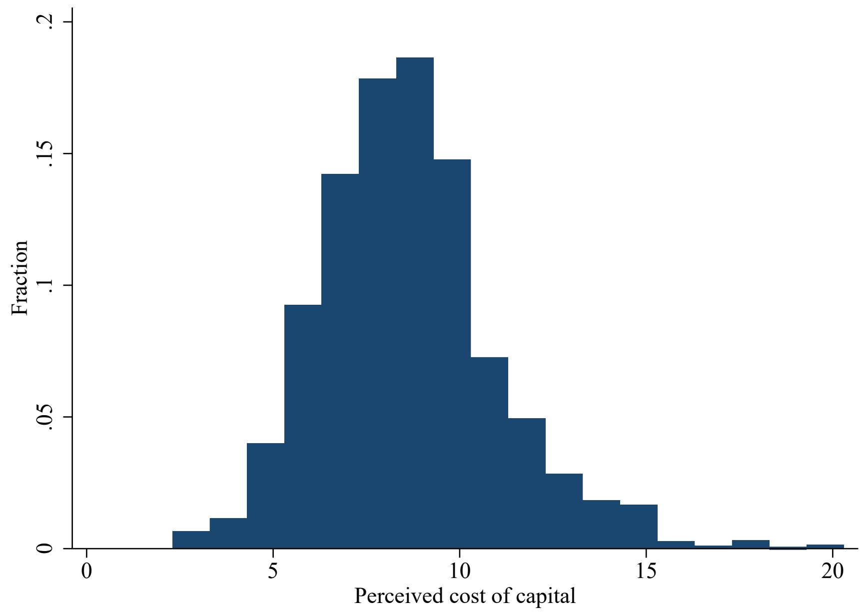


Figure A5
Observation Shares by Country

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

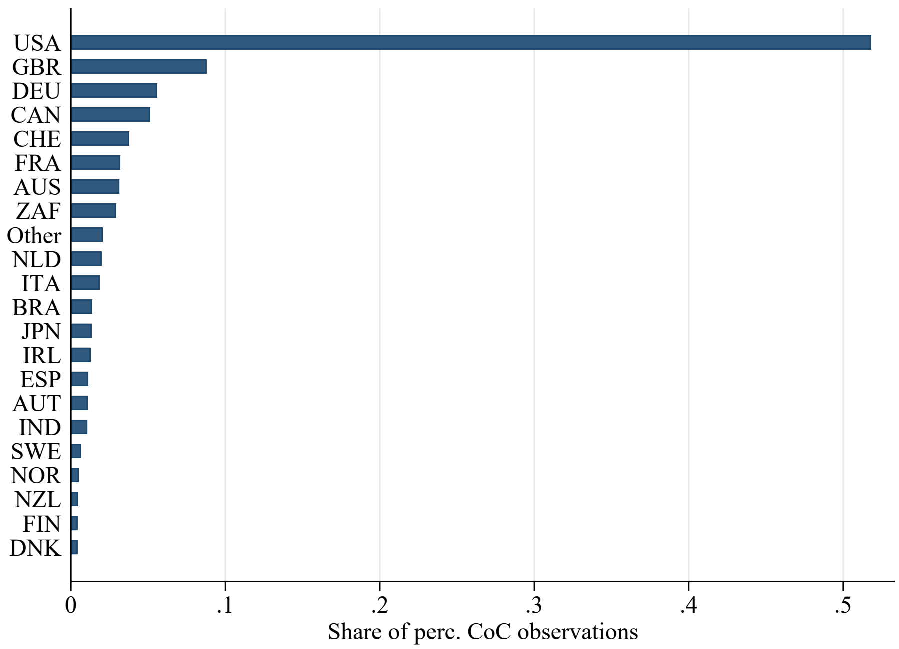


Figure A6
Observation Shares by Industry

The figure plots the share of firms in different industries in the Compustat universe for 2002 to 2024 (left-hand bar in each industry group in red) and in the sample of firms with at least one observed perceived cost of capital (right-hand bars in blue).

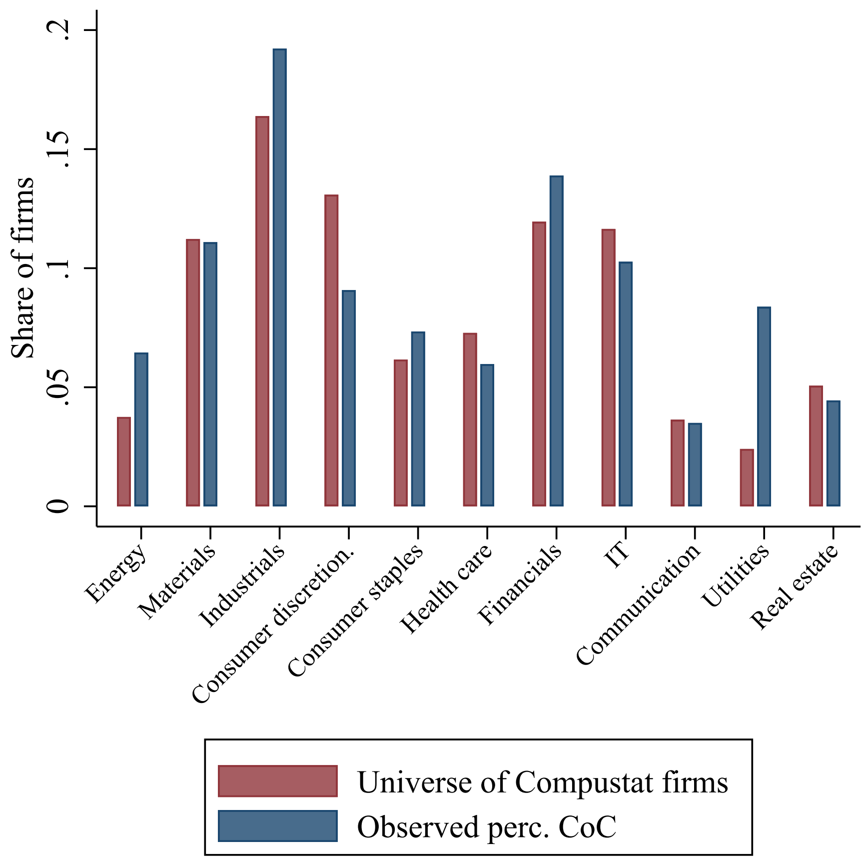


Figure A7
Excess Dispersion in the Perceived Cost of Capital: Heterogeneity

This figure shows excess dispersion in the perceived cost of capital for different subsets of the sample. For each of the five characteristics, we split the sample into two subsamples and estimate excess dispersion in both subsamples. We split the sample based on the median characteristic measured in ex ante percentiles in a given country and quarter. We estimate excess dispersion using the method based on the implied cost of capital, as in Table 3, Panel A. The five characteristics are market capitalization, book-to-market, dependence on external finance (measured using the Kaplan-Zingales index), net issuance relative to assets, and market beta based on 5 years of monthly data. Standard errors are double clustered at the firm and year level. The bars represent 95% confidence intervals.

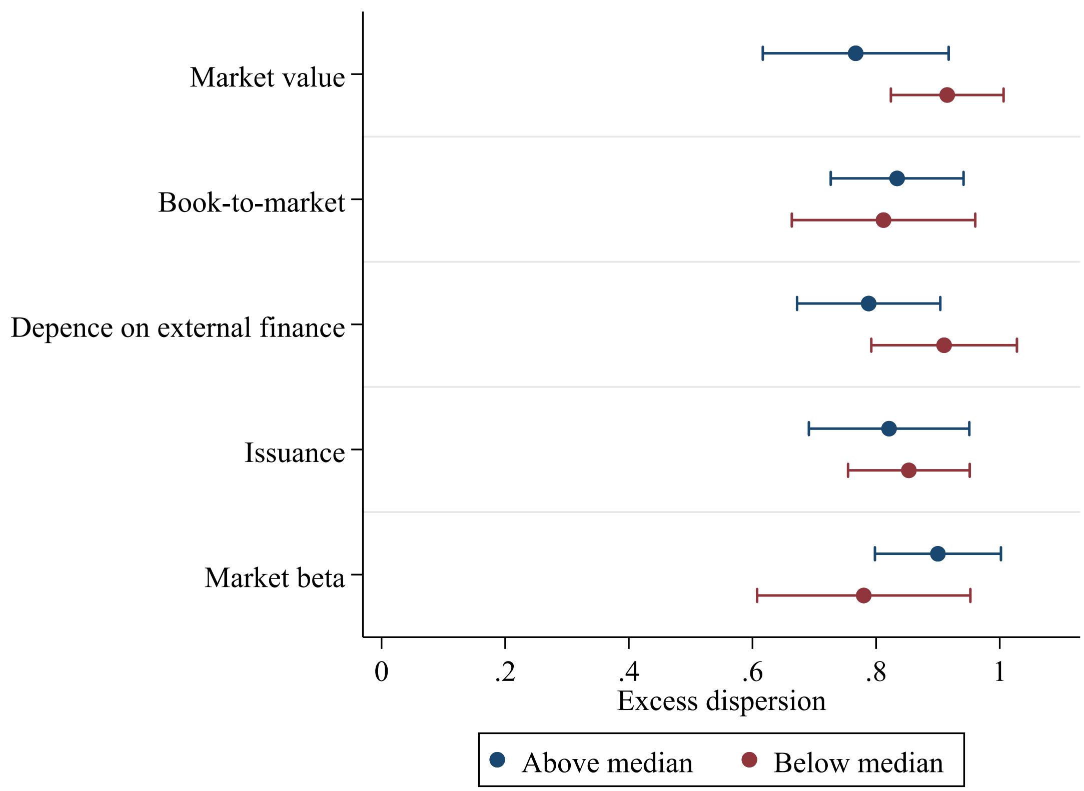


Figure A8
Excess Dispersion Relative to The Implied Cost of Capital Year-by-Year

This figure shows the excess dispersion in the perceived cost of capital relative to the implied cost of capital by year. Each estimate reflects a three-year moving average.

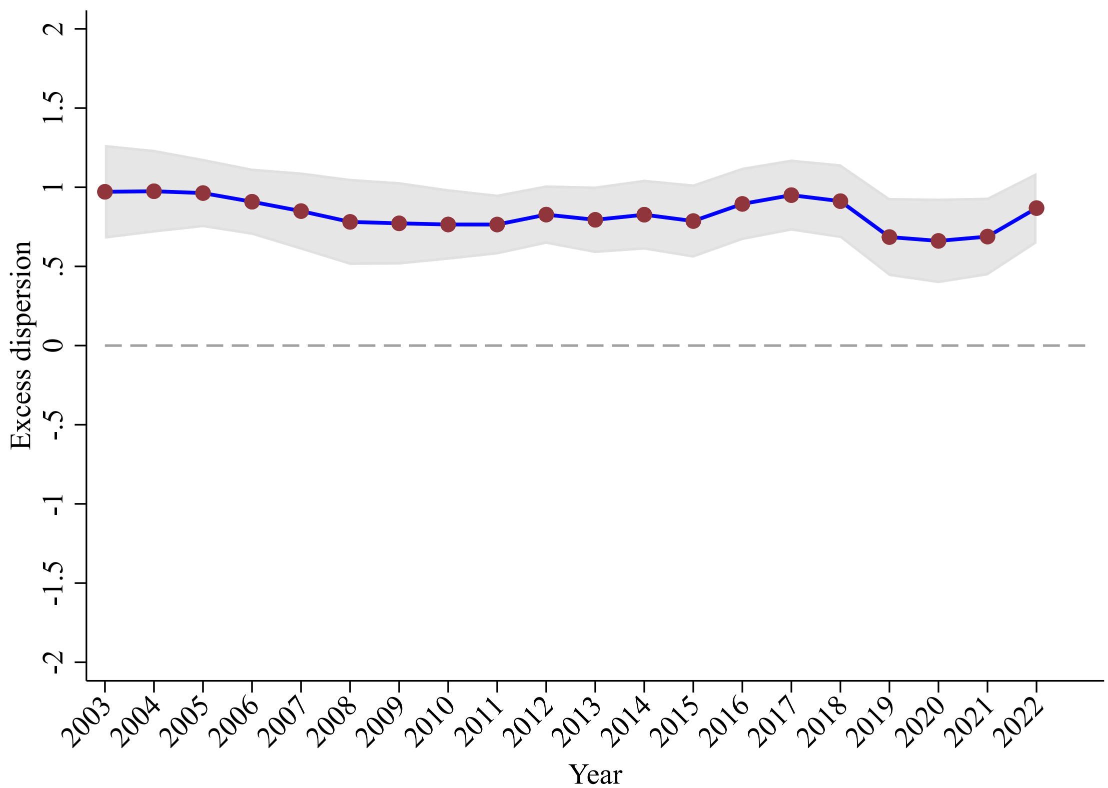


Figure A9
Persistence in the Perceived Cost of Capital

This figure shows slope coefficients φ_j from the following regression of the perceived cost of capital on lags of the perceived cost of capital of the same firm:

$$r_{i,t}^{\text{perc.}} = \sum_{j=1}^{9} \varphi_j r_{i,t-j}^{\text{perc.}} + FE_j + e_{i,t},$$

where FE_j represent lag-specific fixed effects and $j = (1, .., 9)$ the difference in years between the left- and right-hand side observation of the perceived cost of capital. The group $j = 9$ includes all observations with differences above 9 years. We smooth estimates across the two nearest js.

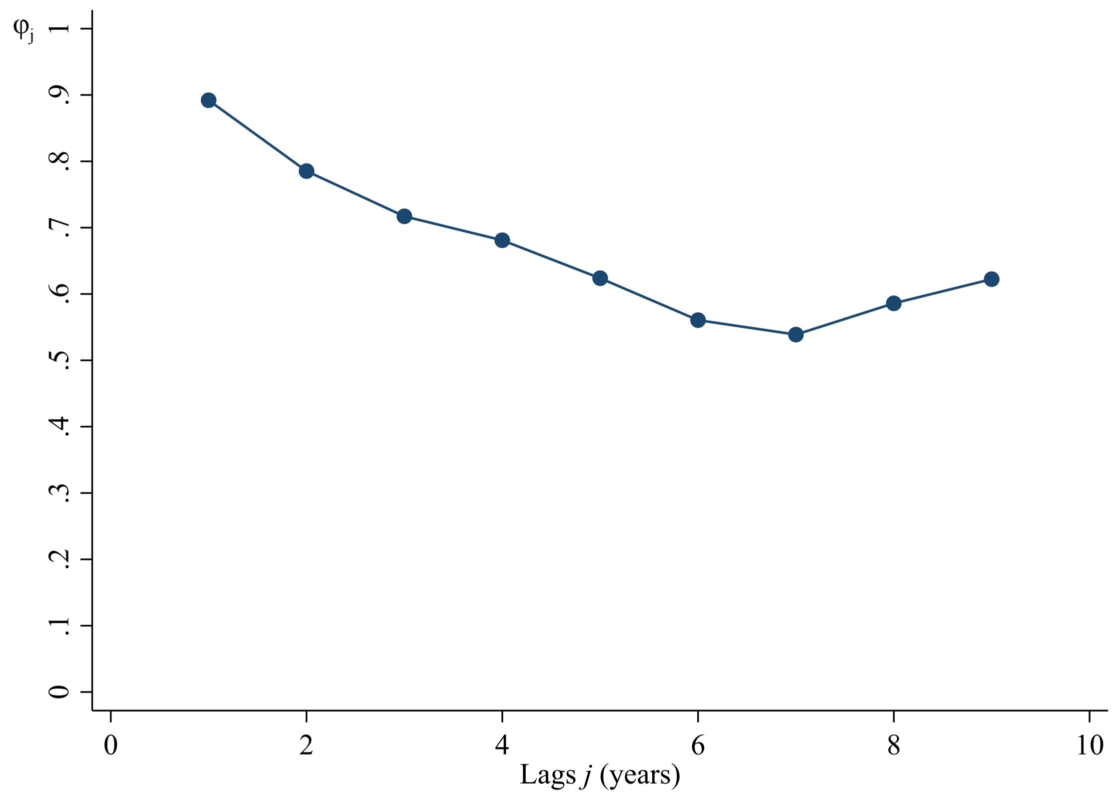


Figure A10
Excess Dispersion Relative to the Analyst Cost of Capital Year-by-Year

This figure shows the excess dispersion in the perceived cost of capital relative to the analyst-based cost of capital, separately estimated for each year from 2010. The specifications follow Table 5. Each estimate reflects a three-year moving average. The analyst-based cost of equity is calculated as the expected equity returns from IBES.

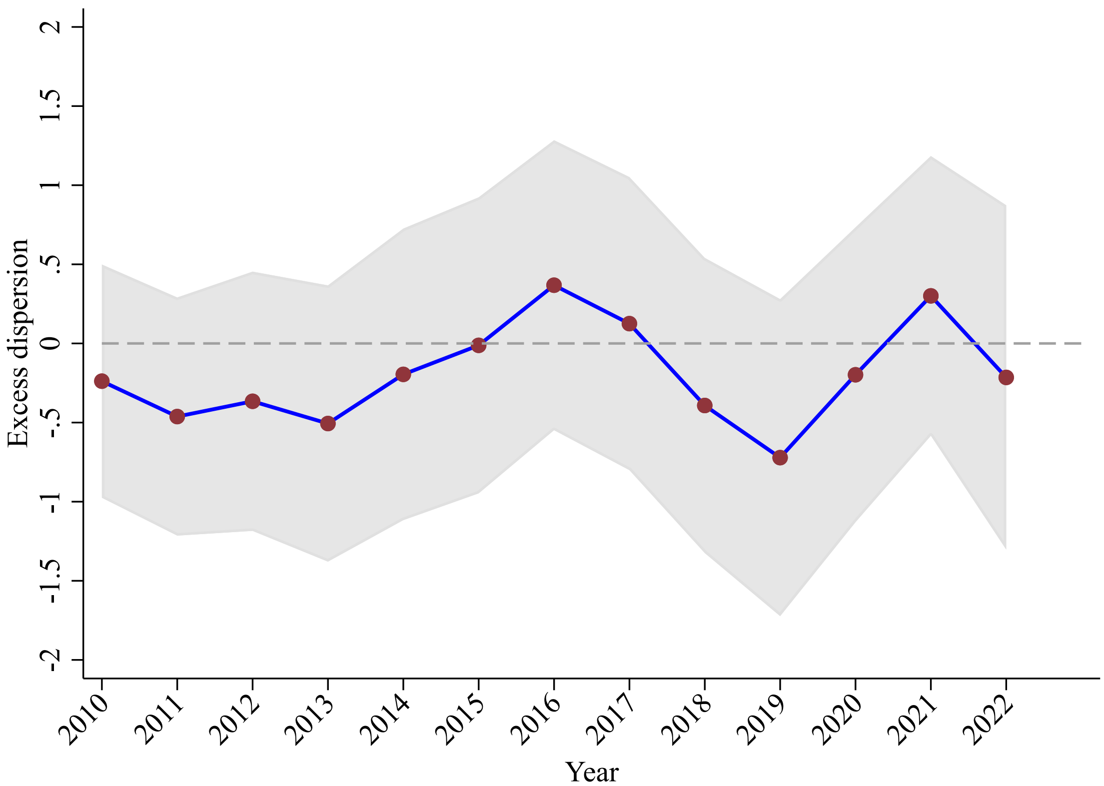


Figure A11
Analyst Perceptions and Excess Dispersion in the Perceived Cost of Equity

This figure shows the excess dispersion in the perceived cost of equity relative to the analyst-based cost of equity. The analyst-based cost of equity is calculated as the expected equity returns obtained from IBES or Value Line. The specifications follow Table 5.

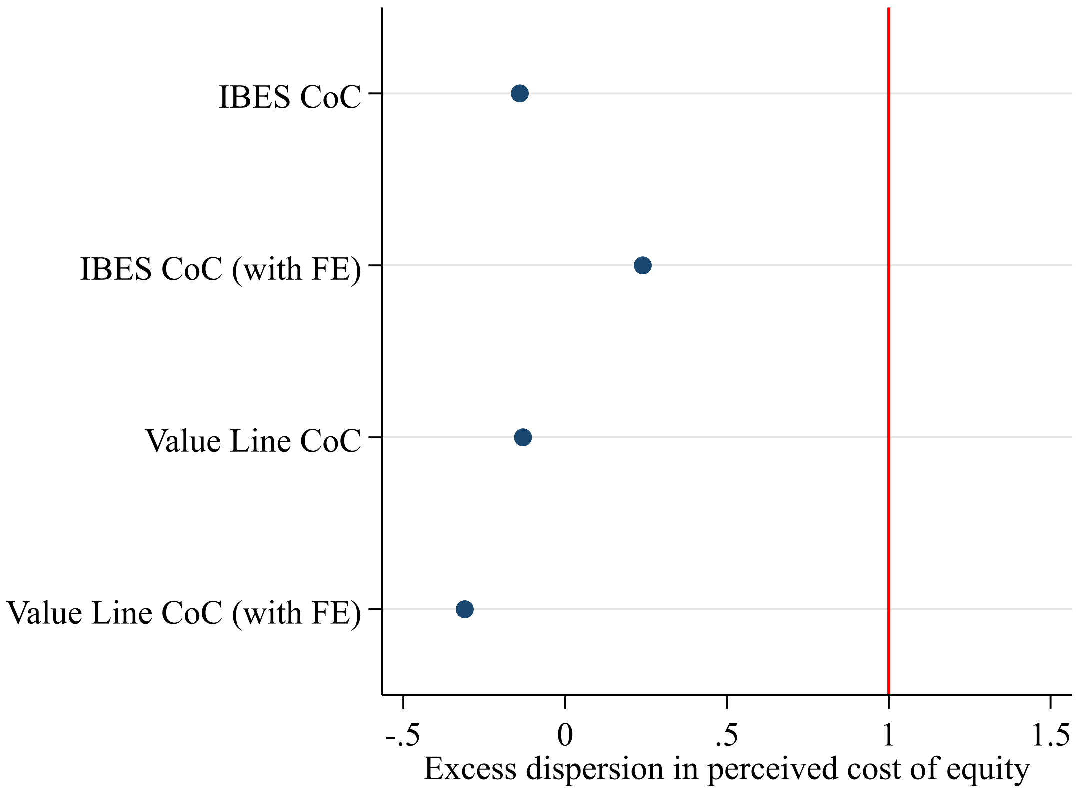


Table A1
Characteristics of Firms with Observed Perceived CoC

The outcome is 100 if the firm reports at least one perceived cost of capital on a conference call between 2001 to 2024 and 0 otherwise. The regressors are firm characteristics averaged over the period 2001 to 2024. The dataset is at the firm level and includes all firms in Compustat between 2001 and 2024 where the firm characteristics are observed. The investment rate is capital expenditure minus depreciation, divided by lagged property, plant, and equipment. Tobin's Q is the market-to-book value of debt and equity. Leverage is book debt over assets. The return on book equity is income before extraordinary items over book equity. Asset / sales is lagged assets divided by sales. Fiscal reporting in Dec. is an indicator for firms always reporting their annual financial statements in December. All specifications include country fixed effects. The reported within R^2 is for within-country variation. Standard errors are clustered by country. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Perceived cost of capital reported by the firm						
Log assets	2.33***	2.33***	2.33***	2.33***	2.30***	2.34***	2.32***
	(0.37)	(0.37)	(0.39)	(0.37)	(0.36)	(0.38)	(0.40)
Net investment rate	-0.24						-0.037
	(0.21)						(0.25)
Leverage		0.0030					0.0040
		(0.0057)					(0.012)
Tobin's Q			0.014				0.015
			(0.092)				(0.094)
Return on equity				0.0021			0.0011
				(0.014)			(0.013)
Assets / sales					-0.10		-0.098
					(0.078)		(0.077)
Fiscal reporting in Dec.						-0.0058	-0.0047
						(0.0063)	(0.0052)
Observations	35,455	35,455	35,455	35,455	35,455	35,455	35,455
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Within R^2	0.075	0.075	0.075	0.075	0.075	0.075	0.076

Table A2
Within-Firm Timing of Reporting the Perceived CoC

The outcome is 100 if the firm reports a perceived cost of capital in a given year and 0 otherwise. All specifications include country-by-year and firm fixed effects, so the coefficients capture within-firm variation in reporting at different points in time. The dataset is at the firm-year level and includes all firm-year observations in Compustat between 2001 and 2024 where the firm characteristics are observed. The net investment rate is capital expenditure minus depreciation, divided by lagged property, plant, and equipment. Tobin's Q is the market-to-book value of debt and equity. Leverage is book debt over assets. The return on book equity is income before extraordinary items over book equity. Asset / sales is lagged assets divided by sales. Fiscal reporting in Dec. is an indicator for whether the firm reported its annual financial statement in December of the given year. The reported within R^2 is for within-country-year and within-firm variation. Standard errors are clustered by country. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)
	Perceived cost of capital reported by the firm in given year					
Net investment rate	-0.045					-0.045
	(0.034)					(0.034)
Leverage		0.000067				0.000073
		(0.00022)				(0.00022)
Tobin's Q			0.00020			0.00031
			(0.0024)			(0.0023)
Return on equity				0.00024		0.00028
				(0.00056)		(0.00058)
Assets / sales					-0.0013	-0.0012
					(0.0023)	(0.0023)
Fiscal reporting in Dec.						-0.00041
						(0.00068)
Observations	344,365	344,365	344,365	344,365	344,365	344,365
Country*Year FE and Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Within R^2	4.9e-06	3.6e-09	1.4e-08	5.3e-08	2.0e-07	5.5e-06

Table A3
Stylized Drivers and the Perceived Cost of Capital

This table reports regressions of the firm-level perceived cost of capital on firm-level characteristics. Leverage is book debt divided by the sum of book debt and the market value of equity. Market beta is estimated in rolling five-year regressions of weekly data, in line with the approach taken by most practitioners. Standard errors are clustered by firm and quarter-year. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)
	U.S. sample		Global sample	
Leverage	-2.16***	-2.80***	-1.49***	-1.83***
	(0.45)	(0.52)	(0.38)	(0.39)
Market beta		1.16***		1.10***
		(0.28)		(0.23)
Log market value		-0.26***		-0.32***
		(0.083)		(0.069)
Book-to-market value		0.17		0.020
		(0.11)		(0.037)
Observations	1,700	1,700	3,480	3,480
Country FE	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes
R^2	0.12	0.22	0.24	0.30

Table A4
Time Variation in the Average Perceived Cost of Capital

This table reports regressions of the firm-level perceived cost of capital on the contemporaneous earnings yield plus expected inflation in the country of the firm as well as the long-term government interest rate in the country. Standard errors are clustered by firm and quarter-year. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1) U.S. sample	(2) Global sample
Earnings yield	0.59***	0.41***
	(0.19)	(0.11)
Long-term government rate	0.37***	0.25***
	(0.044)	(0.039)
Observations	1,700	3,480
Firm FE	Yes	Yes
Within R^2	0.16	0.13

Table A5
Excess Dispersion Relative to Market-Value Approach: IV Estimates

This table presents estimates of excess dispersion relative to the market-value approach along different firm characteristics. We project forecast errors in the perceived cost of capital on the perceived cost of capital and instrument for variation based on different firm characteristics. The instruments are CAPM beta in (1), CAPM beta, market size, and book to market in (2), the predicted perceived cost of capital in (3) and (4). In columns (1) to (3), the forecast errors are defined as the difference between the perceived cost of capital and the cost of capital based on realized returns as measured in equation (15). In column (4), the forecast errors are defined as the difference between the perceived cost of capital and the implied cost of capital. All variables are defined in Sections 5.1 and 5.2. Standard errors are clustered at the firm and quarter-year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)
		$\upsilon_{i,t+1}^{\text{realized}}$		$\upsilon_{i,t+1}^{\text{ICC}}$
$r_{i,t}^{\text{perc.}}$	2.89**	1.92	0.61	0.59***
	(1.37)	(1.17)	(0.82)	(0.072)
Observations	2,655	2,655	1,399	1,348
Instrument	CAPM beta	FF3 model	Predicted CoC	Predicted CoC
Observations	2,651	2,651	1,399	1,348
Quarter-year FE	Yes	Yes	Yes	Yes

Table A6
Comparison of Predicted Data and Duke CFO Data

Columns (1) and (2) report regressions of the perceived cost of capital from the Duke CFO Survey on the predicted perceived cost of capital (predicted based on the conference call data). Columns (3) and (4) report regressions of discount rates (hurdle rates) from the Duke CFO Survey on the predicted discount rates (predicted based on the conference call data). The sample includes only U.S. firms. Standard errors are clustered at the firm and year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1) Duke CoC	(2) Duke CoC	(3) Duke discount rate	(4) Duke discount rate
Predicted CoC	0.74***	0.90***		
	(0.17)	(0.21)		
Predicted discount rate			1.02***	0.98**
			(0.38)	(0.38)
Constant	0.034**	0.021	0.027	0.031
	(0.014)	(0.018)	(0.036)	(0.037)
Observations	319	319	92	92
R-squared	0.057	0.067	0.118	0.136
FE	None	Year	None	None
Within R^2	0.057	0.057	0.12	0.11

Appendix B Maximizing Market Value Using the SDF

A firm faced with a new investment opportunity should discount each cash flow produced by the project separately using the stochastic discount factor (SDF) and invest in the project if the total present value is positive. For representative projects (i.e., projects that have the same risk as the overall firm), this rule can often be simplified to discounting based on the cost of capital and investing in projects with positive NPV. We formalize this logic below and refer to additional discussion in the Online Appendix of Gormsen and Huber (2025).

Consider a manager who at time t evaluates a non-exclusionary investment opportunity i that generates the cash flow

$$C^i_{t+T} = \mu_i + \varepsilon_{t+T}$$

in T periods, where ε_{t+T} is unknown at time t. Undertaking the investment costs $\zeta^i_t > 0$ today. In the absence of frictions, the manager maximizes market value by choosing the project only if

$$E_t[M_{t+T}C^i_{t+T}] - \zeta^i_t \geq 0, \tag{A1}$$

where M_{t+T} is the stochastic discount factor. We can rewrite (A1) as

$$\mathbb{E}_t[\text{Return}^i_{t+T}] \geq R^f - \text{cov}\left(M_{t+T}, \text{Return}^i_{t+T}\right) R^f \tag{A2}$$

where R^f is the gross risk-free rate and $\text{Return}^i_{t+T} = C^i_{t+T}/\zeta^i_t$ is the return the firm earns on the invested capital. If the stochastic discount factor is driven by a factor model,

$$M_{t+T} = a_t - \sum_k b^k_t f^k_{t+T},$$

we can rewrite (A2) as,

$$\mathbb{E}_t[IRR^i_{t+T}] \geq \lambda^0_{t,t+T} + \sum_k \beta^k_t \lambda^k_{t,t+T}, \tag{A3}$$

where β^k_t is the multivariate beta of factor k in a projection of the IRR on the risk factors, $\lambda^0_{t,t+T}$ is the return on a zero-beta portfolio, and $\lambda^k_{t,t+T}$ is the premium on the k'th risk factor between t and $t + T$.[A1]

The expression in (A3) says that managers should accept investments for which the expected return is higher than the expected return in financial markets for a project with similar risk. If the cash flows of the project are representative of the overall firm and the project has zero net present value (i.e., it is a marginal project), the required return is the expected return on the firm's assets in the financial markets. The firm can therefore approximate the optimal investment decision for such a project by using the cost of capital as its discount rate and choosing positive NPV projects.

[A1]See Cochrane (2001) for the derivation.

Equation (A3) also shows that managers should use the expected return over the full horizon of the investment project. Since most corporate investment has fairly long duration, managers should therefore use the long-run expected returns as the basis of their cost of capital.

Appendix C Details on Measurement

We follow the data collection procedure established by Gormsen and Huber (2025). We extend that dataset by adding conference calls for all years from FactSet and for the years 2021 and 2024 from FactSet and Refinitiv.

Appendix C.1 Extraction of Paragraphs from Conference Calls

We access all calls held in English during the period 2002 to early 2024 and available on the databases Refinitiv and FactSet. We download paragraphs from 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 the cost of capital. 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, WACC. We identify roughly 160,000 paragraphs containing a keyword.

We match the firm name listed on the conference call to Compustat Global Company Keys by using a fuzzy merge algorithm, checking each match by hand. Ultimately, we link 93% of the paragraphs to a Compustat firm.

Appendix C.2 Guidelines for Manual Data Entry

With our data collection team, we read through each paragraph and enter relevant figures into tables. We record the following financial variables from the calls:

- 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

We do not record hypothetical numbers (e.g., "we may use a discount rate of x%" 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 quarter, 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., U.S. figures for a U.S. 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 and pre-tax cost of capital. 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 rarely mention a "levered" discount rate, 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% ROIC over the last five years and a 10% 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 C.3 Data Collection Team

A total of 23 research assistants contributed to the data collection. The average team size at any point was 7. The team members were: Alexandra Bruner, Ben Meyer, Cagdas Okay, Charlotte Wang, Chris Saroza, Daniel Marohnic, Esfandiar Rouhani, Henry Shi, Izzy Sethi, Jasmine Han, Jason Jia, Madeleine Zhou, Manhar Dixit, Meena Rakasi, Neville Nazareth, Rachel Kim, Rahul Chauhan, Rohan Mathur, Sanjna Narayan, Scarlett Li, Sean Choi, Sungil Kim, Tony Ma.

Before assistants begin the actual data collection, we teach them basic asset pricing and capital budgeting. Each assistant then reads roughly 2,000 paragraphs to train, which we check and discuss.

All paragraphs containing values for a perceived cost of capital and a discount rate were read at least twice by different assistants and outliers were checked by the authors to avoid errors. The research team met every week to discuss individual cases and to coordinate on consistent data entry rules.

Appendix D Time Horizons of Realized Returns

The predictive regressions used to estimate excess dispersion in Section 5.1 use realized stock returns over the 1-year horizon as the left-hand side variable (see equation 15). Ideally, the horizon should be the same as the horizon of the cost of capital, around 10 years, but using such a long horizon is infeasible given the associated reduction in sample size. In this section, we show that using the shorter 1-year horizon is conservative, in that it biases our estimates of excess dispersion downwards.

We consider a fully equity-financed firm, for which the expected log return $\mu_t = E_t[\log(1 + r_{t+1})]$ is given by

$$\mu_t = \mu + x_t, \tag{A4}$$

where the determinant of the conditional mean, x_t, evolves as an AR(1) process:

$$x_{t+1} = \phi x_t + e_{t+1}, \tag{A5}$$

with $\phi \in (0, 1)$. We define a log version of the market-based cost of capital as the average of the expected log-returns over a 10-year period. Letting t be measured in years,

$$\text{log market-based CoC} = \frac{1}{10}\sum_{j=1}^{10}\mu_{t+j-1} \tag{A6}$$

$$= \mu + \frac{1-\phi^{10}}{10(1-\phi)}x_t. \tag{A7}$$

In predictive regressions of the form

$$\log(1 + r_{t,t+j}) = \alpha^j + \beta^j \times \text{Log market-based CoC}_t + \varepsilon_{t+j}, \tag{A8}$$

we can characterize the slope coefficients, β^j, as a function of j:

$$\beta^j = \frac{10}{j}\frac{1-\phi^j}{1-\phi^{10}}. \tag{A9}$$

Equation (A9) shows that when using a return horizon of 10 years ($j = 10$), which is the assumed horizon of the cost of capital in this example, the slope coefficient is indeed 1. But for all $j < 10$, the slope coefficients are higher than 1. So, using return horizons below 10 years leads to an upward bias in the slope coefficient in the predictive regressions. As a result, the excess dispersion (defined as 1-β) is downwards biased, such that our tests underestimate the true amount of excess dispersion. The size of the bias depends on the persistence of x_t, and it shrinks as ϕ increases towards 1.

Appendix E Estimating the Variance of the Market-Based Cost of Capital

In Section 7.2, we quantify misallocation relative to different benchmarks of the cost of capital. Estimating misallocation requires estimates of variation in the benchmark cost of capital. For the market-value approach, we calculate the benchmark cost of capital as predicted values from predictive regressions; this section explains our methodology for doing so.

The goal is to estimate the variance of the market-based cost of capital. The most challenging input into the market-based cost of capital is the market-based cost of equity, which is given by unobserved long-run expected stock returns. We estimate long-run expected stock returns using predictive regressions that employ as the predictor either the perceived cost of capital or the implied cost of capital (ICC). We explain here the methodology based on the implied cost of capital.

The starting point for our estimation is the "realized" cost of capital from equation (15), which replaces expected stock (and bond) returns with realized returns:

$$\begin{aligned} r_{i,t+j}^{\text{realized}} &= \omega_{i,t} \times (1-\tau) \times r_{i,t+j}^{\text{debt, realized}} + (1-\omega_{i,t}) \times r_{i,t+j}^{\text{equity,realized}} && \text{(A10)} \\ &= r_{i,t}^{\text{market-based}} + \omega_{i,t} \times e_{i,t+j}^{\text{debt}} + (1-\omega_{i,t}) \times e_{i,t+j}^{\text{equity}}, && \text{(A11)} \end{aligned}$$

with definitions as in Section 5.1. The equation shows that the market-based cost of capital is the expected value at time t of the "realized" cost of capital in the future. We calculate this expected value as the expected value given the ICC of the given firm i at a given time t. That is, we estimate

$$r_{i,t+j}^{\text{realized}} = b_0 + b_1 \text{ICC}_{i,t} + \varepsilon_{i,t+j}^{\text{realized}} \tag{A12}$$

and calculate

$$r_{i,t}^{\text{market-based}} = \widehat{b}_0 + \widehat{b}_1 \text{ICC}_{i,t}. \tag{A13}$$

This procedure gives the market-based cost of capital in nominal terms for any firm i at time t. Since the relevant cost of capital is measured in real terms and includes depreciation, we add in firm-level depreciation and subtract a 2% expected inflation rate. Abstracting from depreciation and inflation rates gives almost identical results.

The estimates of b_0 and b_1 are 0.051 and 0.30. The estimate of b_1 is highly statistically significant, suggesting substantial predictive power of the ICC over future stock returns. But the fact that the coefficient is well below 1 emphasizes that ICC in itself is a biased estimate of long-run expected stock returns; it is because of this bias that we cannot directly use the ICC as the cost of capital, but instead need to run predictive regressions. The predictive power is strongest in the time series dimension, as the slope coefficients drop to less than 0.1 when including date fixed effects. Taken together, the ICC measure implies modest cross-sectional variation in the market-based cost of equity.

Our second measure for the market-based cost of capital uses the perceived cost of capital as the predictor variable. Following the analysis in Section 5.1, we can use either realized returns or the ICC on the left hand side in the predictive regressions that use the perceived cost of capital as the regressor. As discussed in Section 5.1, the two approaches lead to largely similar results, but the ICC has higher statistical power and we therefore focus on that measure.

Appendix F Construction of Predicted Data

In Section 4.2, we estimate a simple empirical model to summarize the perceived cost of capital. On the basis of this model, we construct a series of predicted values of the perceived cost of capital for the universe of firms for which we observe the required characteristics. In this section, we explain the process through which we construct the predicted values. We also conduct a similar exercise for firms' discount rates. The predicted data can be found on costofcapital.org along with additional details on the estimation.

Appendix F.1 Generating Predicted Data

We construct predicted values of firms' perceived cost of capital and discount rates based on the Lasso procedures described in Section 4.2. We calculate predicted values for all firms for which we observe the set of characteristics needed to calculate both a perceived cost of capital and discount rate. Since we only feed the model cross-sectional predictors, there is virtually no time variation in the aggregate series. To obtain the correct time variation, we add in the estimated time variation from the full sample of discount rates and perceived cost of capital. We estimate the time variation in these objects by projecting discount rates and perceived cost of capital on year dummies and absorbing firm fixed effects. This procedure ensures that all variation is driven by within-firm variation in the relevant estimates, following the methods in Gormsen and Huber (2025). We calculate time variation separately for the U.S. and Europe. The European countries consist of both Euro (or Euro-pegged) countries and the UK. Using one time series for euro- and pound-denominated countries could be problematic if there is a large divergence in inflation across the two currencies, but helps to ensure a sufficient set of firms to estimate time variation robustly. We exclude firms from other countries from our sample of predicted values as we do not have enough observations to robustly estimate the time variation.

Appendix F.2 Validation

We validate the predictive power of our data in an out-of-sample test. We use the predicted values to predict the perceived cost of capital and discount rates observed in the seminal Duke CFO survey, a quarterly survey of corporate managers (Graham and Harvey 2001). In some of the surveys, managers are asked about their cost of capital and their discount rates (referred to as hurdle rates in the survey). We use these data to test how well our predictive values work out of sample.[A2]

The results are in Table A6. The first two columns show regressions of the perceived cost of capital in the Duke CFO data on our predicted values. The slope on the predicted values is 0.74 without year fixed effects and 0.9 with year fixed effects. These results are consistent with the notion that the time variation in the perceived cost of capital in the Duke CFO survey differs from the conference call data (see Gormsen and Huber 2025 for more discussion on this result), so including year fixed effects increases the slope. More importantly, the finding in column (2) suggests that the cross-sectional variation in our predicted values is close to the Duke CFO data (i.e., the slope is close to 1). The cross-sectional variation in our predicted values thus appears to be an unbiased predictor of the cross-sectional variation in the Duke CFO data.

Columns (3) and (4) show results for discount rates. The slope coefficients are close to one with and without year fixed effects. The discount rates in the Duke CFO data are around 3 percentage points higher than in the conference call data, as seen from the intercept. A likely driver of this difference is that our predicted discount rates account for overhead costs and are therefore lower, whereas the Duke CFO data likely contain some discount rates that do not fully account for overhead. However, the three percentage point difference is insignificant given the small sample of 92 observations.[A3]

[A2]We thank John Graham for generously sharing these data.

[A3]While the Duke CFO data contain more than 92 observations, many of these are non-listed firms or firms that cannot be matched to firm-level identifiers.