Firms' Perceived Cost of Capital*

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Abstract

We analyze firms' perceptions of their cost of capital using hand-collected data. The perceived cost of capital is associated with the allocation of capital across firms. In a model with inefficient financial markets, firms can maximize their current market value by setting their perceived cost of capital equal to the expected returns on their debt and equity. In the data, little variation in firms' perceived cost of capital can be justified by variation in expected returns, suggesting that firms do not follow this market-value maximization benchmark. Alternatively, firms may aim to maximize their "fair value" corrected for financial market inefficiencies. In the data, a fair-value benchmark (based on the CAPM) can justify half the variation in the perceived cost of capital. However, most of the variation can be justified by the beliefs of financial analysts about expected returns. Using a quantitative model, we find that the observed distortions in the perceived cost of capital can substantially impact capital allocation 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.

The challenge for firms is that both the expected return and the cost of capital of projects are unobserved. A large literature has analyzed how firms determine expected returns, which requires firms to calculate the cash flows that will accrue at different points in time. We instead focus on firms' cost of capital. It is not clear how firms set their cost of capital because it depends on their perceptions of financial markets and their objectives. As a result, firms' internally perceived cost of capital—and hence their investment decisions—may deviate substantially from the benchmarks proposed by researchers and practitioners.

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 justified by variation in expected returns on debt and equity, which is the benchmark in models where firms maximize their market value. The perceived cost of capital is better accounted for by a CAPM-based cost of capital, which is consistent with models in which firms maximize their fair value in inefficient markets (i.e., their value net of mispricing). The predictors that justify most variation in firm perceptions are the expected returns of financial analysts. Overall, we find large deviations between the perceived cost of capital actually used by firms and the benchmarks used in the academic literature. The deviations are large enough to materially influence the allocation of capital. In a stylized model, the deviations lower total factor productivity by 5% relative to a market-value benchmark and by 3% relative to a fair-value benchmark based on the Capital Asset Pricing Model (CAPM).

We start by analyzing how firms should set their cost of capital given that financial investors have biased expectations and markets are inefficient. If a firm wants to maximize its current market value, the firm's perceived cost of capital should equal an object called the "market-based cost of capital." This is the objective expected return on the firm's debt and equity in financial markets that an observer with full information and unbiased, rational expectations would calculate (i.e., given FIRE). Alternatively, the firm may want to maximize its fair value, which is the value the firm would have if there were no mispricing in financial markets. In that case, the firm should use a "fair-value cost of capital," which depends only on the fundamental risk of the firm. It may be calculated using the CAPM or other fundamental risk models that are often taught in business schools, as we discuss below. We discuss the conditions under which the two rules apply if firms have biased cash flow expectations about their investment projects, and we find broad empirical support for these conditions.

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 worldwide.

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. The reason for this weak short-run transmission is that firms adjust their discount rates (also known as hurdles) gradually over many years, so transitory variation in the perceived cost of capital has little effect on discount rates and investment (Gormsen and Huber 2025). In the long run, however, the perceived cost of capital is strongly incorporated into firms' discount rates. Hence, long-run, cross-sectional differences in the perceived cost of capital across firms influence firms' investment decisions in the long run. In this paper, we set aside the transitory variation and focus on the long-run allocation of capital, which is determined by firms' perceived cost of capital.

We document stylized facts about 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 recommendations by 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 differences across firms account for around 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 firm-level 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 rational 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 justifies substantially more of 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 can justify 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.

We also study how the perceived cost of capital aligns with analyst expectations of returns. 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 justifies most of the variation in the perceived cost of capital. This finding holds using both the IBES and the Value Line data, and it is robust across time and geography.

The comovement between the perceived and the analyst cost of capital is consistent with stylized facts about analyst beliefs. The perceived cost of capital moves with standard measures of objective expected returns in the aggregate time series, but exhibits substantial excess dispersion in the cross-section. Similarly, analyst expectations move with standard measures of objective expected returns in the aggregate time series, but exhibit substantial excess dispersion in the cross-section (e.g., Bastianello 2025, Thesmar and Verner 2025, Jensen 2026).

We end the paper by studying how dispersion in the perceived cost of capital affects aggregate TFP. We use the classic quantitative framework by Hsieh and Klenow (2009). While the framework is stylized, it provides a useful way to gauge the implications of the perceived cost of capital for the real economy (see also Giroud et al. 2022 and Sraer and Thesmar 2023). Using the framework, we measure by how much dispersion in the perceived cost of capital lowers TFP. We find a TFP loss of around 6%, relative to a setting where all firms use the same cost of capital. This TFP loss reflects, in part, that firms' perceived cost of capital incorporates heterogeneity in risk across firms, so the decrease in TFP comes with an increase in the safety of output. We also measure by how much excess dispersion in the perceived cost of capital—relative to the market-value approach or the fair-value approach—lowers TFP. We find a TFP loss of 5% relative to the market-based benchmark and 3% relative to the CAPM-based fair-value benchmark. These numbers suggest that excess dispersion in the perceived cost of capital has substantial real consequences. The results also suggest that TFP losses documented in the capital misallocation literature are partly driven by dispersion in the perceived cost of capital.

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 almost 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 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 justified by analysts' 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 justify most of the variation in the perceived cost of capital.

Conceptually, investment decisions can be represented using a net present value (NPV) calculation. The literature has focused on the numerator of the NPV calculation, in particular, bias in firms' cash flow expectations (e.g., Malmendier and Tate 2005, Greenwood and Hanson 2015, Gennaioli et al. 2016). We complement this work by analyzing the NPV denominator, in particular, firms' discount factors, which are determined by the cost of capital.

Previous research relies on qualitative survey evidence about firms' cost of capital. The Duke CFO Survey suggests that firms mix and match multiple methods: 80% of large firms use the CAPM, 70% use multi-factor models, and 40% historical returns (Graham 2022). Other surveys find similar results (Jacobs and Shivdasani 2012, Mukhlynina and Nyborg 2016, Jagannathan et al. 2016). Firms' investment decisions are consistent with some firms using the CAPM and simple 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 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. We model a firm that considers an investment project using a net present value (NPV) calculation. If the NPV of the project is positive, the firm undertakes the project. The NPV is

$$\text{NPV} = \sum_{k=0}^{\infty} \frac{E_t[CF_{t+k}]}{\delta_{t+k}}, \tag{1}$$

where CF_{t+k} is the cash flow associated with the project at time $t+k$ and δ_{t+k} depends on firms' perceived cost of capital.

The literature has focused on the numerator of the NPV calculation, showing that biases in firms' expected cash flows shape decisions (e.g., Malmendier and Tate 2005, Greenwood and Hanson 2015, Gennaioli et al. 2016). We turn our attention to how firms choose the perceived cost of capital, which determines the NPV denominator.

In our model, the firm's objective function determines how it should set the perceived cost of capital. If the firm wants to maximize its current value in financial markets, it can use the expected return implied by its market value as the cost of capital (sometimes called the objective expected return). But if the firm wants to maximize its "fair value," which is the value net of mispricing, it should use an expected return based only on the fundamental risk of the firm, which is determined by the CAPM in our model.

Asset prices in our model are distorted by the biases of behavioral investors. Absent any biases, the market-value approach and the fair-value approach lead to the same cost of capital. However, in the presence of behavioral investors, the firm has to choose between the two approaches.

Let us outline the intuition using a simple example. Assume a behavioral investor becomes excited about a firm and bids up the market value excessively. The firm has

[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).

two options for how to respond. The first option is to follow the market-value approach. Under the market-value approach, the firm would observe the elevated market value, infer that the cost of capital has gone down, and invest more. The second option is the fair-value approach. Under this approach, the firm would note that the market value is elevated because of investor sentiment and that the fundamental value of the firm is unchanged. The firm would therefore keep the cost of capital unchanged, so it would not increase investment in response to the investor sentiment (unless its expected cash flows change at the same time).

Below, we lay out a formal model with both rational and behavioral investors. The model relates the different approaches to the cost of capital to investors' beliefs and demand. Our starting point is to study the cost of capital separately from biases in cash flow expectations, but we subsequently discuss the potential role of biases in firms' cash flow expectations. Our model builds on Stein (1996), who similarly argues that the choice of the cost of capital depends on the objective of the firm. Relative to Stein, we introduce an equilibrium model of asset prices with heterogeneous agents that allows us to study how investors' subjective expected returns relate to the market-based and fair-value cost of capital.

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 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 risky securities $j = 1, \ldots, J$. Investors have access to a risk-free asset that offers a return r^f each period. 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 biased expectations. The investors have mean-variance preferences over next-period wealth. 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 risk aversion γ_i summarizes both the number of investors in that group and their individual risk aversion.

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 biased 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 with $\kappa_t^j < 1 + r^f$.[3] The first order condition for investor i at time t is

$$x_{t,i} = \frac{1}{\gamma_i}(\Omega_t)^{-1}\left(E_t^i[P_{t+1} + D_{t+1}] - (1 + r^f)P_t\right). \tag{2}$$

Market clearing implies equilibrium prices

$$P_t = DIA\left(1 + r^f - \tilde{\kappa}_t\right)^{-1}\left(E_t^{\mathrm{O}}[P_{t+1} + D_{t+1}] - \gamma\Omega_t x^*\right), \tag{3}$$

where $1/\gamma = 1/\gamma_A + 1/\gamma_B$ and $\tilde{\kappa}_t = \kappa_t \frac{\gamma}{\gamma_B}$ (see Appendix B for derivations).

We define realized returns on asset j as $1 + r_{t+1}^j = (P_{t+1}^j + D_{t+1}^j)/P_t^j$. The objective expected returns associated with the prices in equation (3) can be expressed through a sentiment-adjusted CAPM:

$$E_t^{\mathrm{O}}[r_{t+1}^j] = r^f - \tilde{\kappa}_t^j + \beta_t^j \lambda_t, \tag{4}$$

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.

[2]The bias here scales with prices, but could equivalently scale with cash flows, scale with expected payouts, or enter additively (as in De Long et al. 1990), without affecting our conclusions. Appendix C reports similar results under the payout-scaling alternative.

[3]This assumption contrasts with De Long et al. (1990) who model stochastic biases in demand. Making the biases stochastic generates noise trader risk premia, such that noise traders and behavioral investors can make money and therefore remain in the market over time. Our assumption weakens the limits to arbitrage.

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 firm j at time t as the expected return that arises if we set $\kappa_t^j = 0 \forall t$ in (3):

$$E_t^{\mathrm{O}}[r_{t+1}^{\text{fair value},j}] = r^f + \tilde{\beta}_t^j \tilde{\lambda}_t, \tag{5}$$

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 $\tilde{\kappa}_t^j$ 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:

$$E_t^{\mathrm{B}}[r_{t+1}^j] = r^f + \hat{\kappa}_t^j + \beta_t^j \lambda_t, \tag{6}$$

where $\hat{\kappa}_t^j = \kappa_t^j \frac{\gamma}{\gamma_A}$. 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 is 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 (4) 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.

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

$$\mathrm{NPV}_t^{\mathrm{market},j} = \sum_{k=0}^{\infty} \frac{E_t^{\mathrm{O}}[CF_{t+k}^j]}{\delta_{t+k}^{\mathrm{market},j}}, \tag{7}$$

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

$$\delta_{t+k}^{\mathrm{market},j} = 1 + E_t^{\mathrm{O}}[r_{t,t+k}^j] \tag{8}$$

is the discount factor for the k'th cash flow. The market-based NPV is calculated using the objective expectations of cash flows in the numerator and of returns (as discount factor) in the denominator, so it reflects the value at which the project would have traded if it were traded in financial markets. We discuss below how departures from objective cash flow expectations influence the analysis.

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 risk. Intuitively, firms exploit the behavioral investors' willingness to buy shares in high-κ firms at excessively high prices—because of excessively high payout 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:

$$\mathrm{NPV}_t^{\text{fair value},j} = \sum_{k=0}^{\infty} \frac{E_t^{\mathrm{O}}[CF_{t+k}^j]}{\delta_{t+k}^{\text{fair value},j}}, \tag{9}$$

where

$$\delta_{t+k}^{\text{fair value},j} = 1 + E_t^{\mathrm{O}}[r_{t,t+k}^{\text{fair value},j}], \tag{10}$$

and invest in all projects with positive fair NPV. The fair NPV uses the fair return from (5) 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 (6), as the cost of capital.

Using the subjective expected return does not maximize current market value. The subjective expected return deviates from the objective expected return in (4), so the subjective expected return 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 $\hat{\kappa}_t^j = \kappa_t^j \frac{\gamma}{\gamma_A}$ (see equation 6). This term goes to zero as rational investors disappear. Formally:

$$\delta_{t+1}^{\text{fair value},j} \approx 1 + r^f + \beta_t^j \lambda_t \to 1 + E_t^B[r_{t+1}^j] \quad \text{as} \quad \gamma_B/\gamma_A \to 0. \tag{11}$$

Hence, if assets are priced only by behavioral investors, their subjective expected return approximately 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 close to the fair rate.[4]

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 fundamental risk). Empirical evidence suggests that subjective return expectations indeed align with subjective risk perceptions (Jensen 2026), 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. Finally, 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 toward the fair cost of capital as the rational investor disappears.[5]

[4] The initial approximation in (11) arises because the fair-value $\tilde{\beta}_t^j, \tilde{\lambda}_t$ may not equal the market β_t^j, λ_t.

[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

Firms with biased cash flow expectations The baseline model assumes that firms have unbiased expectations about cash flows. In Appendix C, we explore the implications of biased cash flow expectations in detail. We summarize the findings here.

In many cases, biases in firms' cash flow expectations do not change the results about the appropriate market-based and fair-value cost of capital. In one case, however, firms can maximize their firm value without using the market-based cost of capital. In particular, if firms have coherent cash flow and return expectations—that is, cash flow and return expectations that jointly produce the observed market value—then firms can maximize their market value by using their biased but coherent return expectations as their cost of capital. Intuitively, the biases in the cash flows and returns cancel out in this case, such that the firm behaves similarly to a rational firm using the market-value approach.

The data imply that biases in cash flow expectations do not fully offset variation in the perceived cost of capital. We detail why in Appendix C. To summarize, if biased cash flow expectations offset variation in the perceived cost of capital, then firms' perceived cost of capital has little explanatory power over firm investment rates and realized returns. This prediction contrasts with the empirical results in Section 4. In Appendix C, we find that biases in cash flow expectations have the potential to offset 24% of the dispersion in the perceived cost of capital. Given the modest potential, we therefore abstract from potential biases in cash flow expectations in our baseline model and the remainder of the paper.

Issuance of equity Our model focuses on the investment decisions of firms, leaving aside funding considerations. In principle, a firm that seeks to maximize its fair value may want to issue or repurchase shares whenever the objective expected return deviates from the fair expected return. In our model, this benefit from issuance would enter as a cash flow effect that does not influence the cost of capital. In some models, issuance may require additional investment, in which case the possibility of issuing overvalued equity motivates firms to invest more. In practice, it is possible that firms incorporate such benefits of investments into the wedge they add to their cost of capital to obtain their discount rate or hurdle rate (see also our discussion of how firms set discount rates in Section 3.1). Stein (1996) provides conditions under which

the noise trader risk (which does not belong in the fair cost of capital).

firms incorporate the benefits of issuance as a fudge factor to the discount rate. We focus on the perceived cost of capital, leaving aside how firms determine their discount rate wedges and issuance.

On the use of a single cost of capital Before turning to the empirical analysis, we highlight a few issues related to the use of the cost of capital in practice. The model analyzes a cost of capital for a project that is representative of the overall firm and small enough not to influence the pricing of risk. These assumptions imply that the firm in our model considers a project that is representative of the average project of the firm and whose risk and sentiment is identical to the risk of the assets of the overall firm. If the firm considered a non-representative project, it should, in principle, apply a project-specific discount rate. In addition, for every project, each cash flow at each horizon should have its own discount rate (as seen in the above definitions of the cost of capital for the market-based and fair-value approaches). In practice, most firms use a single cost of capital for all the cash flows. This approach can be seen as an approximation that is only correct in certain instances (see Appendix D for more details).[6]

3 Measurement and Data Description

We assemble a new firm-level dataset by merging 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 risk 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 standard academic benchmarks, the

[6] Theoretical models often describe firms' optimal investment rules in terms of the stochastic discount factor (SDF). We show in Appendix D that, under simplifying assumptions, rules based on an SDF can be represented as rules based on a project-specific cost of capital.

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 their required returns on investment, called discount rates or hurdles. 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 plays an important role in shaping 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 project characteristics 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 in practice use and report the weighted average cost of capital (WACC), which depends on firms' perceptions of the firm-level cost of debt and cost of equity:

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

where $r_{i,t}^{\text{WACC}}$ denotes the WACC of firm i at time t, ω is the percentage of debt finance (leverage), τ is the corporate 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 $r_{i,t}^{\text{equity}}$.

The WACC does not exactly equal the expected returns of firms' investors. Instead, firms use the WACC as a convenient approximation that allows them to incorporate both the investors' expected returns and the tax benefits of debt in their investment decisions. Specifically, firms assume that the tax benefit is proportional to the cost of debt by including the tax term $(1-\tau)$ in the WACC. Since firms use and report the WACC, we adjust the expected return benchmarks using the tax term in our empirical analyses, so we compare equivalent objects.

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 E.

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 for objects that can be challenged and cross-checked (Hassan et al. 2019). Indeed, analysts and investors sometimes ask managers detailed questions about how past realized investment decisions relate to their cost of capital. Statements from conference calls also 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 is associated with 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 around 20 keywords.[7] Together with a team of research 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 a suggestive question (e.g., "am I correctly assuming that your cost of capital is x%?"),

[7] 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 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.

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 hurdles) 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.[8]

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.[9] We observe a perceived cost of capital for 34 of the 100 largest firms 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

[8]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.

[9]We mainly conduct cross-sectional analyses in this paper, so the share of firms appearing with a perceived cost of capital at least once in the dataset is the relevant statistic.

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 an 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 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 our purposes, the perceived cost of capital is useful because it captures a quantitative determinant of a firm's long-run investment rate 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 around 2 percentage points, as shown in Table A1. However, there is no evidence that firms with different investment rates (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), or 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^{th} percentile to 13% at the 95^{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 risk. 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 (12) 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, a tax rate of 0.2, 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 same quarter. The coefficient is statistically different from zero at the 1% level. The relation between the ROIC and the perceived cost of capital is 1 in a competitive model with constant returns to scale. 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% 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. Recently, Gormsen and Huber (2025) show 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.[10]

4.2 Stylized Drivers and the Perceived Cost of Capital

We describe stylized facts about the variation in the perceived cost of capital.

Traditional drivers of returns We begin with traditional drivers of financial returns in the cross section. According to Modigliani and Miller (1963), firms with higher leverage should have a lower cost of capital due to a higher tax shield (see equation 12), 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.[11]

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 (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

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

[11] 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 4.7% (the average in our sample), the difference in the tax shield should be around $0.5 \times 0.2 \times 4.7\% = 0.47$ percentage points.

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).

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.[12] The size effect may, however, reflect a negative relation between size and market betas. We address this issue through multivariate regressions below.

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 3. The perceived cost of capital significantly increases in market beta and decreases in size and leverage. The value effect is insignificant. Table 3 also reports results from regressions in which we use de-levered betas as the regressor. Doing so drives out the effect of leverage (see also Figure A7).

Strongest cross-sectional predictors Going beyond the four stylized drivers, we study which firm characteristics from a 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

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

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 year.

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 negative loading on age is similarly surprising, as age is associated with higher expected returns (Jiang et al. 2005) and not known to be negatively related to fundamental risk.[13] 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.

We use the Lasso model to construct a database of predicted values for the perceived cost of capital, as detailed in Appendix H. 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

[13]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).

observations of predicted values, both for the perceived cost of capital and also for discount rates, and is available at costofcapital.org.

Time variation 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 (Table A4 documents that the perceived cost of debt is better explained by long-term than short-term interest rates).

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 A3 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 $1/3 \times (1 - \text{tax rate})$ on the interest rate. The coefficients in the U.S. sample in column (1) are 0.6 and 0.4, respectively, relatively close to this benchmark. The coefficients in the global sample in column (2) are slightly lower.[14]

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 variation in how different firms behave. In the remainder of the paper, we focus on the variation across firms.

[14]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.

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

$$r_{i,t}^{\text{market-based}} = \omega_{i,t} \times (1-\tau) \times \mu_{i,t}^{\text{debt}} + (1-\omega_{i,t}) \times \mu_{i,t}^{\text{equity}}, \tag{13}$$

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,

$$r_{i,t}^{\text{market-based}} = \beta_0 + \beta_1 r_{i,t}^{\text{perc.}} + \varepsilon_{i,t}. \tag{14}$$

For the perceived cost of capital to equal the market-based cost of capital, the slope coefficient β_1 in (14) 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 (14) is that the objective expected return underlying $r_{i,t}^{\text{market-based}}$ 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 (14). We can therefore use the realized return on the left-hand side to test if $\beta_1 = 1$, a necessary condition for $r_{i,t}^{\text{perc.}}$ 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:

$$\begin{aligned} r_{i,t+j}^{\text{realized}} &= \omega_{i,t} \times (1-\tau) \times r_{i,t+j}^{\text{debt, realized}} + (1-\omega_{i,t}) \times r_{i,t+j}^{\text{equity,realized}} && (15) \\ &= r_{i,t}^{\text{market-based}} + \omega_{i,t} \times (1-\tau) \times e_{i,t+j}^{\text{debt}} + (1-\omega_{i,t}) \times e_{i,t+j}^{\text{equity}}, && (16) \end{aligned}$$

where the second equality follows from (13) as long as j is sufficiently large, so the equation captures long-run returns.

The slope coefficient β_1 in the regression

$$r_{i,t+j}^{\text{realized}} = \beta_0 + \beta_1 r_{i,t}^{\text{perc.}} + \eta_{i,t}, \tag{17}$$

is the same as in regression (14) 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

$$r_{i,t}^{\text{perc.}} = r_{i,t}^{\text{market-based}} + \upsilon_{i,t}^{\text{market-based}}, \tag{18}$$

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

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

The first term on the right-hand side of (19) 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 (19) by the variance of the perceived cost of capital yields

$$1 = \underbrace{\frac{\text{cov}\left(r_{i,t}^{\text{market-based}}, r_{i,t}^{\text{perc.}}\right)}{\text{var}\left(r_{i,t}^{\text{perc.}}\right)}}_{\gamma^{\text{market-based}}} + \underbrace{\frac{\text{cov}\left(\upsilon_{i,t}^{\text{market-based}}, r_{i,t}^{\text{perc.}}\right)}{\text{var}\left(r_{i,t}^{\text{perc.}}\right)}}_{\gamma^{\text{excess}}}, \tag{20}$$

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 (14) and (17). 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 (17) and recognizing that $\gamma^{\text{excess}} = 1 - \beta_1$, we can write the forecast error as:

$$r_{i,t}^{\text{perc.}} - r_{i,t+j}^{\text{realized}} = -\beta_0 + \gamma^{\text{excess}} \times r_{i,t}^{\text{perc.}} + \xi_{i,t}. \tag{21}$$

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.[15] 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 (17) (see Appendix F). 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 4 presents estimates of γ^{excess}. In the first column, we regress the forecast error $r_{i,t}^{\text{perc.}} - r_{i,t+j}^{\text{realized}}$ on the perceived cost of capital of the same firm in the same quarter, as in equation (21). 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.

[15]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. (The imputed perceived cost of equity is the cost of equity implied by the perceived cost of capital, the observed financial cost of debt, and observed leverage, see Table 1.) Each portfolio has 114 firms on average each month, and never less than 40, leading to well-diversified portfolios.

In the first row of Table 5, 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%.[16]

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

[16]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.

to even stronger economic rejections than the analysis in Table 4.

The inference in these regressions is similar to the standard analysis in empirical 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).[17] 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 of financial analysts. 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'

[17] 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 4 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 0.83 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 A8 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 A9 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 is often taught in business schools and 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 4 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 quarter 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 justifies 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. We note that these effects are consistent with the strong effect of CAPM betas on the perceived cost of capital documented in Table 3.[18]

While the CAPM-based fair-value cost of capital has more explanatory power than the market-value approach, it still does not justify 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

[18]We also find a positive and significant association when regressing the perceived cost of capital on the fair-value cost of capital in Table A6.

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.[19] 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 justifies 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. The results are also consistent with managers using the CAPM model because they are trained to do so in business schools.

Finally, we note that the investment rates of firms using the fair-value cost of capital may still increase during stock market booms or when firms are overvalued. While the fair-value cost of capital falls by less than the market-based cost of capital during booms, the expected cash flows of firms may increase independently of how they set their perceived cost of capital, leading to greater investment for all firms.

[19] The investment factor captures that firms with high asset expansion have low future realized returns. The negative association is often interpreted through the "Investment CAPM," which predicts that firms with higher future realized returns have higher perceived cost of capital and therefore lower investment. However, we find that firms with higher asset expansion have higher perceived cost of capital, which is inconsistent with the Investment CAPM explanation of this specific factor. The investment factor is based on asset expansion rather than more standard measures of investment and Cooper et al. (2024) emphasize the sensitivity of the results to this particular measurement choice.

Cummins et al. (2006) make a similar point.

5.3 Further Decomposition and Measurement Error Concerns

The perceived cost of capital cannot be fully justified 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 within firms. Figure A10 shows the within-firm persistence in the perceived cost of capital. Over the first few years, the perceived cost of capital converges back toward 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 most of the variation in the perceived cost of capital can be justified by the variation in analysts' expectations about returns, which further alleviates measurement error concerns.

6 Analyst Beliefs and the Cost of Capital

The previous section shows that the perceived cost of capital does not align with objective expected returns but partly with fair-value expected returns. This section explores the extent to which firms' perceived cost of capital aligns with the expectations of financial analysts about firms' equity returns.

The literature suggests that analysts' return expectations deviate from objective expected returns in the cross-section of stocks (Engelberg et al. 2020, Jensen 2026). At the same time, recent papers emphasize that time variation in analyst beliefs about the aggregate stock market aligns with objective expected returns (Thesmar and Verner 2025, Bastianello 2025). These patterns are consistent with the results from the previous section: the perceived cost of capital deviates substantially from objective expected returns in the cross-section, but comoves with objective expected returns in the aggregate time series (see Section 4.2 on the time variation).

To formally relate to analyst expectations, we calculate a firm-level cost of capital implied by the equity price 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 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}:

$$r_{i,t}^{\text{analyst}} = \omega_{i,t} \times (1 - \tau) \times \mu_{i,t}^{\text{debt}} + (1 - \omega_{i,t}) \times E_t^{\text{analysts}}[r_{i,t}^{\text{equity}}], \tag{22}$$

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 most of the variation in the perceived cost of capital. For the IBES expectations in column 1 of Table 6, 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 most of the variation in the perceived cost of capital is accounted for by the analyst-based cost of capital and that there is little 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 6. (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 analyst-based cost of capital (left y-axis) is around 11% on average, while the perceived cost of capital (right y-axis) is 8.7% on average.

Figure A11 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 A12 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.[20] 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.

The results in this section do not directly speak to the distinction between the market-based and fair-value approach. One interpretation is that firms attempt to follow the market-value approach and have return expectations similar to analysts. But the results can also be interpreted in favor of the fair-value approach: analysts often incorporate market betas and other measures of fundamental risk into their beliefs (Jensen 2026), so the analyst cost of capital should comove with the perceived cost of capital of firms following the fair-value approach. Our analysis does not aim to distinguish between these interpretations, but focuses on highlighting a connection between firms' perceptions of their cost of capital and analyst beliefs about returns.

7 Cost of Capital Distortions, Capital Allocation, and TFP

In the long run, the perceived cost of capital determines the amount of capital employed by each firm, so variation in firms' perceptions can distort the overall allocation of capital. In this section, we relate such distortions to the total factor productivity (TFP) of the economy and an influential literature on capital misallocation.

The starting point for this literature is the observation that the marginal product of capital is highly dispersed across firms. In stylized models, such dispersion leads to lower TFP because TFP is maximized when marginal products are equalized. Hsieh and Klenow (2009) calculate that the TFP of the U.S. manufacturing sector could increase by 35% if capital were moved from low to high marginal product firms, such that marginal products were equalized. There remains an active debate about the sources and implications of this dispersion in marginal products (e.g., Asker et al.

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

2014, David et al. 2016, 2022, Restuccia and Rogerson 2017, Bils et al. 2021).

Our results above show that differences across firms in the perceived cost of capital generate dispersion in marginal products, as firms with a higher perceived cost of capital require a higher marginal return on capital (see Section 4.1). In this section, we adopt the framework by Hsieh and Klenow (2009) and quantify the impact of this dispersion on TFP.

First, we calculate that the observed variation in the perceived cost of capital implies substantial dispersion in marginal products of capital across firms, which leads to a TFP loss of around 6%, relative to TFP with equalized perceived cost of capital. This finding suggests that the perceived cost of capital may play an important role in understanding the facts documented by Hsieh and Klenow (2009).

The TFP loss arising from the perceived cost of capital is not inefficient in general. If, for instance, the perceived cost of capital were exactly equal to the fair-value cost of capital, the observed TFP could be efficient under the fair-value view. In this case, the 6% TFP loss could reflect an optimal response to heterogeneity in fundamental risk, where TFP is sacrificed for safer output.

To explore the role of risk, we next study the TFP loss arising from excess dispersion in the perceived cost of capital relative to our two benchmarks. Essentially, we ask: if one wanted firms to allocate capital using the market-value approach, how much does firms' failure to set the perceived cost of capital in line with the market-based cost of capital change TFP? And similarly, if one wanted to allocate capital using the fair-value approach, how much do deviations from the fair-value approach lower TFP?

We find that the observed variation in the perceived cost of capital leads to a 5% larger TFP loss than the TFP loss implied by the market-value approach. Similarly, it leads to a 3% larger TFP loss than the loss implied by the fair-value approach. These numbers reflect that there is more dispersion in the perceived cost of capital than justified by either benchmark. However, the estimates also emphasize that much of the TFP loss may reflect fundamental risk. Our model does not feature risk, so it cannot quantify the effect on welfare and the efficiency of capital allocation.

We caution that the results come from a structural model that rests on strong and limiting assumptions. In a richer framework with stochastic productivity or output, one could quantify the total effect of the perceived cost of capital on welfare. Such a model could also speak to potential benefits of firms favoring the fair-value approach over the market-value approach in inefficient capital markets.

7.1 Model of Capital Allocation and TFP

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 real 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. The term τ_{si} captures deviations between the benchmark and perceived cost of capital. Capital depreciates at rate dep_{si} and we write the user cost of capital as $r_{si} = r_{si}^{\text{perc.}} + \text{dep}_{si}$. All firms pay the same wage w for labor. We assume that τ_{si} is independent of $r_{si}^{\text{benchmark}}$ and that TFP and the user cost of capital are jointly log-normally distributed. 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[21]

$$\pi_{si} = P_{si}Y_{si} - wL_{si} - r_{si}K_{si}. \tag{23}$$

Solution Total output is

$$Y = \prod_{s=1}^{S} \left(\mathrm{TFP}_s K_s^{\alpha_s} L_s^{1-\alpha_s}\right)^{\theta_s}, \tag{24}$$

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

$$\mathrm{TFP}_s = \left[\sum_{i=1}^{M_s} \left(A_{si}\frac{\overline{\mathrm{TFPR}_s}}{\mathrm{TFPR}_{si}}\right)^{\sigma-1}\right]^{\frac{1}{\sigma-1}} \tag{25}$$

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

$$\mathrm{TFPR}_{si} = \frac{\sigma}{\sigma-1}\alpha_s^{-\alpha_s}\left(\frac{w}{1-\alpha_s}\right)^{1-\alpha_s}(r_{si})^{\alpha_s}. \tag{26}$$

$\overline{\mathrm{TFPR}_s}$ is a weighted average of TFPR across firms in sector s. Variation in the perceived cost of capital creates dispersion in TFPR that lowers TFP:

$$\log(\mathrm{TFP}_s) = a - \Lambda \operatorname{var}\left(\log(r_{si}^{\text{perc.}} + \mathrm{dep}_{si})\right), \tag{27}$$

where the scalar Λ is given by $2\Lambda = \sigma(\alpha_s)^2 + \alpha_s(1-\alpha_s)$ and a is a constant.[22]

The variation in the perceived cost of capital reflects both variation in benchmark cost of capital and excess dispersion ($r_{si}^{\text{perc.}} = (1+\tau_{si}) \times r_{si}^{\text{benchmark}}$). We are also interested in quantifying the effect of excess dispersion (τ) on TFP.

We consider 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

[21] 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 $1 + r_{si}^{\text{perc.}}$. Abstracting from this term is conservative as it lowers the estimated TFP loss.

[22] See Correction Appendix for Hsieh and Klenow (2009).

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 (25) and (26) 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

$$\log\left(\text{TFP}_s\right) - \log\left(\text{TFP}_s^{\tau=0}\right) = -\Lambda\left(\text{var}\left(\log(r_{si}^{\text{perc.}} + \text{dep}_{si})\right) - \text{var}\left(\log(r_{si}^{\text{benchmark}} + \text{dep}_{si})\right)\right). \tag{28}$$

7.2 Estimates of TFP Distortions

We use expressions (27) and (28) to quantify the TFP distortions that arise from the observed variation in the perceived cost of capital. To do so, we set the elasticity of substitution between products in a sector, σ, to 3 in our baseline calibration, in line with recent work (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). We calculate a depreciation rate dep_i for each firm using Compustat data.[23] We convert the nominal cost of capital into a real value using a 2% expected inflation rate.

TFP loss due to variation in the perceived cost of capital We start by quantifying the impact of the perceived cost of capital on TFP using equation (27). TFP depends on Λ times $\text{var}\left(\log(r_i^{\text{perc.}} + \text{dep}_i)\right)$ (leaving out sector subscripts). We are interested in the part of the TFP loss that can be explained by the perceived cost of capital alone, so we subtract Λ times the variance we would obtain if all firms used the cross-sectional average as their perceived cost of capital. (The constant a cancels out.)

The estimated TFP loss is 6.33%. This number implies that TFP would be around 6% higher if all firms used the same perceived cost of capital. The TFP loss does not necessarily reflect inefficient misallocation (David et al. 2022). If, for instance, the TFP loss were driven only by the fact that the perceived cost of capital equals a benchmark cost of capital, capital would be optimally allocated relative to the benchmark. We next calculate the extent to which the TFP loss is justified by two

[23] We calculate dep_i as depreciation (DP) divided by property, plant, and equipment (PPEGT). Since DP includes amortization of intangible capital, but PPEGT includes only tangible capital, we subtract the average amortization rate (AM/PPEGT) in Compustat. We winsorize at 2.5%.

benchmarks: the market-based cost of capital and fair-value cost of capital.[24]

TFP loss relative to market-based benchmark From equation (28), we can calculate the TFP loss arising from firms using the perceived cost of capital instead of the market-based cost of capital. This TFP loss represents a loss coming from variation in the perceived cost of capital that should not exist under the market-based benchmark. The TFP loss depends on the difference between $\text{var}\left(\log(r_i^{\text{perc.}} + \text{dep}_i)\right)$ and $\text{var}\left(\log(r_i^{\text{market-based}} + \text{dep}_i)\right)$. To estimate the second part, we need to estimate the variance in 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). Moreover, our sample is skewed toward 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 relatively small.

Our main approach quantifies the variance of the market-based cost of capital using the implied cost of capital (see Appendix G for details). We do so under the assumption that the implied cost of capital equals the market-based cost of capital plus an orthogonal error. 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 values from forecasting regressions akin to (17), 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. The predicted values from these regressions then form the basis of $\text{var}\left(\log(r_i^{\text{market-based}} + \text{dep}_i)\right)$, relying on additional steps and assumptions detailed in Appendix G.

We find that the TFP loss relative to the market-based benchmark is equal to 5.14%. If we instead set $\sigma = 4$, the TFP loss increases to 6.16%. While the precise

[24] We also calculated the TFP loss based on the discount rates (i.e., required returns to capital, see Section 4.1) that are used in firm investment decisions and reported on conference calls as distinct objects from the perceived cost of capital. The TFP loss based on discount rates is even larger than the TFP loss based on the perceived cost of capital.

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 TFP distortions.

The capital distortions arising from the excess dispersion do not only influence TFP. The distortion could also influence the riskiness of capital and output. For instance, if capital is distorted toward relatively safer firms, overall output may become safer. We find that the perceived cost of capital is positively related to market betas, idiosyncratic volatility, and other standard measures of risk, suggesting that capital is indeed allocated from high-risk to low-risk firms, as measured by these characteristics. These characteristics are not strongly associated with the market-based cost of capital, but they could be associated with fundamental risk. In the next section, we quantify the TFP loss relative to the fair-value cost of capital, which represents one traditional measure of fundamental risk.

The model abstracts 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). Bias in cash flow expectations could further exacerbate TFP losses, but could also mitigate them if biases in cash flows offset variation in the perceived cost of capital. As discussed in Appendix C, such bias could offset roughly 24% of the dispersion in the perceived cost of capital and hence lower the estimated TFP losses. Overall, our findings speak most directly to the distribution of capital among the large listed firms in our dataset. 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, van Binsbergen and Opp (2019) assess whether individual risk factors can contribute to the allocation of capital, whereas we analyze TFP losses due to deviations between the market-based and perceived cost of capital.

TFP loss relative to fair-value benchmark We next estimate the TFP loss relative to the fair-value benchmark. In this analysis, we assume that the "correct" benchmark cost of capital is the fair-value cost of capital based on the CAPM.

We calculate $\operatorname{var}\left(\log(r_i^{\text{fair-value}} + \text{dep}_i)\right)$ 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. This assumption implies, for instance, that firms do not use excessive shrinkage in their cost of capital estimation. Based on this assumption, we calculate the fair-value cost of capital as the predicted values from a regression of our CAPM fair-value estimate on the perceived cost of capital. The predicted values from these regressions then form the basis of var $\left(\log(r_i^{\text{fair-value}} + \text{dep}_i)\right)$, as detailed in Appendix G.

The TFP loss relative to the fair-value approach is 3.04%, suggesting that the observed variation in the perceived cost of capital leads to TFP that is around 3% lower than TFP if all firms used the fair-value approach. This estimated loss is substantially lower than the loss relative to the market-based benchmark. The results are consistent with the interpretation that a substantial part of the overall TFP loss arising from dispersion in the perceived cost of capital comes with the benefit of a safer output, as viewed from a fair-value perspective.

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 can set their perceived cost of capital given that 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 can set their perceived cost of capital and, thereby, their long-run investment rules. Firms can take different approaches depending on their objectives. Under the market-value approach, firms want to maximize their current market value in inefficient financial markets. This objective can be achieved by setting the perceived cost of capital equal to 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. In that case, the perceived cost of capital should equal a fair-value benchmark, such as the CAPM.

Our evidence rejects that firms implement the market-value approach. Instead, a fair-value approach based on the CAPM aligns better with the data. However, most variation in the perceived cost of capital can be justified by firms incorporating the return expectations of financial analysts.

How firms set their perceived cost of capital can matter for aggregate real outcomes. In a quantitative model, the deviations between the perceived cost of capital and the market-value approach reduce TFP by around 5% in a model where the market-value approach is optimal. In comparison, the deviations from the fair-value approach generate only a 3% TFP loss in a model where the fair-value approach is optimal. The results imply that the TFP losses discussed in the influential literature on capital misallocation are partly driven by firms incorporating fundamental risk factors, but also partly by firms introducing excess dispersion (over and above risk-based benchmarks) in their perceived cost of capital. Taken together, the findings suggest that firms' perceptions are of first-order importance to aggregate outcomes.

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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 12), 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 its 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 percentage points. 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
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. The de-levered market beta is multiplied by 1 minus the leverage ratio. 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)	(5)	(6)
		U.S. sample			Global sample	
Leverage	-1.94***	-2.67***	0.21	-1.49***	-1.96***	0.62
	(0.54)	(0.59)	(0.71)	(0.38)	(0.45)	(0.56)
Market beta		1.56***			1.51***	
		(0.25)			(0.20)	
De-levered Market beta			2.29***			2.16***
			(0.33)			(0.28)
Log market value		-0.25***	-0.25***		-0.21***	-0.20***
		(0.085)	(0.085)		(0.063)	(0.063)
Book-to-market value		0.24	0.26		0.077	0.092
		(0.31)	(0.31)		(0.24)	(0.24)
Observations	1,700	1,700	1,700	3,282	3,282	3,282
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.12	0.22	0.23	0.24	0.30	0.30

Table 4
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. The estimates come from projections of forecast errors in the perceived cost of capital onto the perceived cost of capital. In Panel A, the forecast errors are defined as the difference between the perceived cost of capital and the market-based cost of capital. In columns 1 and 2, we calculate the forecast error as the difference between $r^{\text{perc.}}_{i,t}$ and $r^{\text{realized}}_{i,t+j}$, where $r^{\text{realized}}_{i,t+j}$ is an estimate of the cost of capital that uses realized stock returns over the 1-year horizon as a proxy for the cost of equity (see equation 16). In columns 3 and 4, we use the implied cost of capital as proxy for expected returns (see text for details). 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

	$\upsilon^{\text{realized}}_{i,t+1} = r^{\text{perc.}}_{i,t} - r^{\text{realized}}_{i,t+j}$		$\upsilon^{\text{ICC}}_{i,t+1} = r^{\text{perc.}}_{i,t} - r^{\text{ICC}}_{i,t}$	
$r^{\text{perc.}}_{i,t}$	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

	$\upsilon^{\text{CAPM}}_{i,t+1} = r^{\text{perc.}}_{i,t} - r^{\text{CAPM}}_{i,t}$		$\upsilon^{\text{FF5}}_{i,t+1} = r^{\text{perc.}}_{i,t} - r^{\text{FF5}}_{i,t}$	
$r^{\text{perc.}}_{i,t}$	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 5
Time Series Averages of Portfolios Sorted on Perceived CoC

This table reports time series averages for equity 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 stock 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 column 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. Estimates are presented in raw numbers (e.g., 0.1 = 10%). 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 stock 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 6
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 $\upsilon_{i,t+1}^{\text{IBES}} = r_{i,t}^{\text{perc.}} - r_{i,t}^{\text{IBES}}$		Value Line expectations $\upsilon_{i,t+1}^{\text{VL}} = r_{i,t}^{\text{perc.}} - r_{i,t}^{\text{VL}}$	
$r_{i,t}^{\text{perc.}}$	-0.13	-0.0034	0.016	0.17
	(0.19)	(0.19)	(0.15)	(0.18)
Observations	2,434	2,434	961	961
Quarter-year FE	No	Yes	No	Yes
P(slope = 1)	0	0	0	0
R^2	0.13	0.25	0.000016	0.26

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.

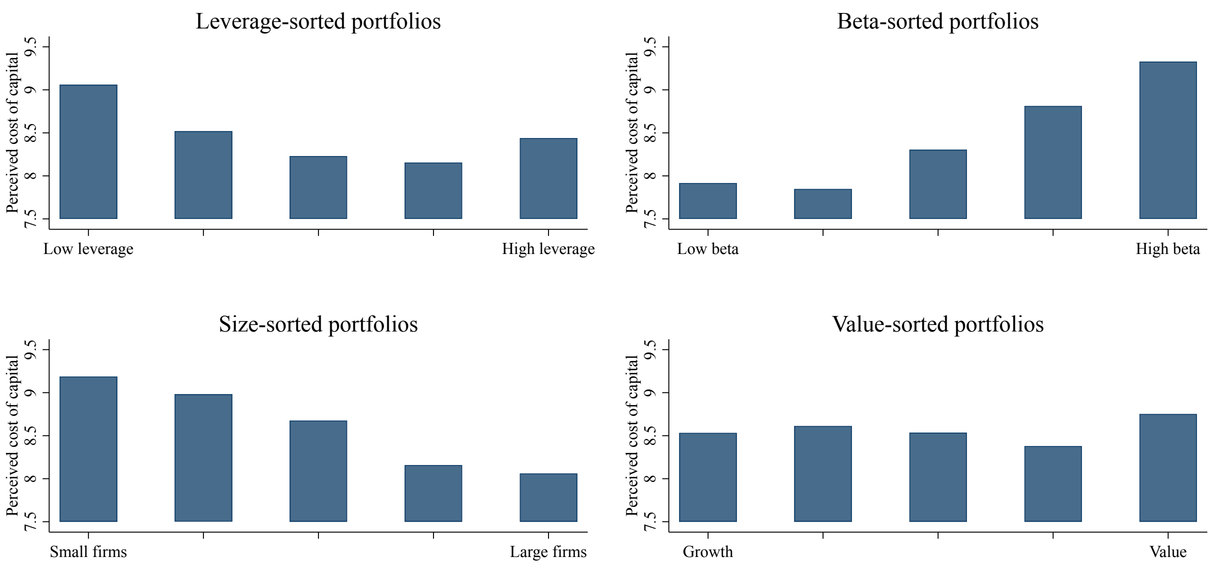


Figure 2
Firm Characteristics Associated with the Perceived Cost of Capital

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.

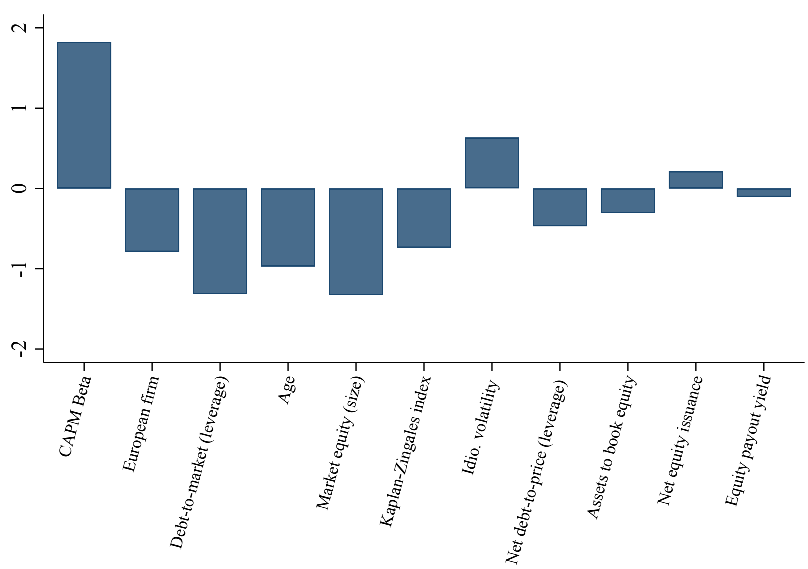


Figure 3
Time Variation in the Average Perceived Cost of Capital

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.

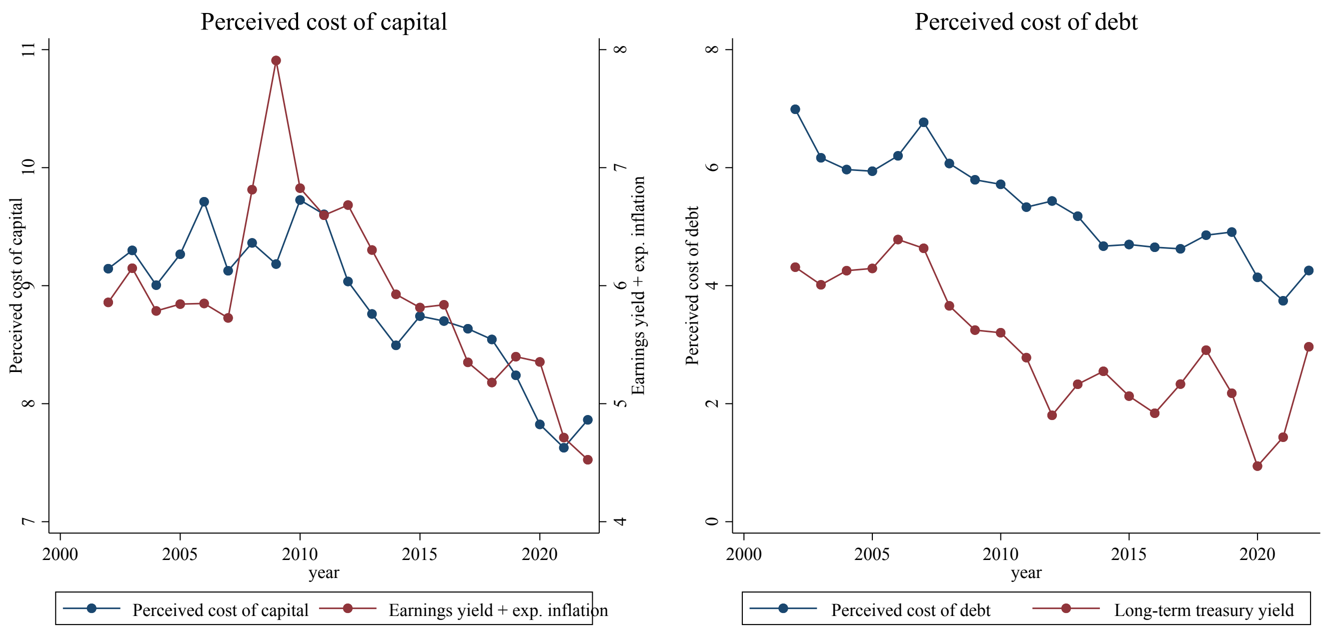


Figure 4
Returns to Equity Portfolios Sorted on the Perceived Cost of Capital

This figure shows time series averages for equity 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 stock returns over the subsequent month as well as the average imputed perceived cost of equity. We plot annualized returns in the figure. The imputed 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.

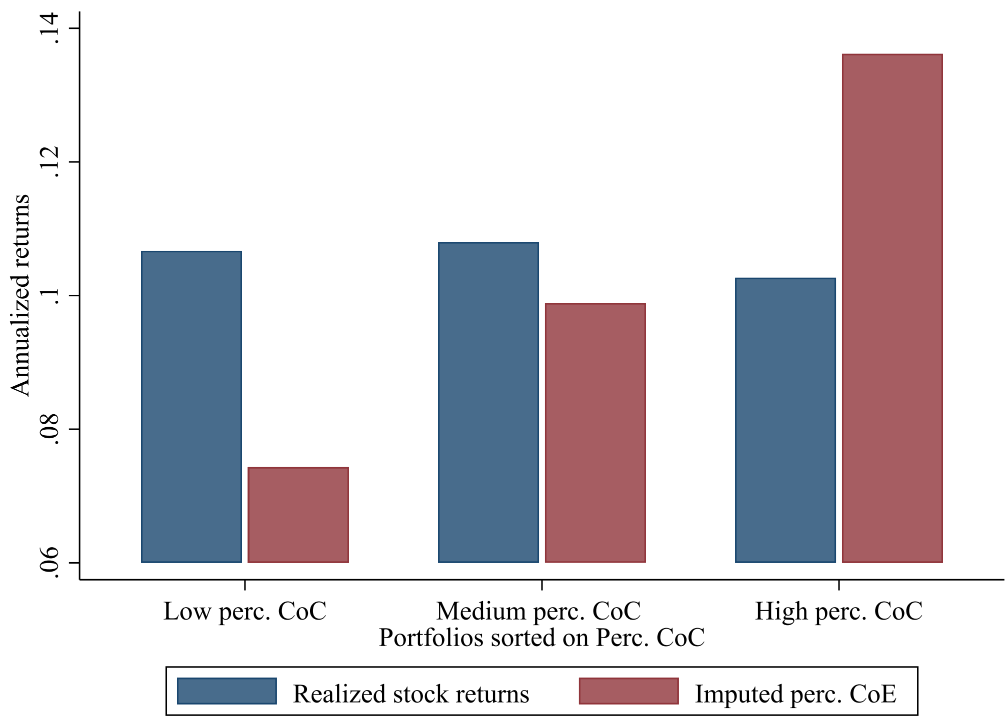


Figure 5
Excess Dispersion in the Perceived Cost of Capital, Equity, and Debt

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 4. 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.

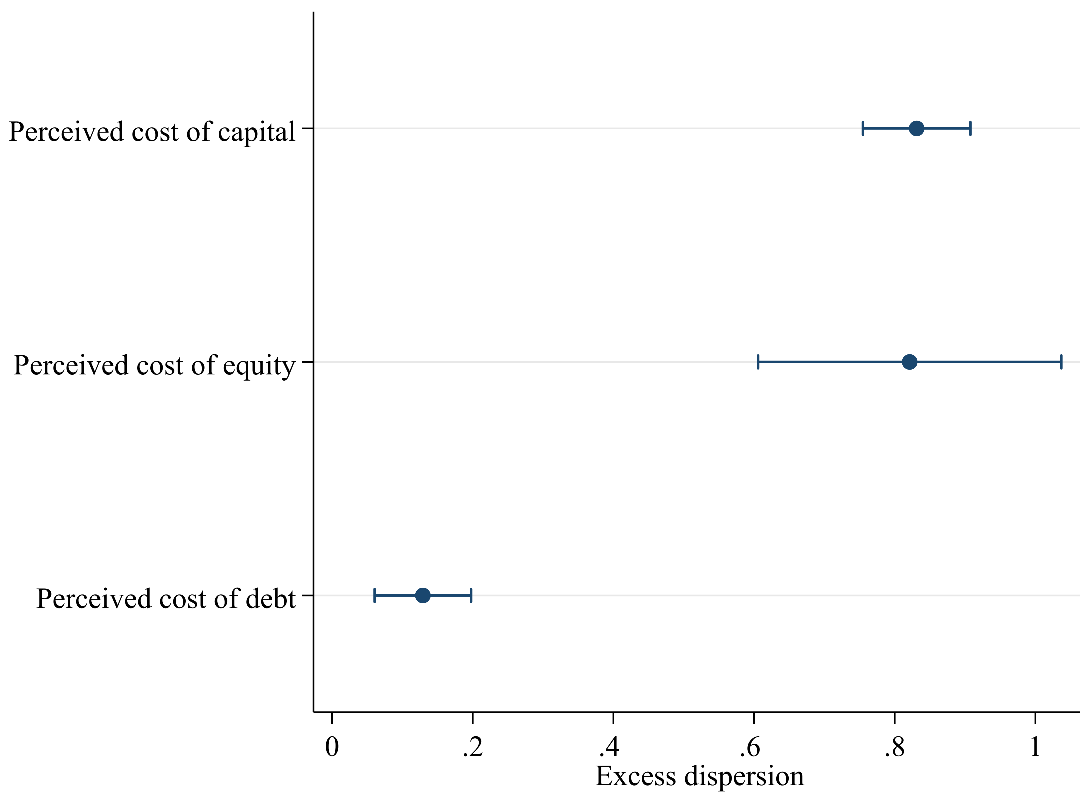
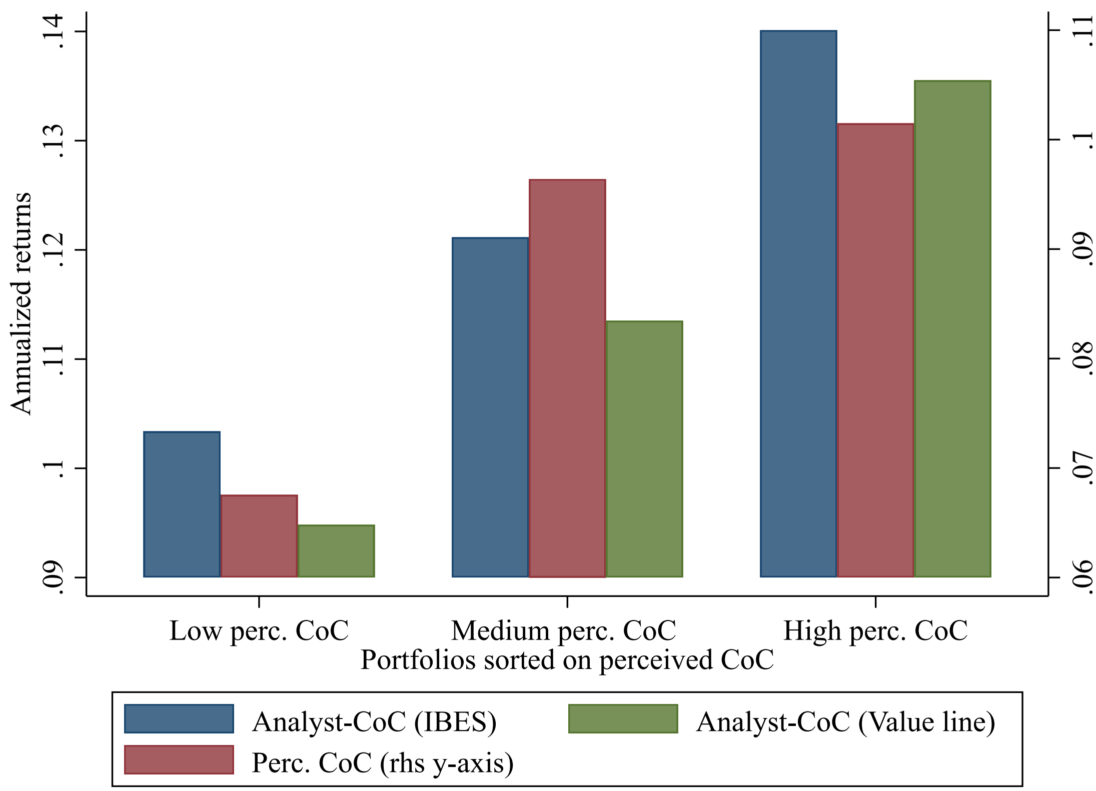


Figure 6
Analysts' Cost of Capital for Portfolios Sorted on Perceived Cost of Capital

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 22). We also calculate the average perceived cost of capital for each portfolio. 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.



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.

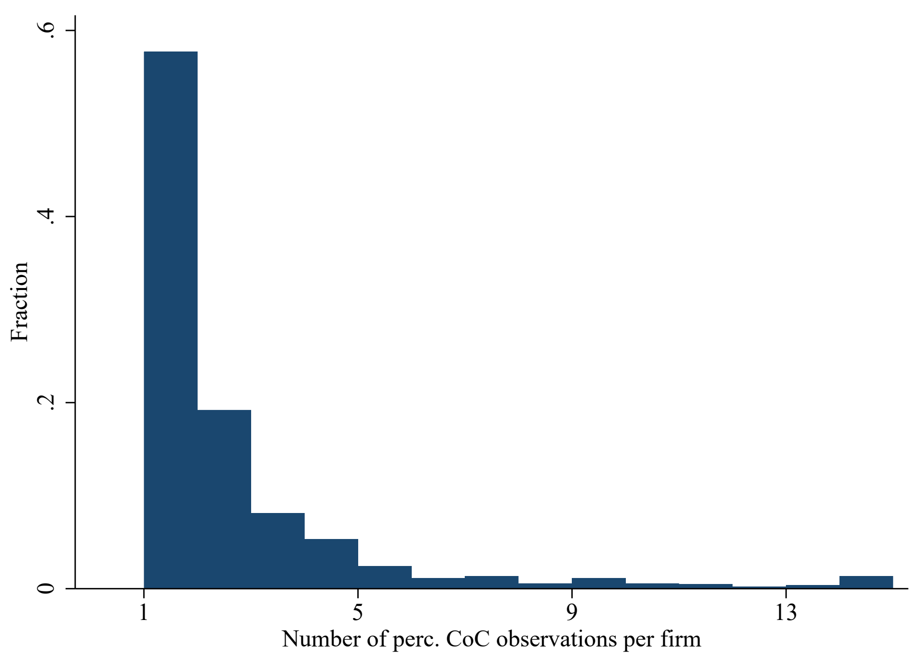


Figure A2
Number of Years Between Observations of the Same Firm

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.

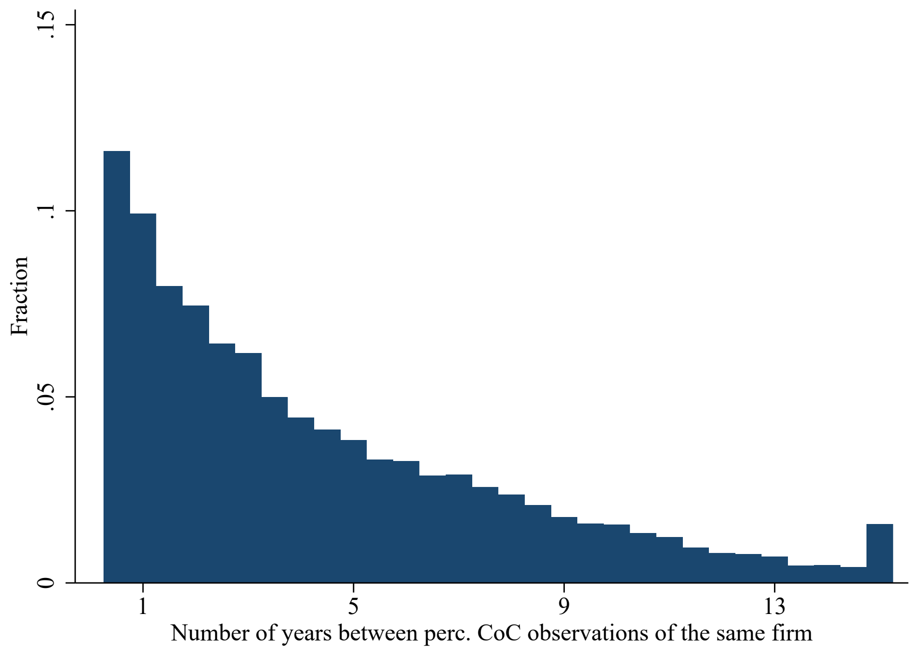


Figure A3
Share of Firms with Adjusted Perceived Cost of Capital

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.

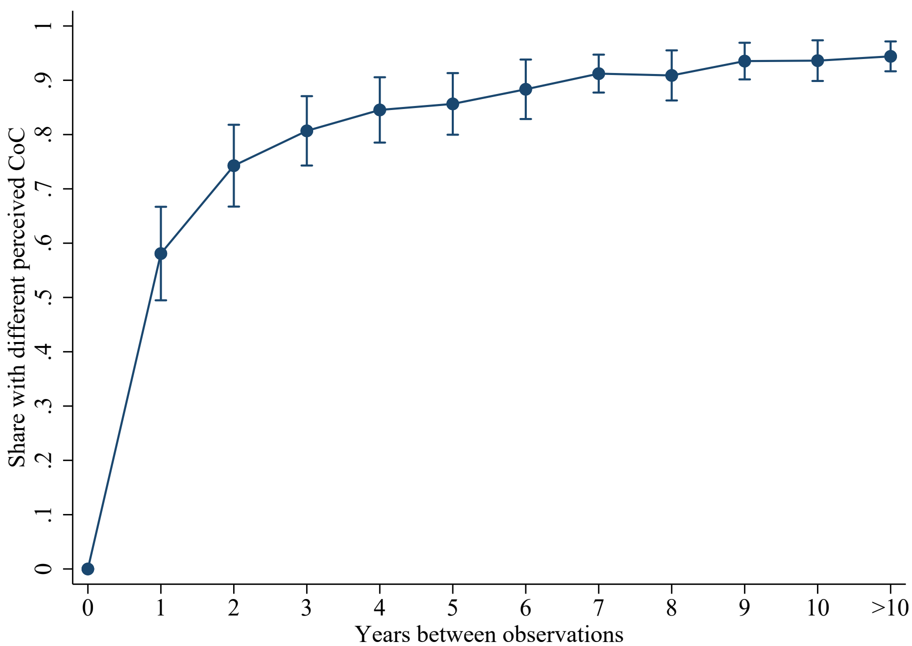


Figure A4
Histogram of the Perceived Cost of Capital

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

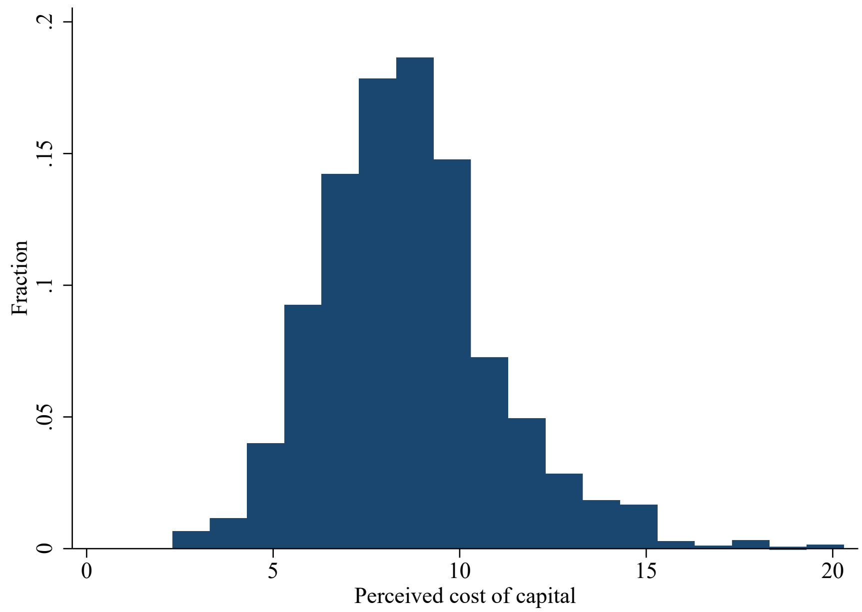


Figure A5
Observation Shares by Country

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

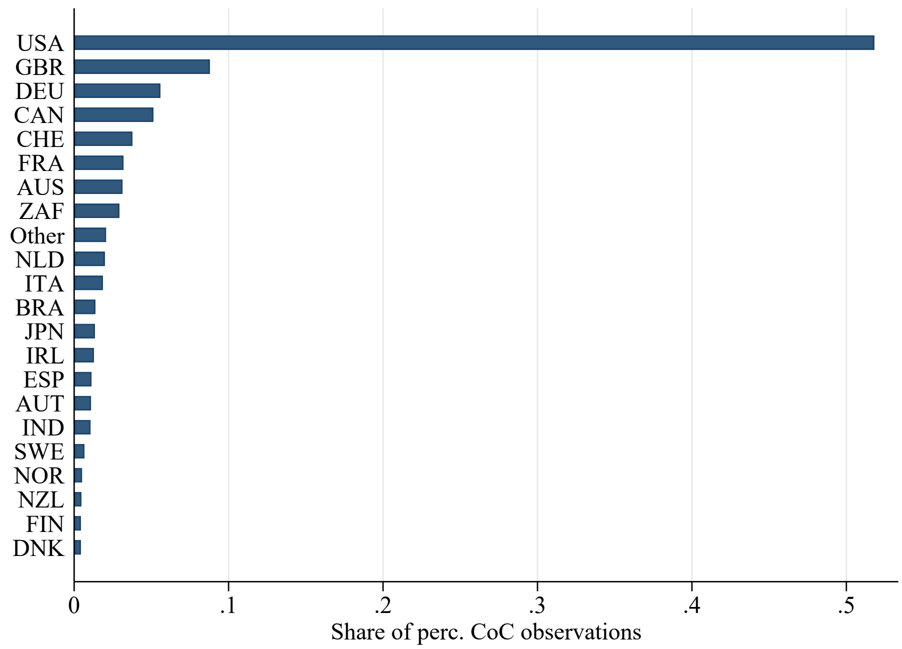


Figure A6
Observation Shares by Industry

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).

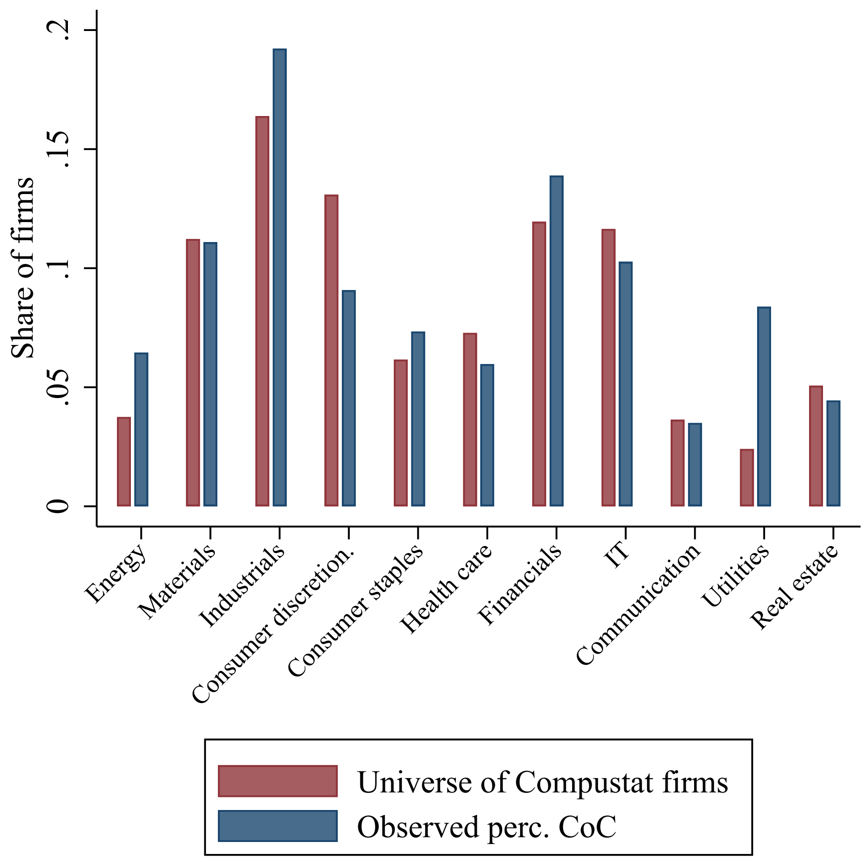


Figure A7
Stylized Drivers and the Perceived Cost of Capital: Double Sorts

This figure shows the average perceived cost of capital for firms double-sorted into groups based on market beta and of three firm-level characteristics, as well as firms sorted on market beta. The other characteristics are leverage, size, and book-to-market value. We first regress leverage, size, and book-to-market on market betas and year fixed effects. We then sort firms into five groups based on the residuals in these regressions. 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.

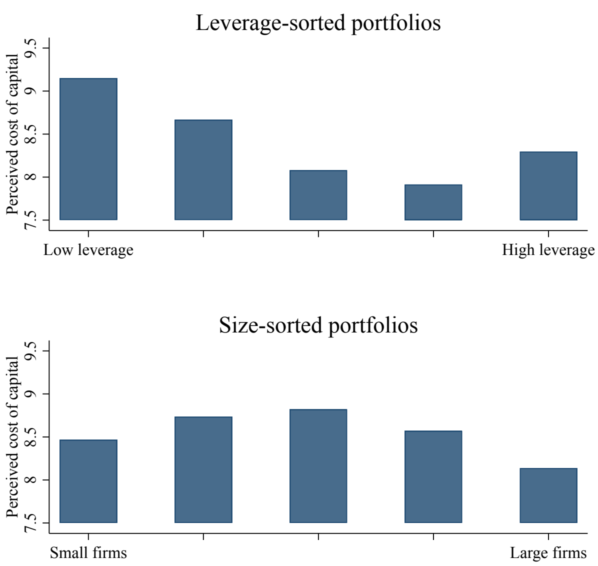


Figure A8
Excess Dispersion in the Perceived Cost of Capital: Heterogeneity

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 4, 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. Standard errors are double clustered at the firm and year level. The bars represent 95% confidence intervals.

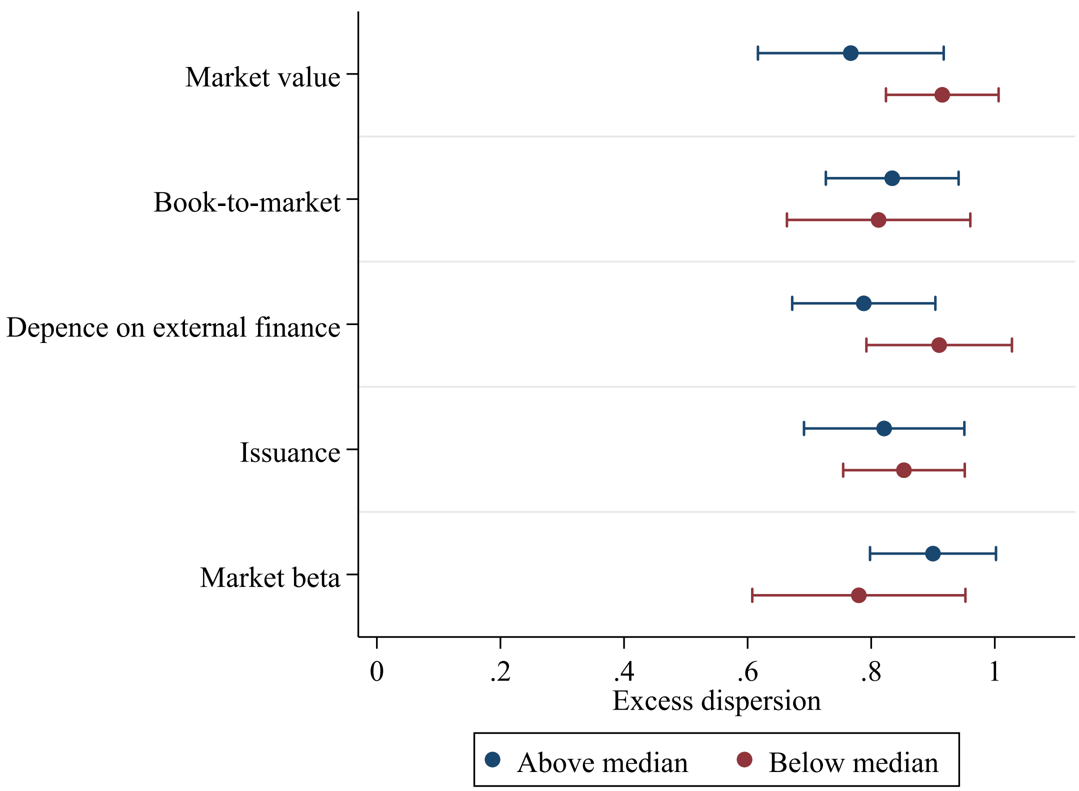


Figure A9
Excess Dispersion Relative to the Implied Cost of Capital Year-by-Year

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.

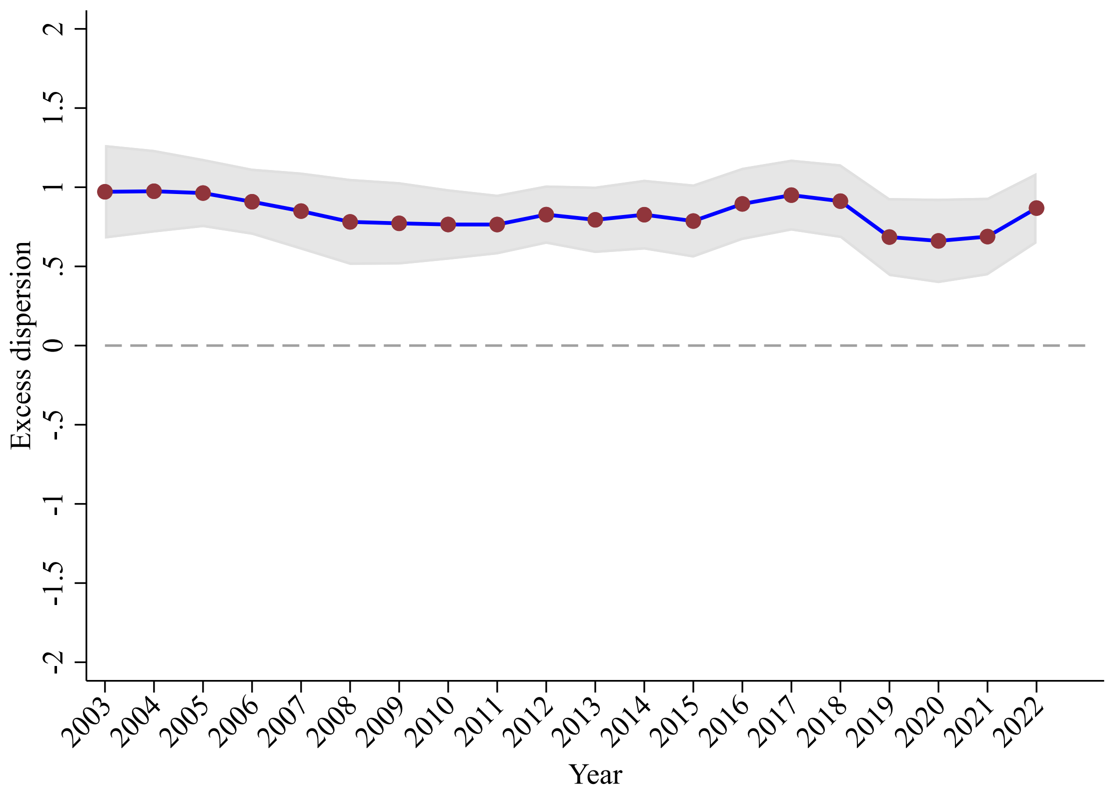


Figure A10
Persistence in the Perceived Cost of Capital

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.

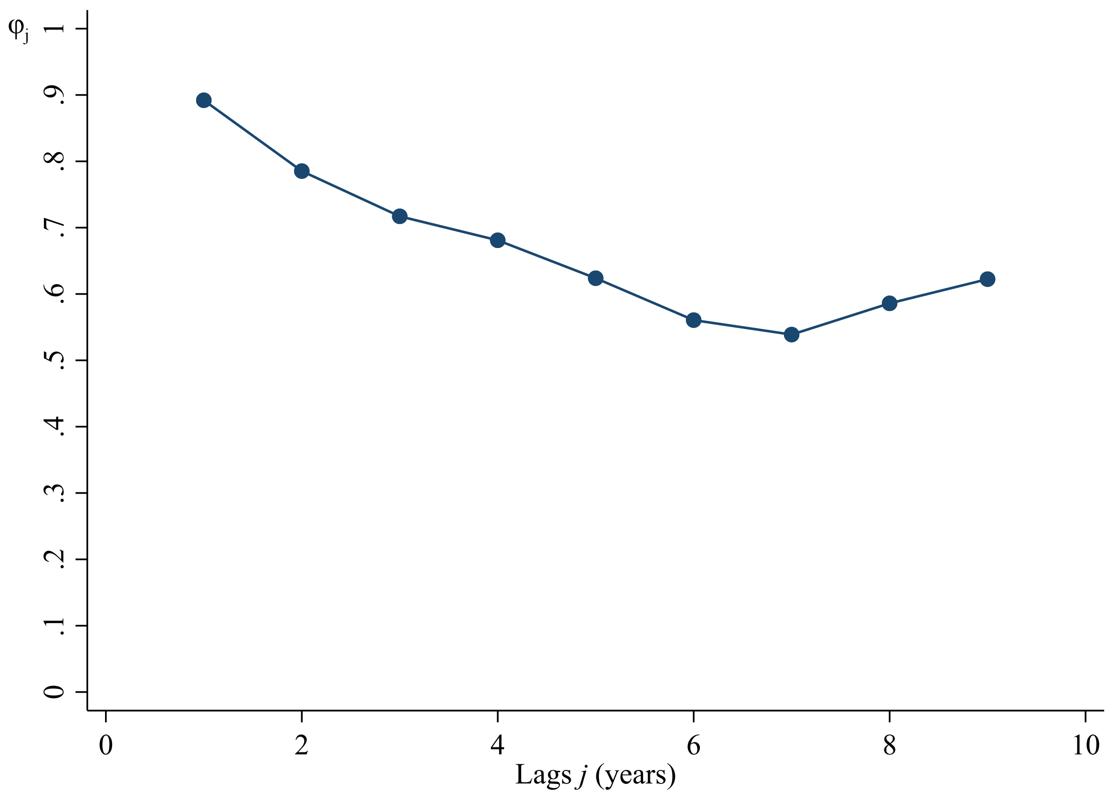


Figure A11
Excess Dispersion Relative to the Analyst Cost of Capital Year-by-Year

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 6. Each estimate reflects a three-year moving average. The analyst-based cost of equity is calculated as the expected equity returns from IBES.

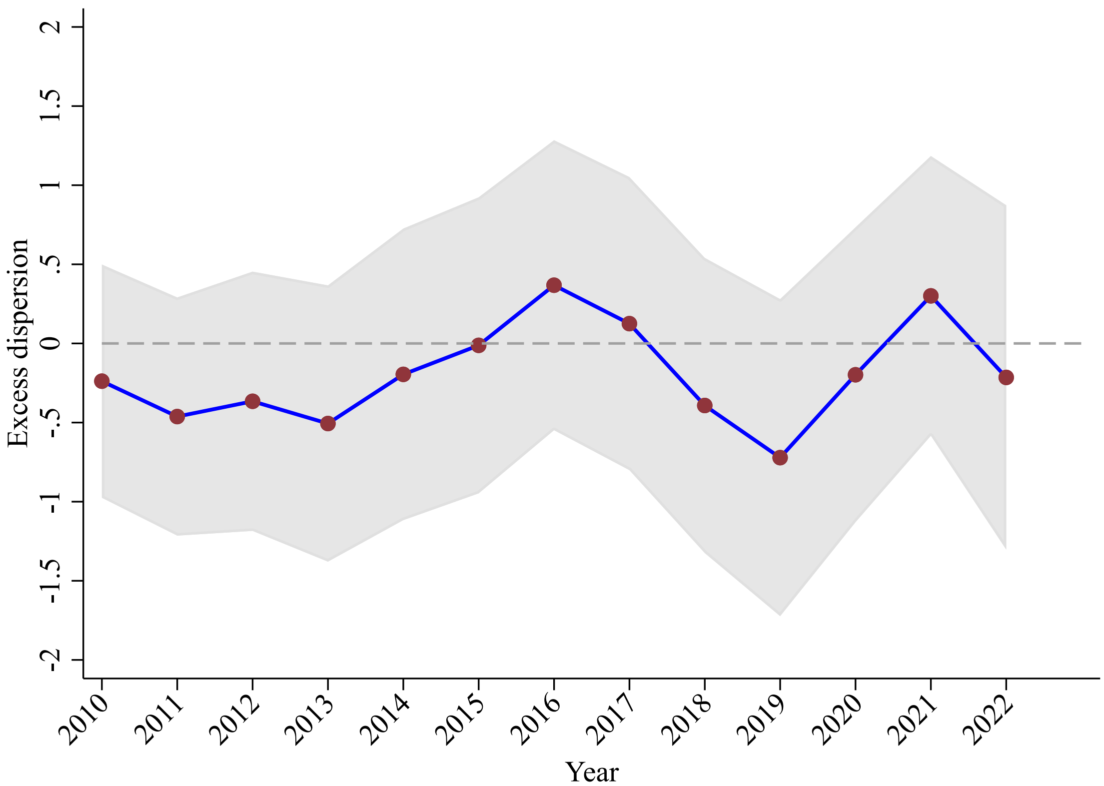


Figure A12
Analyst Perceptions and Excess Dispersion in the Perceived Cost of Equity

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 6.

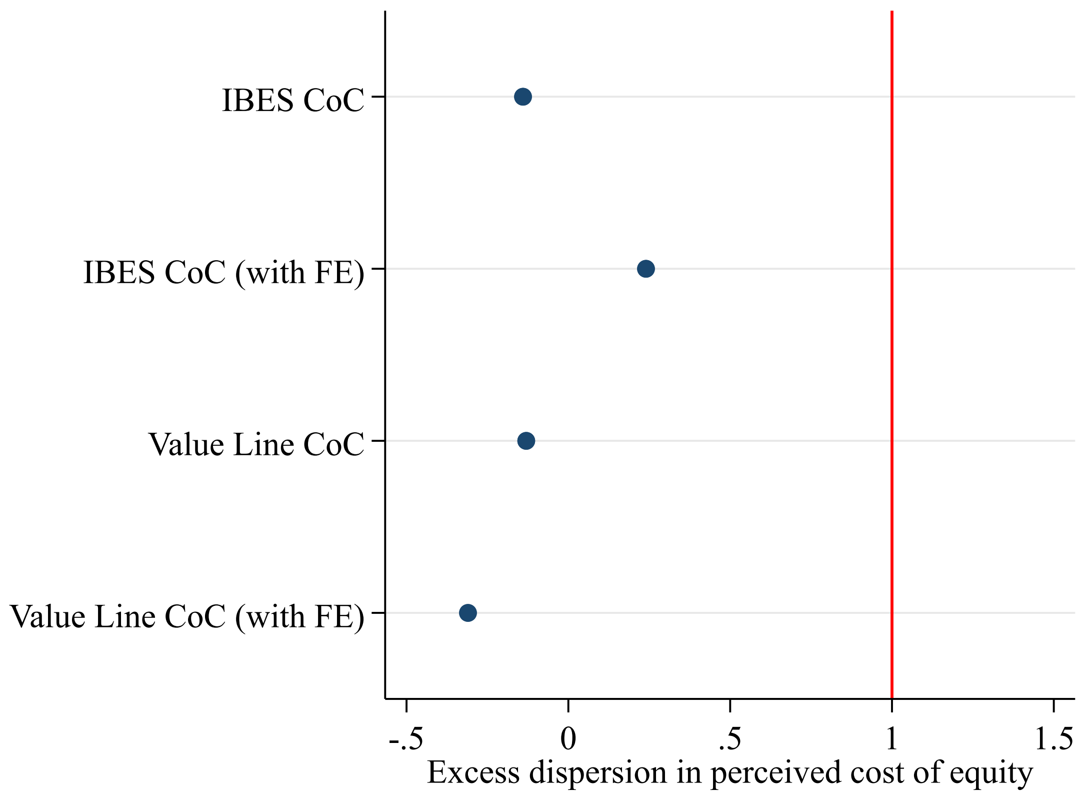


Table A1
Characteristics of Firms with Observed Perceived CoC

The outcome is 100 if the firm reports at least one perceived cost of capital on a conference call from 2002 to 2024 and 0 otherwise. The regressors are firm characteristics averaged over the period 2002 to 2024. The dataset is at the firm level and includes all firms in Compustat between 2002 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 2002 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
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 A4
The Perceived Cost of Debt

This table reports regressions of the firm-level perceived cost of debt on short- and long-term interest rates in the given country. Short-term refers to interest rates at the 3-month horizon, whereas long-term rates refer to interest rates at the 10-year horizon. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)
	U.S. Sample		Global sample			
Short-term interest rate	0.16*		0.46***		0.22	0.078
	(0.080)		(0.10)		(0.13)	(0.10)
Long-term interest rate		0.51***		0.55***	0.35**	0.36***
		(0.094)		(0.091)	(0.13)	(0.11)
Constant	4.80***	3.65***	3.78***	3.00***	3.19***	3.39***
	(0.21)	(0.29)	(0.35)	(0.33)	(0.31)	(0.23)
Observations	1,821	1,821	5,478	5,583	5,368	5,368
Country FE	NA	NA	No	No	No	Yes
R^2	0.027	0.11	0.26	0.31	0.31	0.44

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

Table A6
Regressions of the Perceived Cost of Capital on the Fair-Value Cost of Capital

This table presents results of regressions of the perceived cost of capital on the fair-value cost of capital estimated using the CAPM model. 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)
	U.S. sample		Global sample	
$r_{i,t}^{\text{fair-value}}$	0.34***	0.36***	0.35***	0.37***
	(0.045)	(0.049)	(0.031)	(0.033)
Observations	1,700	1,700	3,282	3,282
Quarter-year FE	No	Yes	No	Yes
R^2	0.19	0.30	0.17	0.24

Table A7
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	Year
Within R^2	0.057	0.057	0.12	0.11

Appendix B Proofs for the Asset Pricing Model in Section 2

This appendix provides derivations of equations (3) and (4).

Equation (3) The first-order conditions of the two investors $i = A, B$ are

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

The first-order condition for A follows by applying objective beliefs:

$$x_{t,A} = \frac{1}{\gamma_A}\,\Omega_t^{-1}\Big(E_t^O[P_{t+1} + D_{t+1}] - (1 + r^f)P_t\Big)\,.$$

Substituting $E_t^B[P_{t+1} + D_{t+1}] = E_t^O[P_{t+1} + D_{t+1}] + DIA(\kappa_t)\,P_t$ into agent B's position yields

$$x_{t,B} = \frac{1}{\gamma_B}\,\Omega_t^{-1}\Big(E_t^O[P_{t+1} + D_{t+1}] - DIA(1 + r^f - \kappa_t)\,P_t\Big)\,.$$

Market clearing, $x_{t,A} + x_{t,B} = x^*$, then implies

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

where $1/\gamma = 1/\gamma_A + 1/\gamma_B$ and $\tilde{\kappa}_t = (\gamma/\gamma_B)\,\kappa_t$. Solving for P_t gives equation (3).

Equation (4) Row j of equation (3) can be rearranged as

$$E_t^O[P_{t+1}^j + D_{t+1}^j] - (1 + r^f - \tilde{\kappa}_t^j)P_t^j = \gamma(e^j)'\Omega_t x^*$$

where e^j is the $J \times 1$ unit vector with a 1 in position j and zeros elsewhere. Dividing both sides by P_t^j and rearranging gives

$$\begin{aligned}
E_t^O[r_{t+1}^j] &= r^f - \tilde{\kappa}_t^j + \frac{\gamma}{P_t^j}\,(e^j)'\Omega_t x^* \\
&= r^f - \tilde{\kappa}_t^j + \frac{\gamma}{P_t^j}\,\mathrm{cov}_t(P_{t+1}^j + D_{t+1}^j, [P_{t+1} + D_{t+1}]'x^*) \\
&= r^f - \tilde{\kappa}_t^j + \gamma\,\mathrm{cov}_t(r_{t+1}^j, r_{t+1}^M)\,x^{*\prime}P_t.
\end{aligned}$$

Multiplying by the market weights $w^j = x^{*,j}P_t^j/(x^{*\prime}P_t)$ and summing over j gives

$$E_t^O[r_{t+1}^M] = r^f - \tilde{\kappa}_t^M + \gamma\,\mathrm{var}_t(r_{t+1}^M)\,x^{*\prime}P_t,$$

where $\tilde{\kappa}_t^M \equiv \sum_j w^j \, \tilde{\kappa}_t^j$ is the value-weighted sentiment. Hence

$$\gamma \, x^{*\prime} P_t = \frac{\lambda_t}{\mathrm{var}_t(r_{t+1}^M)}, \qquad \lambda_t = E_t^O[r_{t+1}^M] - r^f + \tilde{\kappa}_t^M.$$

Substituting back gives equation (4). Proofs of (5) and (6) follow along the same lines.

Appendix C Model where Firms Have Biased Cash Flow Expectations

We extend the main model to allow for biases in firms' cash flow expectations. We study how biases in cash flow expectations influence how firms should set their cost of capital. The analysis focuses on the case where firms attempt to maximize current market value, but have biased expectations about both cash flows and returns in financial markets. The bias in expected returns implies that firms do not use objective expected returns as their perceived cost of capital, even though market value maximization is their objective.

The model follows Section 2 closely. We extend by allowing firms to have biased cash flow expectations. We consider a set of biases that differ in the extent to which they are coherent with the bias embedded in the perceived cost of capital (i.e., firms' expected returns). We consider three types of bias: firms whose cash flow expectations are unrelated to the cost of capital bias (incoherent expectations), firms whose cash flow bias fully matches the cost of capital bias (coherent expectations), and intermediate cases.

If the bias in cash flow expectations is unrelated to the bias in the perceived cost of capital, the analysis is unchanged relative to that in Section 2. Firms continue to maximize their current value by using the market-based cost of capital. The only difference is that biases in cash flow expectations induce suboptimal investment decisions and lower firms' market value, so firms with biased expectations fail to achieve as high a market value as rational firms.

However, if firms have coherent expectations, they are able to obtain the same market value as if they had rational expectations. In particular, if firms have coherent expectations, their bias in the cash flow expectations cancels the bias in the return expectations. So, by using their own biased return expectations as their perceived cost of capital, they can eliminate the value loss induced by the bias in their cash flow expectations. Their investment decisions are therefore identical to those of rational firms. In that case, neither biases in expected cash flows nor in expected returns would influence firms' investment decisions or market values. Coherent expectations are therefore inconsistent with some of the literature on the impact of biases in cash flow expectations on investment (e.g., Malmendier and Tate 2005 and Gennaioli et al. 2016).

We test whether expectations are coherent using the data on the perceived cost of capital. The tests exploit the relation between the perceived cost of capital and ROIC. If firms have unbiased expectations about cash flows, the marginal ROIC is determined by the perceived cost of capital (e.g., in basic models, firms invest until the marginal return equals the cost). This is also true if firms have bias in their cash flow expectations that is unrelated to their perceived cost of capital. But if the bias in cash flow expectations offsets the biases in the perceived cost of capital, this relation may no longer hold. Intuitively, if firms with an upward biased perceived cost of capital have similarly upward biased cash flow expectations (i.e., coherent expectations), their realized ROIC might not be higher than that of other firms. If the biases in firms' expectations are large (i.e., large excess dispersion in the perceived cost of capital), coherent expectations imply that the marginal ROIC is largely unrelated to the perceived cost of capital.

Empirically, however, we find a strong relation between the perceived cost of capital and the ROIC. The observed relation is close to that predicted by fully incoherent cash flow expectations—in which the biases in cash flow expectations are unrelated to the bias in return expectations—but the data admit the possibility that biases in the cost of capital are reflected in cash flow expectations with a factor of $\alpha \approx 0.24$. The existing literature suggests that biases in cash flow expectations influence investment decisions, which further pushes against fully coherent expectations (Malmendier and Tate 2005 and Gennaioli et al. 2016).

To summarize, biases in cash flow expectations have a modest offsetting effect on the perceived cost of capital, which means that excess dispersion in the perceived cost of capital influences investment decisions.

Appendix C.1 Asset Prices and Expected Returns

The asset pricing model is almost identical to the model in Section 2, except we make a slight change in the formulation of the bias in expectations to simplify the equations, changing it from an additive to a multiplicative bias.

We consider an overlapping generations model with investors who live for two periods. 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 whereas agent B (behavioral) has biased expectations. Young investors choose portfolios at time t to maximize

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

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

Agent A has objective expectations $E_t^A = E_t^{\mathrm{O}}$. Agent B overestimates future payouts by a multiplicative factor $(1 + \kappa_t^j)$:

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

Market clearing yields equilibrium prices

$$P_t = \frac{1}{1+r^f}\left(DIA(1+\tilde{\kappa}_t)\, E_t^{\mathrm{O}}[P_{t+1}+D_{t+1}] - \gamma\Omega_t x^*\right), \tag{A1}$$

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

Objective expected returns follow a sentiment-adjusted CAPM (using a first-order approximation):

$$E_t^{\mathrm{O}}[r_{t+1}^j] = r^f - \tilde{\kappa}_t^j + \beta_t^j \lambda_t^{\mathrm{O}}, \tag{A2}$$

where β_t^j is the market beta, λ_t^{O} is the objective market risk premium, and $\tilde{\kappa}_t^j$ captures the return distortion from B's bias. Agent B's subjective expected returns are (using a first-order approximation)

$$E_t^{\mathrm{B}}[r_{t+1}^j] = r^f + \hat{\kappa}_t^j + \beta_t^j \lambda_t^B, \tag{A3}$$

where λ_t^B is the subjective risk premium and $\hat{\kappa}_t^j$ is the subjective sentiment distortion. A key property linking objective and subjective expected returns over k periods is

$$1 + E_t^B[r_{t,t+k}^j] = \left(\prod_{s=0}^{k-1}(1+\kappa_{t+s}^j)\right)\left(1 + E_t^{\mathrm{O}}[r_{t,t+k}^j]\right). \tag{A4}$$

Appendix C.2 Firm Investment

Each firm j evaluates an investment project that produces a stochastic cash flow stream CF_{t+k}^j. The project is representative of the firm in terms of risk and sentiment, and is too small to influence the pricing of risk in the economy.

We consider three types of firms that all attempt to maximize current market value, but differ in their expectations. We assume that all three firms use the subjective expected return $r_t^{B,j}$ as their perceived cost of capital, so $r_t^{P,j} = r_t^{B,j}$. This baseline assumption is not important for the upcoming results. The firms differ in how their cash flow expectations relate to the bias embedded in the return they use for their cost of capital, in this case $r_t^{B,j}$. We consider three cases.

Incoherent expectations In the first case, firms' cash flow expectations are unrelated to the bias κ^j that drives prices and subjective expected returns. For simplicity, we model this firm as having objective cash flow expectations $E_t^{\mathrm{O}}[CF_{t+k}^j]$, but what matters is that the bias in the firm's cash flow expectations is unrelated to the bias driving $r_t^{B,j}$. The firm's NPV calculation is

$$NPV_t^{j,\text{incoherent}} = \sum_{k=0}^{\infty} \frac{E_t^{\mathrm{O}}[CF_{t+k}^j]}{1+E_t^B[r_{t,t+k}^j]}. \tag{A5}$$

Coherent expectations The second firm's cash flow bias is the same multiplicative factor that enters the subjective discount rate. As expressed in (A4), the bias embedded in $E_t^B[r_{t,t+k}^j]$ over k

periods is $\prod_{s=0}^{k-1}(1+\kappa^j_{t+s})$. The coherent firm applies this same factor to cash flow expectations, so the NPV is

$$NPV_t^{j,\text{coherent}} = \sum_{k=0}^{\infty} \frac{\left(\prod_{s=0}^{k-1}(1+\kappa^j_{t+s})\right) E_t^{\text{O}}[CF^j_{t+k}]}{1+E_t^B[r^j_{t,t+k}]}. \tag{A6}$$

The key property of this firm is that the expected cash flows and expected returns are *coherent* with the prices set in financial markets.

Partly coherent expectations The third firm's cash flow bias sits in between the first two firms' expectations. The firm applies a muted multiplicative factor $(1+\alpha\kappa^j_{t+s})$ in each period $s=0,\ldots,k-1$ instead of the full $(1+\kappa^j_{t+s})$, where $\alpha \in [0,1]$:

$$NPV_t^{j,\alpha} = \sum_{k=0}^{\infty} \frac{\left(\prod_{s=0}^{k-1}(1+\alpha\kappa^j_{t+s})\right) E_t^{\text{O}}[CF^j_{t+k}]}{1+E_t^B[r^j_{t,t+k}]}. \tag{A7}$$

The incoherent and coherent cases are nested as $\alpha = 0$ and $\alpha = 1$, respectively.

Investment decision In the next section, we study how each of these types of firms' ROIC relates to their perceived cost of capital. But before doing so, we note that the firm with coherent expectations invests like a market-value maximizing firm with rational expectations.

Remark 1 (Equivalence of Coherent and Rational Expectations for Investment Analysis). *The NPV calculated by the firm with coherent cash flow and discount rate expectations reduces to*

$$NPV_t^{j,coherent} = \sum_{k=0}^{\infty} \frac{\left(\prod_{s=0}^{k-1}(1+\kappa^j_{t+s})\right) E_t^{O}[CF^j_{t+k}]}{1+E_t^B[r^j_{t,t+k}]} = \sum_{k=0}^{\infty} \frac{E_t^O[CF^j_{t+k}]}{1+E_t^O[r^j_{t,t+k}]}. \tag{A8}$$

This is identical to the NPV computed by a fully rational firm that uses objective cash flow expectations and objective discount rates. Coherent and rational expectations therefore lead to equivalent investment decisions.

The result in Remark 1 is consequential: if expectations are coherent with prices, there is no role for bias in managerial expectations to influence investment decisions. Such coherence would thus challenge the literature arguing that biases in cash flow expectations influence investment decisions (e.g., Malmendier and Tate 2005 and Gennaioli et al. 2016). Our data on the perceived cost of capital allow us to test the extent to which expectations are coherent.

Appendix C.3 Relation between ROIC and the Perceived Cost of Capital for Different Firm Types

We derive a relation between a firm's return on invested capital (ROIC) and its perceived cost of capital as a function of their bias in expectations. We assume that each firm j produces stochastic output according to a production function $F^j(K_t^j)$, where F^j is twice continuously differentiable with $F^{j\prime} > 0$ and $F^{j\prime\prime} < 0$. Capital depreciates at rate δ^j per period. Profits are $\Pi_t^j(K_t^j) = F^j(K_t^j)$.

Each firm type invests until the NPV of the marginal unit of capital is zero. Moreover, the marginal unit costs one to install, produces a marginal profit $\partial\Pi^j/\partial K^j$ each period, and capital $(1-\delta^j)$ remains at the end of the period.

To map the return of invested capital to the perceived cost of capital, we define the elasticity of profits with respect to capital as

$$\eta^j \equiv \frac{\partial\Pi_t^j/\partial K_t^j}{\Pi_t^j/K_t^j}. \tag{A9}$$

This elasticity relates the marginal product of capital, $\partial\Pi_t^j/\partial K_t^j$, to the average return on invested capital, $\text{ROIC}_t^j \equiv \Pi_t^j/K_t^j$, via $\partial\Pi_t^j/\partial K_t^j = \eta^j \cdot \text{ROIC}_t^j$. Based on this measure, we can express the predictions of each firm type in terms of the observable ROIC^j.

Incoherent expectations ($\alpha = 0$) The firm discounts at the subjective rate $r^{P,j} = r^{B,j}$ with objective cash flow expectations. Using equation (A4), the per-period discount rate is $(1+\kappa^j)(1+r^{O,j})$. Setting the NPV of the marginal unit to zero, evaluating the geometric series, and linearizing around $\kappa^j \approx 0$:

$$\frac{\partial\Pi^j}{\partial K^j} = r^{P,j} + \delta^j. \tag{A10}$$

Dividing by η^j gives

$$\text{ROIC}^j = \frac{r^{P,j} + \delta^j}{\eta^j}. \tag{A11}$$

Coherent expectations ($\alpha = 1$) The firm's cash flow bias $(1+\kappa^j)^k$ cancels with the same factor in the subjective discount rate. Setting the NPV of the marginal unit to zero and evaluating the geometric series:

$$\frac{\partial\Pi^j}{\partial K^j} = r^{O,j} + \delta^j, \tag{A12}$$

and therefore

$$\text{ROIC}^j = \frac{r^{O,j} + \delta^j}{\eta^j}. \tag{A13}$$

Partly coherent expectations (general α) The firm's cash flow bias $(1+\alpha\kappa^j)^k$ partially offsets the discount rate bias $(1+\kappa^j)^k$. Setting the NPV of the marginal unit to zero, evaluating the geometric series, and linearizing around $\kappa^j \approx 0$ gives

$$\frac{\partial \Pi^j}{\partial K^j} = \alpha\, r^{O,j} + (1-\alpha)\, r^{P,j} + \delta^j, \tag{A14}$$

and therefore

$$\text{ROIC}^j = \frac{\alpha\, r^{O,j} + (1-\alpha)\, r^{P,j} + \delta^j}{\eta^j}. \tag{A15}$$

The ROIC is a weighted average of the objective and subjective expected returns, with the weights determined by the degree of coherence in the cash flow expectations. Equations (A11) and (A13) are nested as the special cases $\alpha = 0$ and $\alpha = 1$.

Empirical counterparts We now explain the predicted relation between the ROIC and the perceived cost of capital for the different firms. We are interested in the slope coefficient in the regressions

$$\text{ROIC}^j = a + \beta^{\text{OLS}}\, r^{P,j} + \varepsilon^j. \tag{A16}$$

Before presenting our results, we define excess dispersion as

$$\gamma^{\text{excess}} \equiv 1 - \frac{\text{cov}(r^{O,j},\, r^{P,j})}{\text{var}(r^{P,j})}, \tag{A17}$$

the share of variation in $r^{P,j}$ not justified by variation in the objective cost of capital $r^{O,j}$, and we assume that δ_j, η_j and the pair $(r^{O,j}, r^{P,j})$ are mutually independent.

Result 1 (Cross-Sectional ROIC Regression Coefficients). *The cross-sectional relation between ROIC and the perceived cost of capital, $r^{P,j}$, depends on the structure of firms' bias in cash flow expectations:*

Incoherent bias ($\alpha = 0$): $$\beta^{\text{OLS}} = E[1/\eta^j] \tag{A18}$$

Coherent bias ($\alpha = 1$): $$\beta^{\text{OLS}} = (1-\gamma^{\text{excess}})\, E[1/\eta^j] \tag{A19}$$

Partly coherent bias (general α): $$\beta^{\text{OLS}} = (1-\alpha\,\gamma^{\text{excess}})\, E[1/\eta^j] \tag{A20}$$

The slope coefficients in Result 1 depend on how concave the profit functions are. If the profit functions are linear (constant returns to scale), $1/\eta^j$ is 1 and ROIC is exactly equal to the marginal return. If profit functions are concave, the ROIC is higher than the marginal return by the factor $1/\eta^j$. Empirically, the term $E[1/\eta^j]$ is pinned down by the average ROIC, the average marginal return, and the average depreciation rate. If $E[r^{O,j}] = E[r^{P,j}]$, the average marginal return on capital equals $E[r^P + \delta]$ regardless of the expectations of firms. Under the continued assumption that the three variables are independent, taking expectations of equation (A15) gives

$$E[1/\eta^j] = \frac{\overline{\text{ROIC}}}{\bar{r}^P + \bar{\delta}}. \tag{A21}$$

Calibration We can calibrate $E[1/\eta^j]$ based on the conference call data or standard security market data. For the conference call data, we get $\overline{\text{ROIC}} = 20\%$, $\bar{r}^P = 8\%$, and $\bar{\delta} = 10\%$, so $E[1/\eta^j] = 20/18 = 1.11$. Alternatively, Fama and French (1999) calculate average ROIC and cost of capital from security market data, and using these estimates we get $E[1/\eta^j] = 1.05$. The conference call estimate is more conservative for the conclusion we draw, so we use this as our benchmark. We use the estimated $\gamma^{\text{excess}} = 0.8$.

Under fully incoherent bias ($\alpha = 0$), the predicted slope of ROIC on the perceived cost of capital is $E[1/\eta^j] = 1.11$. Under fully coherent bias ($\alpha = 1$), the predicted slope is $(1-\gamma^{\text{excess}}) \cdot E[1/\eta^j] = 0.22$. The empirical estimate is $\beta^{\text{OLS}} = 0.9$, which is far from the coherent estimate of 0.22. We can therefore reject that firms have coherent cash flow and return expectations: if firms had coherent cash flow and return expectations, the two would offset such that the ROIC was determined by the objective expected returns, and by extension almost orthogonal to the perceived cost of capital.

While the observed β^{OLS} of 0.9 is well above the estimate implied by the coherent expectations, it is also slightly below the estimate implied by the fully incoherent expectations. We therefore explore the scope for partly offsetting bias by solving for the α implied by the observed ROIC and excess dispersion. Inverting equation (A20) yields the cash flow muting parameter as a function of the regression coefficient, the expected inverse elasticity, and excess dispersion:

$$\alpha = \frac{1 - E[1/\eta^j]^{-1} \cdot \beta^{\text{OLS}}}{\gamma^{\text{excess}}}, \tag{A22}$$

which in our calibration gives

$$\alpha = \frac{1 - (1/1.11) \times 0.9}{0.8} = \frac{1 - 0.81}{0.8} = 0.24.$$

The estimate of alpha suggests that firms incorporate offsetting cash flow biases only to a modest extent. That is, firms' bias in cash flow expectations is not fully coherent with the bias driving asset prices.

Appendix D 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 sometimes 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 firm that at time t evaluates an investment opportunity i that is not mutually exclusive from other projects and 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 firm maximizes market value by choosing the project only if

$$E_t[M_{t+T} C^i_{t+T}] - \zeta^i_t \geq 0, \tag{A23}$$

where M_{t+T} is the stochastic discount factor. We can rewrite (A23) as

$$\mathbb{E}_t[\mathrm{IRR}^i_{t+T}] \geq R^f - \mathrm{cov}\left(M_{t+T}, \mathrm{IRR}^i_{t+T}\right) R^f \tag{A24}$$

where R^f is the gross risk-free rate and $\mathrm{IRR}^i_{t+T} = C^i_{t+T}/\zeta^i_t$ 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 (A24) as

$$\mathbb{E}_t[IRR^i_{t+T}] \geq \lambda^0_{t,t+T} + \sum_k \beta^k_t \lambda^k_{t,t+T}, \tag{A25}$$

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 (A25) says that firms 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.

The example above considers a project with a single cash flow. In reality, projects have many different cash flows. If these cash flows are similar in risk, the firm can often apply the same cost of capital for all the cash flows. If the cash flows differ in risk, they should each have their own cost of

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

capital. In certain cases, one can still use a single cost of capital to obtain the correct NPV, though that rate is a weighted summary rather than any individual cash flow's cost of capital. Overall, the practice of using a single discount rate for all cash flows should be seen as an approximation that is not correct in general.

Equation (A25) also shows that firms should use the expected return over the full horizon of the investment project. Since most corporate investment has fairly long duration, firms should therefore use the long-run expected returns as the basis of their cost of capital.

Appendix E 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 as well as for the years 2021 to 2024 from Refinitiv.

Appendix E.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 E.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 E.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 F 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 16). 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

$$\mu_t = \mu + x_t, \tag{A26}$$

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

$$x_{t+1} = \phi x_t + e_{t+1}, \tag{A27}$$

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,

$$\text{log market-based CoC} = \frac{1}{10}\sum_{j=1}^{10} E_t[\mu_{t+j-1}] \tag{A28}$$

$$= \mu + \frac{1-\phi^{10}}{10(1-\phi)} x_t. \tag{A29}$$

In predictive regressions of the form

$$\frac{1}{j}\log(1+r_{t,t+j}) = \alpha^j + \beta^j \times \log \text{ market-based CoC}_t + \varepsilon_{t+j}, \tag{A30}$$

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

$$\beta^j = \frac{10}{j}\frac{1-\phi^j}{1-\phi^{10}}. \tag{A31}$$

Equation (A31) 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 toward 1.

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

In Section 7, we quantify misallocation relative to different benchmarks of the cost of capital. Quantifying misallocation requires estimates of variation in a benchmark cost of capital. Here, we explain the exact methodologies used to calculate these variances.

The market-based cost of capital We aim to calculate var $\left(\log(r_i^{\text{market-based}} + \text{dep}_i)\right)$, which is challenging because the market-based cost of capital is unobserved. Our approach to calculating the variance relies on the implied cost of capital (ICC) as an instrument. 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 the ICC.

The starting point for our estimation is the "realized" cost of capital from equation (16), which replaces expected stock (and bond) returns with realized returns:

$$r_{i,t+j}^{\text{realized}} = \omega_{i,t} \times (1 - \text{tax rate}) \times r_{i,t+j}^{\text{debt, realized}} + (1-\omega_{i,t}) \times r_{i,t+j}^{\text{equity,realized}} \tag{A32}$$

$$= r_{i,t}^{\text{market-based}} + \omega_{i,t} \times (1 - \text{tax rate}) \times e_{i,t+j}^{\text{debt}} + (1-\omega_{i,t}) \times e_{i,t+j}^{\text{equity}}, \tag{A33}$$

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

$$r_{i,t+j}^{\text{realized}} = b_0 + b_1 \text{ICC}_{i,t} + \varepsilon_{i,t+j}^{\text{realized}} \tag{A34}$$

and calculate

$$\widehat{r}_{i,t}^{\text{market-based}} = \widehat{b}_0 + \widehat{b}_1 \text{ICC}_{i,t}. \tag{A35}$$

We assume that the ICC equals the market-based cost of capital plus an orthogonal error. This procedure estimates 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.

The estimates of b_0 and b_1 are 0.05 and 0.30, using only U.S. firms in the sample.[A2] 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 the ICC itself is a noisy estimate of the market-based cost of capital. Because of this noise, we cannot directly use the ICC as the cost of capital, but instead need to run predictive regressions. Taken together, the ICC measure implies modest cross-sectional variation in the market-based cost of equity.

We now use the predicted values from (A35) to estimate $\text{var}\left(\log(r_i^{\text{market-based}} + \text{dep}_i)\right)$. We first note that the variance of the market-based cost of capital, $\text{var}\left(r_i^{\text{market-based}}\right)$, is given by $\widehat{b}_1 \times \text{var}\left(\text{ICC}_{i,t}\right) = \text{var}\left(\sqrt{\widehat{b}_1}\text{ICC}_{i,t}\right)$. To avoid attenuation, we divide the predicted values by the square root of the estimated slope coefficient and impose the same mean as observed in the perceived cost of capital data.[A3] That is, we define $\widehat{r}_i^{\text{market-based,scaled}} = \overline{r^{\text{perc.}}} + \left(\widehat{r} - \overline{\widehat{r}}\right)/\sqrt{\widehat{b}_1}$ and calculate $\text{var}\left(\log(r_i^{\text{market-based}} + \text{dep}_i)\right) = \text{var}\left(\log(\widehat{r}_i^{\text{market-based,scaled}} + \text{dep}_i)\right)$. This methodology recovers the variance when the market-based cost of capital and the noise in the implied cost of capital are normally distributed and $\widehat{r}_{i,t}^{\text{market-based}}$ is independent of dep_i, the implied orthogonality of which we verify empirically. We continue to measure the cost of capital in real terms, subtracting a 2% expected inflation rate.

The fair-value cost of capital Our goal is to estimate $\text{var}\left(\log(r_i^{\text{fair-value}} + \text{dep}_i)\right)$. We start with a regression of our CAPM-based proxy for the fair-value cost of capital (as defined in Section 5.2) on the perceived cost of capital:

$$r_{i,t}^{\text{fair-value}} = b_0 + b_1 r_{i,t}^{\text{perc.}} + \varepsilon_{i,t}^{\text{fair-value}}. \tag{A36}$$

We follow a process analogous to the above. We define a scaled variable that divides by the square root of the slope coefficient and imposes the same mean as the perceived cost of capital: $\widehat{r}_i^{\text{fair-value, scaled}} =$

[A2]Section 5.1 discusses that the ICC predicts realized stock returns with a slope coefficient of 0.5. The difference in the slope coefficients arises because the 0.5 refers to realized stock returns whereas the 0.3 refers to the realized cost of capital.

[A3]We impose the mean of the perceived cost of capital to ensure that differences are driven by the cross-sectional dispersion. Differences in means will influence the variance through the log transformation. The mean of the realized cost of capital is noisily estimated and not significantly different from the average perceived cost of capital.

$\overline{r^{\text{perc.}}} + (\widehat{r} - \overline{\widehat{r}})/\sqrt{\widehat{b}_1}$. We then calculate the variance as var $\left(\log(\widehat{r}_i^{\text{fair-value, scaled}} + \text{dep}_i)\right)$. Using the scaled estimate increases the variance of the benchmark and therefore decreases the estimated TFP loss arising from excess dispersion. We continue to measure the cost of capital in real terms, subtracting 2% expected inflation.

Appendix H 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 H.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 H.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 the predicted values work out of sample.[A4]

The results are in Table A7. 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.[A5]

[A4]We thank John Graham for generously sharing these data.

[A5]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.