Firms' Perceived Cost of Capital*

Niels Joachim Gormsen and Kilian Huber

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Abstract

We analyze firms' perceptions of their cost of capital using hand-collected data. We show that firms with higher perceived cost of capital invest less and earn higher returns on invested capital, suggesting that the perceived cost of capital determines the long-run allocation of capital. In traditional models with efficient financial markets, firms maximize their market value by setting their cost of capital based on perfectly observed expected returns in financial markets. The data soundly reject this efficient market benchmark. In models with inefficient markets, firms may instead base their cost of capital on "fair-value" fundamental risk measures. Consistent with such models, a fair-value benchmark based on market betas explains half the variation in firms' perceived cost of capital. In addition, firms' perceived cost of capital reflects similar biases as the return expectations of financial analysts, which can lead to the misallocation of capital relative to efficient market and fair-value benchmarks. In a quantitative model, the resulting misallocation reduces total factor productivity by 3% to 5%.

Keywords: cost of capital, misallocation, subjective beliefs
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1 Introduction

One of the most important decisions faced by firms is determining how much to invest. Standard theory suggests that firms should invest based on the price of capital, undertaking only projects with an expected return above the cost of capital. This rule is influential in standard models, business school teaching, and corporate practice.

The challenge in applying this rule is that the cost of capital is unobserved. Academics typically advise firms to base their cost of capital on the expected returns on firms' outstanding debt and equity in financial markets. However, this approach assumes that financial markets are efficient and that firms can estimate expected returns without bias, which is a difficult task. Given the simplified academic guidance, it is unclear how firms estimate their cost of capital in practice, whether they do it correctly relative to different benchmarks, and how they account for market inefficiencies. Firms' perceptions of their cost of capital may differ substantially from the assumptions of standard models based on efficient markets and perfect information, and firms' investment decisions may thus deviate from the predictions of standard models.

In this paper, we study firms' perceptions of their cost of capital based on hand-collected data. We find that firms' perceptions of their cost of capital align with their long-run realized investment rates and returns on investment, consistent with firms basing their investment decisions on their perceived cost of capital. But firms' perceived cost of capital deviates substantially from the assumptions made in standard models and textbooks. Much of the deviations can be explained by firms adjusting for financial market inefficiencies using a "fair-value" benchmark based on market betas. In addition, part of the deviations reflects that firms' perceived cost of capital is prone to similar biases as the return expectations of financial analysts. The biases distort the allocation of capital relative to efficient market and fair-value benchmarks. Using a standard general equilibrium model, we find that the resulting capital misallocation lowers total factor productivity by 5% relative to the efficient market benchmark, but only 2.5% relative to the fair-value benchmark.

We start by analyzing how a firm should set its cost of capital. We use a simple but general model allowing for inefficient financial markets. The cost of capital chosen by the firm is the minimum expected return that the firm is willing to accept on investment projects. If markets were efficient and the firm wanted to maximize its

financial market value, the firm-level cost of capital should unambiguously equal the expected return on the firm's debt and equity, which we term the "market-based cost of capital." The intuition is that the expected return in efficient financial markets equals the return required by investors in exchange for providing capital to the firm, so the firm should also adopt this required return when choosing investment projects. However, in inefficient markets, this connection breaks down. The proper cost of capital now depends on the objective function of the firm. If the firm wanted to maximize its current financial market value, it should still use the market-based cost of capital.[1] But if the firm wanted to maximize the long-term, fair value of the company—the value of the firm absent investors' behavioral biases—they should use a "fair-value" cost of capital. The fair-value cost of capital depends on the fundamental risk of the firm, which may be calculated using the Capital Asset Pricing Model (CAPM) or other fundamental models, as we discuss below.

One aim of our empirical analysis is to evaluate to what extent firms use a market-based or fair-value based cost of capital. 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 occasionally share their internal perceptions of their cost of debt, equity, and total capital. We collect the data by manually reading call transcripts. The data contain around 2,500 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 capture roughly 40% of the total assets of Compustat firms in advanced economies. The conference call data are useful because firms' perceived cost of capital is not easily observed in publicly available data.

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 results suggest that the perceived cost of capital shapes capital allocation decisions in the long run, in line with standard models. We emphasize, however, that these findings refer to firms' long-run investment decisions: in the short run, changes in the perceived cost of capital have limited impact on firm investment because of stickiness

[1] By doing so, firms can exploit financial investors' behavioral biases for short-term gains in market prices.

in firms' required returns on new investments (known as hurdle or discount rates, see Gormsen and Huber 2025 and Fukui et al. 2025).

We document stylized facts about which factors shape the perceived cost of capital. In the time series, firms largely incorporate time variation in the equity risk premium and interest rates in line with both the market-based and the fair-value 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, as proponents of the market-based approach to the cost of capital argue firms should (Fama and French 1997). Going beyond the traditional factors, firm age, reliance on external finance, and other measures of risk are also associated with the perceived cost of capital.

We next analyze cross-sectional variation in the perceived cost of capital. We test how well the perceived cost of capital is explained by the market-based and fair-value cost of capital. According to standard theory and our model, the market-based cost of capital is the expected return on a firm's outstanding debt and equity, based on full-information rational expectations ("objective" expected return). This market-based cost of capital is unobserved and there is no agreed-upon measure. However, following a standard technique from asset pricing, we can test whether the market-based cost of capital equals the perceived cost of capital by regressing future realized returns on the perceived cost of capital. If firms used the market-based cost of capital, all variation in the perceived cost of capital should be reflected in future realized returns. However, the data soundly reject this prediction. Only 20% of the variation in the perceived cost of capital is reflected in future realized returns. The remaining 80%, which we label "excess dispersion" relative to the market-based benchmark, cannot be justified by the market-based approach. The results are similar if we proxy for expected returns using the "implied cost of capital" instead of realized returns. The excess dispersion is similar across time periods, geographies, and types of firms. The 80% excess dispersion reflects variation in the perceived cost of capital that should not exist according to standard models based on efficient markets and full information.

The fair-value approach to the cost of capital is substantially better at explaining firms' perceptions. 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 fair-value risk factors—a natural starting point is the CAPM model (Stein 1996). The fair-value cost of capital based on the CAPM explains

around 50% of the variation in the perceived cost of capital. The 50% is a lower bound for the fair-value approach, as managers could potentially include other fundamental risk factors besides just the CAPM. Potential alternatives include the Fama and French factors, but including these factors lowers the explanatory power relative to the CAPM, potentially because firms do not perceive these to be fundamental risk factors.

We verify that our results are not driven by measurement error in the perceived cost of capital. We can rule out that the data on firm perceptions are subject to general measurement error because we find no excess dispersion in the perceived cost of debt. We further verify that measurement error does not drive our results by using an instrumental variable approach and by verifying the relation between the perceived cost of capital and realized returns on invested capital. 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 from such misclassifications.

We also study whether firms' perceived cost of capital contains similar biases to those documented in the literature on subjective return expectations. Firms attempting to follow the market-based approach need to estimate expected returns on debt and equity, which is a challenging exercise. The literature documents that many agents, including financial analysts and professional forecasters, introduce systematic biases when estimating expected returns (Greenwood and Shleifer 2014, Engelberg et al. 2020). To test whether firms are prone to similar biases as analysts, we construct an "analyst cost of capital" based on analysts' return expectations provided by the Institutional Brokers' Estimate System (IBES) and the sell-side firm Value Line. We find that the analyst cost of capital explains essentially all the variation in the perceived cost of capital, both using the IBES and the Value Line data. One of the most prominent biases in agents' expectation formation is overreaction (see summary in Bordalo et al. 2022b). This bias leads to over-extrapolation: financial investors incorrectly believe that stocks with high past returns have high future returns (De Bondt and Thaler 1985, Lakonishok et al. 1994). We find that firms are also subject to over-extrapolation, as firms with higher realized returns over the previous decade have a higher perceived cost of capital. Taken together, these findings are consistent with the idea that firms are subject to similar biases as analysts, leading to bias in firms' perceived cost of capital relative to a market-based benchmark.

We end the paper by studying how the deviations in the perceived cost of capital

from the market-based and fair-value benchmarks could distort the allocation of capital in the economy. Firms with too low a perceived cost of capital invest too much and firms with too high a perceived cost of capital invest too little, relative to the benchmark allocation. We quantify the impact of such misallocation through the lens of the framework by Hsieh and Klenow (2009). While the framework is stylized, it provides a useful way to gauge the economic magnitude of deviations in the perceived cost of capital (see also Giroud et al. 2022). In the framework, excess dispersion in the perceived cost of capital translates into lower aggregate TFP. We estimate TFP losses based on different benchmarks of the cost of capital, finding estimates around 5% relative to the market-based benchmark and 2.5% relative to the fair-value benchmark.

One may wonder if the market for corporate control could undo potential biases in managerial perceptions. In principle, mistakes lower stock prices, so an arbitrageur could take over the firm, correct the 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 stock 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 (it is indeed rare that analysts on conference calls disagree with managers' perceptions of the cost of capital).

Previous research on the perceived cost of capital relies on qualitative survey evidence about the methods used by firms to estimate their cost of capital. According to the Duke CFO Survey, 80% of large firms apply the CAPM, 70% additionally use multi-factor models, and 40% use historical returns (Graham and Harvey 2001, Graham 2022). Other surveys find similar results (Jacobs and Shivdasani 2012, Mukhlynina and Nyborg 2016, Jagannathan et al. 2016). Firm investment decisions are consistent with firms using the CAPM and simplified factor models (Krüger et al. 2015, Hommel et al. 2025). These findings leave open how exactly firms apply and combine different approaches, whether firms act "as if" certain factors mattered, and how quantitatively important different factors actually are. More generally, there is no evidence on the relation between expected returns and the perceived cost of capital as well as the implications for misallocation and macro-finance models.[2]

[2]Previous work has studied the quantitative importance of one factor, the market beta, for firms'

2 Model: Cost of Capital in Inefficient Markets

The cost of capital is the return firms have to offer outside investors (i.e., holders of the firm's debt and equity) in exchange for providing capital to the firm. In stylized models, firms use this cost of capital as their required return (or "discount rate") on new investments, giving it a key role in firms' investment decisions.

The cost of capital has traditionally been defined in the context of an efficient market. If investors have full-information rational expectations, they perfectly know the return they can objectively expect from the firm in exchange for providing capital. In equilibrium, prices adjust so that this expected return is equal to the return investors require given the riskiness of the firm. The objective expected return therefore equals both the rate firms pay and the rate investors require, leading to a clear definition of the cost of capital.

In inefficient markets, the definition is more complicated because there is a difference between the rate that firms actually pay and the "fair rate" investors would require in an efficient market. Firms could find it optimal to use either as their cost of capital, depending on their objective function. Given this additional complexity in inefficient markets—and the overwhelming evidence on market inefficiency in general—we introduce a model for formalizing the cost of capital in inefficient markets.

In the upcoming section, we introduce a model of asset prices where behavioral investors have irrational beliefs about future cash flows and returns. The behavioral investors distort prices and expected returns away from the fair value implied by firms' riskiness. Firms can choose to maximize either the market value of the firm in financial markets or the "fair value" implied by the firm's riskiness. If firms want to maximize market value, they should adopt their objective expected return (i.e., the return actually paid to investors) as their cost of capital. But if firms want to maximize their fair value, they should use a "fair-value return" as their cost of capital. The fair-value return is based on the riskiness of the firm and in our model it is determined by the CAPM.

The behavioral investors in the model have subjective return expectations that deviate from the objective expected return. We show that in the special case where there are only behavioral investors in the market, these subjective expectations

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).

coincide with the fair-value cost of capital. But once there are rational investors in the market, the subjective expectations of the behavioral investor deviates from both the market-based and the fair-value cost of capital. Using these expectations as the basis for the cost of capital would thus lead to suboptimal investment decisions, as doing so would maximize neither the market-value nor the fair-value of the firm.

The model relates to Stein (1996), who similarly argues that firms should base their cost of capital on the objective expected return if they want to maximize current market value and on risk if they want maximize the fair value of the firm. In both models, the appropriate measure of risk for calculating the fair-value return is given by the CAPM. Relative to Stein, we additionally introduce an equilibrium model of asset prices that allows us to study how subjective expected returns of investors relate to objective expected returns and the fair-value return.

2.1 Model of Asset Prices and Expected Returns

We introduce a model of inefficient capital markets before discussing firms' investment rules.

We consider an overlapping generations model with investors who live for two periods. At each time 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^j, has x^{*j} shares outstanding, and trades at an endogenous price P_t^j. Agent A (arbitrageur) has rational expectations about future prices and dividends whereas agent B (behavioral) has irrational expectations. Young investors choose portfolios at time t to maximize their utility:

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

where γ_i is the risk aversion, Ω_t is the variance-covariance matrix of the payout next period, $P_{t+1} + D_{t+1}$, and E_t^i denotes expected values as perceived by agent i. The arbitrageur A has full-information rational expectations. We refer to these as objective expectations and denote them E_t^{O} such that $E_t^A[P_{t+1} + \delta_{t+1}] = E_t^{\mathrm{O}}[P_{t+1} + \delta_{t+1}]$. The behavioral investor B has irrational views on the expected value of future payouts. B overestimates future values by a factor of κ_t^s, such that

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

and $D()$ transforms the vector κ into a diagonal matrix. The first order condition for investor i at time t is

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

Market clearing implies equilibrium prices

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

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

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

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

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

For the subsequent analysis, it is useful to define the expected returns that would have arisen if investors made no mistakes about a given firm's expected payout (i.e., $\kappa_t^j = 0$). We refer to these as the "fair-value" expected returns, because they reflect the expected returns justified by the fundamental risk alone. We define the fair-value expected return for firm j at time t as the expected return that arises if we set $\kappa_t^j = 0$ in (2):

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

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

Investor B thinks expected returns are distorted away from the CAPM, but in the opposite direction of the objective expected returns:

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

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

2.2 Investment Rules

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

We consider two ways in which firms can decide whether to invest in their project. The first arises from the aim of maximizing current value in financial markets, while the second arises from a goal of maximizing long-run, intrinsic value of the firm.

Investment rule 1: market-based approach The first investment rule is based on the objective of maximizing current stock prices. This is the standard objective in most models used in finance and economics, and often taught in MBA classes to CFOs. Firms achieve this objective by first calculating the net present value (NPV) of investing in the project as evaluated in financial markets. This NPV tells the firm how much its market value changes if it undertakes the project, and firms should then undertake all projects that increase current value. The market-based NPV of firm j is

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

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

$$\delta_{t+k}^{\text{market},j} = \prod_{h=1}^{k} \left(1 + E_t^{\text{O}}[r_{t+h}^j]\right) \tag{7}$$

is the discount rate for the k'th cash flow. The market-based NPV uses the objective expected returns on firm j as the cost of capital of the project, which means the cost of capital is distorted away from the risk-based benchmark by the sentiment κ. Taking projects with positive market-based NPV ensures that the firm maximizes current value in financial markets, but it implies that firms may take projects that offer lower expected returns than the fair return the project should deliver given its riskiness. Intuitively, firms exploit B's willingness to buy shares in high-κ firms at excessively high prices—because of excessively high cash flow expectations—which translates into an effective cost of capital below the risk-based benchmark.

Investment rule 2: fair value approach The second investment rule arises if firms aim to maximize the fair, or intrinsic value of the firm. This is the value financial markets would have assigned the firm if all investors had rational expecations about the firms' cash flows ($\kappa_t^i = 0 \ \forall \ i, t$). Firms can maximize the fair value of the firm by using the fair-value NPV of the project to decide whether to invest based on that. The fair-value NPV is calculated as

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

where

$$\delta_{t+k}^{\text{fair value},j} = \prod_{h=1}^{k} \left(1 + E_t^{\text{O}}[r_{t+1}^{\text{fair value},j}]\right). \tag{9}$$

The fair-value NPV uses the fair-value expected return from (4) as the cost of capital. This is the return financial markets would have required if B made no mistakes in expectations and, in this sense, it reflects the risk properties of the project. In our model, the fair-value expected returns are set by the CAPM, but models with other preferences could lead to other factor models for the fair-value expected return. By undertaking projects with positive fair-value NPV, the firm ensures that the projects

have objective expected returns above the returns investors would require in efficient markets.

While many models assume that firms aim to maximize valuations in financial markets—so that firms use the market-based NPV—there are several reasons for firms to maximize the fair value instead. Firms may use the fair value approach because they want to act in the best interest of their investors and invest such that investors get the fair rate of return. Managers could also be motivated by career concerns. If firms undertake many projects, all investors will in time be able to calculate the average realized returns to these projects and compare them to their required rates of return. Such an evaluation could favor managers using fair-value discount rates over those using market-based discount rates.

Firms may also use the fair-value approach if they want to maximize long-run market value and expect investor sentiment to be transitory. By using the fair-value NPV, the firm ensures that it does not undertake a project that is only profitable given the 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 subjective and objective expected returns will be the same at time T. In this case, firms can use their forward expected return, which is the objective expected value at time t of the objective expected return at time T, as the basis of their fair-value discount rate. We will exploit this approach in parts of our empirical analysis.

Subjective return expectations and the cost of capital The two rules above use the objective expected returns in (3) to maximize current value, and the fair-value returns in (4) to maximize intrinsic value. A natural question is what happens if firms use B's subjective expected returns in (5) as the cost of capital.

Using the subjective expected returns as the cost of capital is inconsistent with the market-based approach as it will not maximize current value. This is because the subjective expected returns in (5) always deviate from the objective expected returns in (3), so the subjective expected returns will always deviate from the market-based cost of capital.

Using the subjective expected returns is generally inconsistent with the fair-value approach as well, although in a certain case it can be consistent. The fair-value cost of capital is given by the CAPM, which differs from B's subjective expected return differs

by the terms κ_t^s (see equation 5), such that the subjective expected returns deviate from the fair-value cost of capital. The only case where the two do not deviate is when the rational investor has no risk capacity relative to the behavioral investors, such prices are set entirely by the behavioral investors. In this case, B thinks markets are priced correctly and B's subjective return expectations equal the fair-value discount rates. Formally:

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

If assets are priced only by the behavioral investors, we can thus use their subjective expected returns as the fair-value discount rates. The subjective return expectations can thus be useful because they reveal the fair-value cost of capital, making it possible for firms to maximize the intrinsic value without knowing the fundamental risk perceived by investors (in this model, it is given by the CAPM model, but in practice firms do not know how investors perceive fundamental risk). We caution, however, that this relation only holds in fully inefficient markets where there are no rational investors. Once rational investors have some risk capacity relative to the behavioral investors, the subjective expected returns will deviate from the fair-value cost of capital, and using the subjective expected returns as the cost of capital will lead to suboptimal investment decisions.

3 Measurement

We analyze a new firm-level dataset containing the perceived cost of capital, asset prices, exposure to risk factors, and capital investment.

We are interested in measuring the firm-level cost of capital. This cost of capital refers to a project that is representative of the overall firm, in the sense that the project has the same riskiness as the average project of the firm. Most firms focus on a firm-level cost of capital in their investment decisions, rather than a project-specific cost of capital (Graham and Harvey 2001). Some firms then set required returns on investment, called discount rates or hurdle rates, that are project- or division-specific to account for differences in risk. In the cases where firms discuss a project-specific cost of capital on conference calls, we will collect the numbers separately but will not

use them in our analysis.

The firm-level cost of capital is usually expressed in terms of the weighted average cost of capital (WACC), which is the weighted average of the cost of equity and the cost of debt, accounting for tax benefits of debt:

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

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

We will measure of the three firm-level terms, $r_{i,t}^{\text{WACC}}$, $r_{i,t}^{\text{debt}}$, and $r_{i,t}^{\text{equity}}$ using the methodology outlined below.

3.1 Data Collection

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

Most listed firms hold quarterly conference calls to inform analysts and investors about their strategy. Firm managers occasionally disclose an internal estimate of their cost of capital on these calls, which we term the perceived cost of capital. The calls are relatively high-stakes settings, so managers have incentives to report accurate numbers if those numbers can be challenged and cross-checked by analysts and investors (Hassan et al. 2019). Indeed, analysts and investors often ask managers detailed questions about how past realized investment decisions relate to their cost of capital and statements from conference calls appear as evidence in securities lawsuits (Rogers et al. 2011). We verify in Section 4 that the perceived cost of capital measured on the conference calls predicts future investment and realized returns on invested capital.

We search through all transcripts of calls available on the databases by Refinitiv and FactSet for the years 2002 to 2022. We download paragraphs where managers

mention at least one of 22 keywords.[3] Together with a team of research assistants, we manually read through roughly 110,000 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. The collected data do not include instances where firms discuss hypothetical values (e.g., "imagine a cost of capital of x%"), where outsiders posit a cost of capital or ask suggestive question (e.g., "am I correctly assuming that your cost of capital is x%?"), or where managers discuss rates associated with specific debt issuances (e.g., "the yield associated with the new bond issuance is x%.") Firms almost always discuss the after-tax cost of capital, but we convert the few pre-tax values to after-tax values.

In addition to the perceived cost of capital, we also collect firms' perceived cost of debt, perceived cost of equity, and the discount rates (required returns) 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 IRR that they want to earn on new investment projects.[4]

We link firm names from the conference call data to a Compustat firm key using manual matching of firm names. This allows us to then merge 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).

3.2 Summary Statistics and Representativeness

The mean perceived cost of capital is 8.6%, with substantial variation ranging from 5.3% at the 5$^{\text{th}}$ percentile to 13% at the 95$^{\text{th}}$ percentile, as shown in Table 1. The mean discount rate, used internally by the firm to evaluate investment projects, is 15.3%, although the 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).

[3]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.

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

We compare firms included in the conference call sample to the population of listed firms. We report the average percentile of firms in the sample, relative to the population of firms in Compustat in the same year and country, in Panel A of Table A1. The main difference is that firms in the sample are larger, with the average market value rank of firms in the perceived cost of capital sample lying at the 83rd percentile. The skew toward larger firms implies that we cover a substantial share of aggregate market value. For instance, firms appearing in the cost of capital sample with at least one observation cover 40% of the total assets of Compustat firms in advanced economies. 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.

As a result of the skew toward large firms, the sample contains few financially constrained firms, with the average financial constraints (Hadlock and Pierce 2010) rank in the cost of capital sample lying at the 20th percentile. The average firm in the cost of capital sample has slightly higher return on equity, physical capital to assets, and leverage, although these differences are not large, with average ranks around the 60th percentile. The average book-to-market ratio, investment rate, and bankruptcy risk (Z-score) ranks are relatively close to the 50th percentile, indicating that the average firm in the sample is representative of the Compustat population along these characteristics.

Firms do not systematically disclose their perceived cost of capital during periods that are unusual for the firm, as shown in Panel B of Table A1. We regress indicator variables (scaled by 100) for whether a firm mentions a particular variable in a given quarter on firm characteristics as well as firm and year fixed effects, so that we analyze only within-firm variation over time. For instance, in column (3), the included firm characteristic is bankruptcy risk, measured in country-year percentile ranks of the Z-score. The point estimate is small and insignificant. It implies that the probability of observing a perceived cost of capital rises by only 0.07 percentage points if bankruptcy risk falls from the highest to the lowest value observed in the country-year bin. We similarly find small and insignificant associations in column (4), where we include other firm characteristics, many of which are part of the Z-score. In column (6), we are significantly more likely to observe a perceived cost of debt when leverage is high relative to the firm's average, likely because firms discuss the cost of debt more when they have issued more debt than usual. Firms also discuss the cost of debt slightly

more often when their return on equity is high.

4 Data Validation and Stylized Facts

We begin the analysis of the perceived cost of capital by verifying that it relates to firms' capital allocation decisions. We next establish stylized facts about the behavior of the perceived cost of capital across time and firms.

4.1 Data Validation

Firms with a higher cost of capital should invest in projects that offer higher expected returns. Keeping everything else constant, these firms should therefore earn higher return on invested capital and invest less (as fewer projects clear the high cost of capital). We verify below that firms' perceived cost of capital indeed relates to long-run capital allocation in line with these predictions.

While the predictions apply to most models of investment behavior, Gormsen and Huber (2025) show that firms' investment rules respond to changes in their cost of capital with a delay. When the cost of capital changes, it takes many years for firms to update their investment rules and hence their investment decisions. This finding implies that transient fluctuations in the cost of capital should not influence capital allocation decisions. Only long-run, persistent fluctuations in the cost of capital should influence the investment decisions of firms in line with the predictions above. We verify below that the variation in the perceived cost of capital is persistent.

We begin by studying how the perceived cost of capital relates to the firm-level return on invested capital (ROIC). In Table 2, we regress the firm-level return on invested capital (ROIC), calculated using Compustat accounting data, on the perceived cost of capital. The ROIC captures the average return to a firm's investments. If the perceived cost of capital determines firms' long-run required return, the ROIC should be higher for firms with a higher perceived cost of capital. The slope coefficient in column (1) is 0.7, suggesting that a firm's ROIC is 0.7 basis points higher when the perceived cost of capital is 1% higher. Deviations from 1 could be explained by the fact that the perceived cost of capital is not perfectly persistent, so only parts of the perceived cost of capital influences investment decisions and the ROIC.

In column (2), we control for the firm-level implied cost of capital and interest

expenses. These are two measures often used in the literature to proxy for the cost of capital (see, e.g., Eskildsen et al. 2024). The coefficients on both proxies are insignificant at the 10% level, whereas the coefficient on the perceived cost of capital remains stable. This finding lends support to the view that the perceived cost of capital shape the ROIC, and that this effect is not solely driven by components captured by simple measures of the cost of capital.

In columns (3) and (4), we consider the average firm-level investment rate. We measure the investment rate as net investment (capital expenditure minus depreciation) during the year over capital at the beginning of the year (net value of property, plant, and equipment). We find that the perceived cost of capital predicts future investment with a slope coefficient of approximately -0.8, both with and without controls for the proxies of the true cost of capital. This magnitude is consistent with a simple Q-model (see Gormsen and Huber 2025).

In order to influence investment decisions, the variation in the perceived cost of capital must be persistent. To document the persistence, we leverage the panel structure of our data and regress a firm's current perceived cost of capital on its lagged perceived cost of capital:

$$r_{i,t}^{\text{perc.}} = \sum_{j=1}^{9} \varphi_j r_{i,t-j}^{\text{perc.}} + FE_j + e_{i,t}, \tag{12}$$

where φ_j are autoregressive coefficients, FE_j represent lag-specific fixed effects for the $j = (1, .., 9)$ lags. Figure 1 shows that the autoregressive coefficients fall from 0.9 to 0.6 in the first six years. From year six onward, the curve flattens and the autoregressive coefficients stabilize around 0.6. This finding implies a high degree of persistence in the perceived cost of capital.

Figure 2 plots slope coefficients using investment rates of different future years as outcome. The figure shows that the effect is relatively stable over time, supporting the view that the perceived cost of capital is persistent and shapes long-run investment.

4.2 Stylized Drivers of the Perceived Cost of Capital

Over the past 20-years, interest rates and expected stock returns have decreased, leading to a decrease in the both the market-based and the fair-value cost of capital. There has also been been fluctuations around the global financial crisis, the sovereign

debt crisis, and the 2022 inflation spike, which should similarly have influenced the cost of capital.

Gormsen and Huber (2025) document that firms have generally incorporated time variation in expected returns in financial markets into their perceived cost of capital. To illustrate this finding, Table 3 presents regressions of firms' perceived cost of capital on measures of the financial cost of capital. For simplicity, we use the earnings yield plus expected inflation as a proxy for time variation in the cost of equity and the long-term government interest rate as a proxy for time variation in the cost of debt (this approach abstracts from the impact of credit risk).

In column (1) of Table 3, we regress the firm-level perceived cost of capital on the country-level earnings yield and interest rate for US firms. The slope coefficients are 0.51 and 0.27. 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 should expect slopes of 2/3 on the equity yield and 1/3 $\times$ the tax rate on the interest rate.[5] Columns (2) and (3) document similar results when using firm fixed effects and when studying a global sample. The results suggest that firms, on average, incorporate long-run fluctuations in expected stock returns and interest rates into their perceived cost of capital. But while the slope coefficients are close to what full incorporation would predict, the R^2 is far from one, suggesting substantial heterogeneity across firms. We will study this cross-sectional variation in the upcoming section.

Figure 3 visualizes the time variation in the perceived cost of capital. The left panel shows a downward trend in the perceived cost of capital that moves almost one-to-one with the trend in the earnings yield (the earnings yield is on a separate y-axis, but the ranges of the two y-axes are the same). We observe a similarly close relation between the average perceived cost of debt in the US and the long-term Treasury rate in the right panel (with a level difference driven by credit risk).

We next turn to stylized drivers of cross-sectional variation in the cost of capital. According to Modigliani and Miller, firms with higher leverage should have lower cost of capital due to a higher tax shield (see equation 11). This effect is at play both for the market-based and the fair-value approach cost of capital. According to Fama and French, cross-sectional variation in expected stock returns should be

[5] Fluctuations in the earnings yield (plus expected inflation) are not a pure measure of fluctuations in the cost of capital in financial markets, as they also reflect fluctuations in expected real growth rates and much of of corporate earnings are reinvested by firms. Earnings yields are nonetheless often used as a rough proxy for long-run expected stock returns.

determined by exposure to the market, size, and value factors, leading to an effect on the fair-value cost of capital. These patterns should influence the cost of capital under the market-based approach – and if these factors capture real fundamental risk, they should also influence the cost of capital under the fair-value approach.

Figure 4 illustrates the empirical 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 five different groups based on leverage ratios. The perceived cost of capital drops from 9% for firms with the lowest leverage to 8.5% for firms with the highest leverage, which is roughly consistent with the benefits of the tax shield.[6]

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 when going from low to high beta firms. This relatively large increase is consistent with past surveys, according to which many firms use market betas as one input into their perceived cost of capital (see, e.g., Graham and Harvey 2001). The strong effect of beta on the cost of capital is consistent with firms using the fair-value approach to the cost of capital, but also the market-based approach (to the extent that market betas are associated with expected stock returns).

There is also a meaningful size effect in the cost of capital, as larger firms have substantially lower cost of capital than small firms. 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 is also partly consistent with the the market-based approach, as small firms have historically had high expected stock returns, although this effect has mostly disappeared. 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 the effect is consistent with the fact that financial analytics firms, like the Kroll Cost of Capital Navigator by Duff and Phelps, account for size premia.[7]

There is no value effect in the cost of capital, as shown in the bottom right panel. This finding is the first clear evidence against the market-based approach: one of the organizing ideas of modern asset pricing is the notion that value firms have higher

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

[7]See https://www.kroll.com/en/cost-of-capital/frequently-asked-questions.

expected returns than growth firms, so the absence of an effect on the cost of capital runs counter to the market-based approach. When through the lens of the fair-value approach, the absence of a value effect in the cost of capital suggests that managers do not perceive the value factor as capturing fundamental risk that should be incorporated in the cost of capital.

We also study the above characteristics in multivariate panel regressions in the Online Appendix. The multivariate relations between the perceived cost of capital and the variables in Figure 4 are similar to the univariate relations. The cost of capital significantly increases in market beta and decreases in size and leverage. The effect of value is again insignificant.

We produce a parsimonious empirical model describing the variation in the perceived cost of capital. Following the discussion in Section 2, we model firms' perceived cost of capital as a function of exposure to equity risk factors. We select the empirically relevant risk factors using a Lasso model.

Our analysis is based on the 153 risk factors identified by Jensen et al. (2023). The authors measure firm-level exposure to each risk factor through firm-level characteristics (a high book-to-market ratio, for instance, reflects a high exposure to the value factor). The characteristics are measured in cross-sectional percentiles relative to firms in the same country and quarter. We use a Lasso procedure to pick the combination of characteristics that best describes the perceived cost of capital. In addition to the 153 characteristics that proxy for exposure to risk factors, we also include a dummy for European versus US firms.

The Lasso procedure selects 11 characteristics. Figure 5 plots the loadings of the perceived cost of capital on each of these characteristics. 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 beta is around 2, which means the perceived cost of capital is 2 percentage points higher for firms with the highest market beta than firms with the lowest market beta.

The Lasso procedure also picks leverage and size characteristics. There are 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 of these are associated with a lower perceived cost of capital, consistent with Figure 4. Market size also shows up with the expected negative sign. There is no direct value characteristic, consistent

with the modest effect shown in Figure 4. The lasso procedure additionally picks firm age, access to external finance, idiosyncratic volatility, and the European dummy (due to the lower nominal interest rate during our sample period) among the relevant risk factors.

We use the Lasso model to construct a database of predicted values for the perceived cost of capital. By using the Lasso model, we can construct predicted values for firm-quarter observations where we do not observe the perceived cost of capital. The resulting database contains 250,000 firm-quarter observations of predicted values. We share the resulting data on costofcapital.org. We explain the details of our methodology in Appendix G, which also includes a description of a related methodology for firms' discount rates (required returns on investment).

Another salient driver of cross-sectional variation in the perceived cost of capital, which is excluded from the above analysis, is the "greenness" of the underlying firm. Gormsen et al. (2023) study how firms' perceived cost of capital relates to the greenness of the firm, as measured by the MSCI. That paper finds that green and brown firms historically have had similar perceived cost of capital, but that the cost of capital between the two has diverged substantially since the rise of the sustainable investment movement. At the end of the 2020s, firms with above-median greenness reported a perceived cost of capital that was 1 percentage point below their brown counterparts. We do not analyze greenness in the above analysis as it is not part of the classical risk factors in the dataset of Jensen et al. (2023).

5 Testing Traditional Theories of the Cost of Capital

We now turn to formal tests of the market-based and the fair-value approaches to the cost of capital.

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

The market-based approach says that the cost of capital should be given by the expected return on firms' outstanding debt and equity (see 2.2). The empirical challenge in testing this approach is that expected returns are unobserved, making it difficult to assess whether the perceived cost of capital is equal to 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 stocks to assess whether the perceived cost of capital is an unbiased estimate of expected returns, a necessity for the two to be equal.

Following our 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.

The ideal regression projects the market-based cost of capital onto the perceived cost of capital for any time 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 true cost of capital must, on average, be one percentage point higher (the perceived cost of capital must be an unbiased estimate of the market-based cost of capital). And if $r_{i,t}^{\text{market-based}}$ is measured without error, the errors terms $\varepsilon_{i,t}$ should all be zero and the R^2 should be one.

The empirical challenge in implementing (14) is that r^{true} represents an expected return that is unobserved. A standard approach used 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 still test if $\beta_1 = 1$, a necessary condition for $r_{i,t}^{\text{perceived}}$ to equal $r_{i,t}^{\text{market-based}}$.

To implement this approach for the cost of capital, we define the realized return between period t and $t + j$ on stock 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:

$$r_{i,t+j}^{\text{realized}} = \omega_{i,t} \times (1-\tau) \times r_{i,t+j}^{\text{debt, realized}} + (1-\omega_{i,t}) \times r_{i,t+j}^{\text{equity,realized}} \tag{15}$$

$$= r_{i,t}^{\text{market-based}} + \omega_{i,t} \times e_{i,t+j}^{\text{debt}} + (1-\omega_{i,t}) \times e_{i,t+j}^{\text{market-based}}, \tag{16}$$

where the second equality follows from (13) as long as j is sufficiently large. 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 $r_{i,t}^{\text{market-based}}$. Equivalently, one can regress a forecast error, defined as $r_{i,t}^{\text{perc.}} - r_{i,t+j}^{\text{realized}}$, on $r_{i,t}^{\text{perc.}}$, so that the coefficient on $r_{i,t}^{\text{perc.}}$ is $1-\beta_1$. In that case, the coefficient on $r_{i,t}^{\text{perc.}}$ must equal zero for $r_{i,t}^{\text{perc.}}$ to equal $r_{i,t}^{\text{market-based}}$ (forecast errors must be unpredictable).

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. We start by writing

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

where $r_{i,t}^{\text{market-based}}$ is the true 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." 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

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

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 the regressions (14) and (17). In turn, $1 - \beta_1$, which is the coefficient on $r_{i,t}^{\text{perc.}}$ when the forecast error is on the left-hand side, exactly equals the excess dispersion share γ^{excess}.

Testing the market-based approach using realized returns To implement the variance decomposition approach, we need to calculate realized equity returns over a horizon at which the expected return is a meaningful proxy for 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. 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 equation (17). 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, as outlined above. However, since debt includes includes many different bonds and types of bank debt, it is easier to calculate a proxy for expected than realized returns for debt. We follow Gormsen and Huber (2025) and 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 $r_{i,t}^{\text{perceived}} - r_{i,t+j}^{\text{realized}}$ on the perceived cost of capital of the same firm

in the same quarter without any fixed effects. The estimate is 0.79, implying that 79% of total variation in the perceived cost of capital reflects excess variation. The estimate has large standard errors given the high ratio of noise-to-signal inherent in realized returns. While we can strongly reject the hypothesis that there is no excess variation, we cannot reject the hypothesis that there is no true variation (i.e., that the slope is equal to 1). Later in this section, we will pursue an alternative approach with more power that allows us to reject the hypothesis that there is no true variation.

Column (2) focuses on cross-sectional variation by adding year fixed effects. The slope coefficient increases to 0.91. A slope coefficient above 1 implies a negative slope in regressions of $r_{i,t+j}^{\text{realized}}$ on $r_{i,t}^{\text{perceived}}$, which is to say that a higher perceived cost of capital is associated with a lower true cost of capital. While the coefficient is not statistically different from 1, the estimate highlights a substantial disconnect between cross-sectional variation in the perceived and the true cost of capital.

In Appendix D.1, we analyze a cost of capital factor, constructed following the methodology in Fama and French (1993). We again conclude that the perceived cost of capital is a biased estimate of expected returns. This analysis focuses solely on cross-sectional differences in returns and considers returns at the monthly horizon. This approach alleviates potential concerns about inference in the baseline panel.

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

The implied cost of capital calculates the expected long-run stock return of a firm as implied by current valuations and expectations among investors. The implied cost of capital is known to be a noisy predictor of true 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 that is not justified by expected returns. Assuming that the implied cost of capital is equal to the true expected return plus noise that is uncorrelated with firms' 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-based 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).

We follow the methodology of Eskildsen et al. (2024) to construct the implied cost of capital. This method constructs the implied cost of capital by averaging four accounting measures of the cost of capital: the residual income models of Gebhardt et al. (2001) and Claus and Thomas (2001) and 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.

Column 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 year fixed effects slightly increases the coefficient to 0.84. 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 can now reject the hypothesis that there is no relation between the market-based and perceived cost of capital (i.e., a coefficient of 1).

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

The fair-value approach to the cost of capital says that firms should estimate the cost of equity based on 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 are likely to reflect mispricing rather than real fundamental risk (Pedersen 2019). Our approach is to first to test the most natural definition of the fair-value cost of capital, which is based on the CAPM (Stein 1996), and then subsequently consider a more exotic estimate of the fair-value cost of capital from the Fama and French five-factor model Fama and French (2015).

To test the CAPM-based, fair-value cost of capital, we first estimate the cost of equity based on the CAPM. We do so assuming a constant risk premium of 6% and using the long-term interest rate in the country at time t as the risk-free rate. (Incorporating time-variation in the market risk premium does not improve the upcoming results). We continue to calculate the cost of debt, leverage, and tax shields

as above.

Panel B of Table 4 presents the estimates of excess dispersion. The estimate in column 1 shows that the CAPM-based, fair-value cost of capital can explain 50% of the variation in the perceived cost of capital. This estimate decreases slightly when including year fixed effects (column 2), which reflect that part of the variation captured by the CAPM fair-value cost of capital is driven by time-variation in interest rates.

The results show that the fair-value cost of capital based on the CAPM explains a significantly larger part of the variation in the perceived cost of capital than the market-based cost of capital does. This finding lends support to the fair-value view of the cost of capital, i.e. that managers base their cost of capital on fundamental risk factors rather than expected stock returns.

While the fair-value cost of capital does better than the market-based, it still does not explain all of the variation in the perceived cost of capital. One possibility is that the rest of the variation in the perceived cost of capital is driven by other fundamental risk factors than the market factor. To assess this possibility, we calculate a fair-value cost of capital based on the Fama and French five-factor model, which augments the market factor with four additional risk factors (Fama and French 2015). This is the most recent of the factor models Fama and French have proposed to explain stock returns through fundamental risk – and which the authors argue should be used for the estimation of 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 five risk factors by the risk premia for the associated factor (estimating risk premia as the average historical return on the factor), and using the short-term interest rate in the country as the risk-free rate (following the definition by Fama and French).

The results in column 3 and 4 shows that there is no increase in the explanatory power of the fair-value cost of capital from incorporating the additional four factors over and above the market factor. In fact, incorporating the additional four factors lowers the explanatory power of the fair-value cost of capital for the perceived cost of capital, as the excess dispersion increases by around 17 percentage points. Most of the decrase in the explanatory power arises because one of the risk factors – the "investment factor" – is reflected in the perceived cost of capital with the wrong sign.

Overall, the results provide support for the fair-value approach to the cost of capital, as it explains the perceived cost of capital better than the market-based approach.

Managers appear to incorporate the market risk factor in their cost of capital, but leave out other dimensions of expected stock returns, such as those captured by the Fama and French risk factors. Through the lens of the model in Section 2, managers may perceive the market factor as capturing fundamental risk but the other factors as capturing behavioral mispricing (see Bordalo et al. 2024).

5.3 Further Decomposition and Measurement Error Concerns

The perceived cost of capital cannot be explained by neither the market-based nor the fair-value approach to the cost of capital. There is excess dispersion of around 80% under the market-based approach and 50% under the fair-value approach. In this subsection, we provide more evidence on where the excess dispersion is coming from, and we rule out that it is driven by measurement error.

Decomposing the perceived cost of capital The excess dispersion in the perceived cost of capital reflect excess dispersion in either the perceived cost of debt or cost of equity. Since we have data on both, we estimate excess dispersion in each separately by projecting the forecast error in the perceived cost of equity on the perceived cost of equity and doing the analogue for the cost of debt. The errors for the perceived cost of equity are based on the implied cost of capital, whereas the errors for the perceived cost of debt are based on the interest rate expense measure described in Section 5.1.

Figure 6 shows that the excess dispersion in the perceived cost of equity is around 80%, similar to the amount of excess dispersion in the overall perceived cost of capital. In contrast, the excess dispersion in the perceived cost of debt is only 13%. The excess dispersion in the perceived cost of capital is thus driven by the perceptions about the cost of equity rather than the cost of debt. This finding may reflect that the cost of debt is substantially easier to estimate than the cost of equity, leaving little room for behavioral biases to influence firms' estimates.

Conceptually, most of the variation in the perceived cost of capital comes from the perceived cost of equity, because the perceived cost of equity is much more volatile than the perceived cost of debt (see Table 1) and because firms are mostly financed with equity. Consistent with this argument, the excess dispersion in the perceived cost of capital is close to the excess dispersion in the perceived cost of equity.

Measurement error concerns One may be concerned that the estimates of excess dispersion are driven by measurement error. If the perceived cost of capital that we measure on conference calls contains error, our results would overstate the amount of excess dispersion. However, we argue that there is unlikely to be a substantial amount of measurement error. For one, managers are unlikely to state wrong numbers on conference calls as the cost of capital is a well-defined construct they are expected to know. Moreover, we collect the data manually and examine all records multiple times, minimizing the risk that numbers are saved incorrectly. We also record potential project-specific cost of capital estimates 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 very rare, as explained in Section 3.1).

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.

Another argument against measurement error driving the results can be found in columns (4) to (6) of Panel B in Table 4. We find excess dispersion in the part of the perceived cost of capital that is driven by exposure to risk factors. Since this part is predicted using a two-stage procedure, the results in columns (4) to (6) cannot be driven by classical measurement error. This argument does not imply that we consider the other part, which is not driven by risk factor exposure, as containing measurement error. We are merely pointing out that the two-stage procedure ensures that the part driven by risk factor exposure cannot contain error.

Finally, in Section 4.1, we studied how the perceived cost of capital relates to real outcomes. We find that the perceived cost of capital relates to real outcomes with a magnitude close to that predicted by theory and we find that other measures of the cost of capital do not predict real outcomes once controlling for the perceived cost of capital. Both of these findings support the notion that there is little measurement error in the perceived cost of capital.

6 Cost of Capital and Subjective Beliefs

We now explore the third possibility from our model, namely that firms use the biased subjective return expected of behavioral investors as their cost of capital. There are two cases where the perceived cost of capital may align with the subjective expectations of investors. The first case is when there are only behavioral investors in the market. In this case, the subjective return expectations of behavioral investors equal the fair-value cost of capital (see 10), so firms that take the fair-value approach to the cost of capital should use these subjective expected returns. The second is case that firms may attempt to estimate the market-based cost of capital, but because they share the biased beliefs of the behavioral investors, their cost of capital does not reflect true market-based cost of capital. Instead, their perceived cost of capital reflects the biased return expectations of the behavioral investors.

We use analyst expectations about stock returns as a measure of the subjective expectations of behavioral investors. Analyst expectations of stock returns are known to be biased – both in the time series (Greenwood and Shleifer 2014) and the cross section (Engelberg et al. 2020) – as analysts believe most of the excess volatility in prices reflect variation in expected cash flows (Bordalo et al. 2022a Bordalo et al. 2024). These are the same biases as the ones held by the behavioral agents in our model, making the analyst expectations well suited for our tests.

We calculate firms' cost of equity based on expected stock returns from IBES and Value Line. We use price targets from either IBES or Value Line to calculate expected returns at time of the issuance of the targets. For IBES, these targets are on the one-year horizon, while Value Line provides price targets on three to five year horizons. We then use the resulting expected stock return as the cost of equity in the analyst perceived cost of capital, r^{anlayst}, as

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

where $E_t^{\text{analysts}}[r_{i,t}^{\text{equity}}]$ is the analysts' expected return on firm i outstanding equity at time t. We continue to calculate all other terms – cost of debt, leverage, and taxes – as in equation (13)

The analyst-based cost of capital accounts for almost all the variation in the perceived cost of capital. For the IBES expectations in column 1 of Table 5, the slope coefficient is close to zero when regressing the deviation between the analyst-based

and the perceived cost of capital onto the perceived cost of capital (including a country fixed effect). This finding implies that all of the variation in the perceived cost of capital is accounted for by the analysts-based cost of capital, and that there is no excess dispersion under this benchmark. We find almost identical results when considering the Value Line expectations in column 3. The Value Line expectations are only available for US firms, so there are fewer observations and no country fixed effects in these regressions.

The results are robust to inclusion of year and country fixed effects (column 2 and column 4). Figure A4 plots the excess dispersion for each year post 2010, showing that the analyst-based cost of capital can explain all or more of the perceived cost of capital in every year. Figure A5 shows that the results also hold when we consider the cost of equity in isolation, in an exercise similar to that in Figure 6.

The results suggest that firms that perceive a one-percent higher cost of capital indeed have a one-percent higher cost of capital in the eyes of the analysts, on average. The result does not imply that analyst and firm perceptions always comove perfectly. It is, for instance, well known that the level of analyst expectations is excessively high, with an average around 20%; in contrast, the level of the cost of capital is much smaller, and more easily aligned with interest rates and the historical equity risk premium. Moreover, the correlation between the analyst-based cost of capital and firms' perceived cost of capital is 0.3, which is well below perfect correlation. The low 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).

One interpretation of the results is, as mentioned, that firms use the subjective expected returns as a stand-in for the fair-value cost of capital. This would be consistent with the strong relation between subjective returns and subjective risk perceptions of analysts (Jensen (2022)). But the results relies on there being no rational investors in the market and on all firms taking the fair-value approach to the cost of capital.

A second, complementary, interpretation of the results is that some firms exhibit similar bias as analysts when forming their expectations about returns, and hence their cost of capital. One of the most salient mistakes made by analysts and investors is to overextrapolate from past returns: analysts and investors tend to think that high past returns will materialize in high future returns, despite the empirical tendency for

long-term reversal rather than continuation (De Bondt and Thaler 1985). If managers suffer from the same bias when forming expectations about stock returns, we should expect firms with higher past returns to have higher perceived cost of capital.

Consistent with the over-extrapolation bias, we find that firms with past returns report a higher perceived cost of capital. Figure 7 shows past returns for five value-weighted portfolios of firms sorted on the perceived cost of capital. The firms with the lowest perceived cost of capital has the lowest return over the last five years, and the firms with the highest cost of capital has the highest past return. Here we measure past returns as CAPM alpha, so it is net of past market returns, and a purely cross-sectional statement. It tells us that firms with relatively high returns in the past expect relatively high returns going forward. It does not speak to "aggregate" extrapolation, that is, overextrapolation of the average firm to past market returns.

The cross-sectional extrapolation is hard to reconcile with a rational implementation of the market-based approach to the cost of capital, as firms with high past alpha do not have higher future returns (Fama and French 1996). It could, in principle, be reconciled with the fair-value approach to the cost of capital, but that requires firms that have relatively high past returns to be more exposed to fundamental risk. The approach is consistent with the idea that the perceived cost of capital suffers from the behavioral biases documented in the literature on analysts' subjective expected returns.

The cross-sectional extrapolation is modest in magnitude but statistically significant, as shown in Table 6. The table shows the results of regressions of the perceived cost of capital on past realized alpha or raw returns. The loading on past alpha is statistically significant at the one-percent level at both the five- and ten-year horizon. The loading on past returns is significant at the five- and ten-percent level.

The cross-sectional extrapolation suggests that firms may use a biased cost of capital which, through the lens of our model, would lower the value of firms in financial markets. One may wonder why the market for corporate control cannot undo such apparent mistakes. If the biases in the cost of capital lower stock prices, an arbitrageur could in principle buy the firm, correct the cost of capital, and sell the firm at a profit. There are, however, limits to arbitrage in the market for corporate control (Shleifer and Vishny 1997). A takeover of one of the large corporations in our sample requires an investment in the order of hundreds of billions of dollars, exposing the arbitrageur to large idiosyncratic risk that can make the trade infeasible. Moreover, building the

large position necessary for obtaining corporate control pushes prices up, particularly if the arbitrageur is prevented from building the position slowly over time. If demand is highly inelastic (Gabaix and Koijen 2021), the price pressure from the takeover may destroy the potential gains from correcting the cost of capital. In addition, attempts to change firms' estimates of their cost of capital without a takeover could be prevented by other investors sharing managers' biased perceptions. This argument is supported by the comovement between the IBES expectations and the perceived cost of capital, and the fact that we rarely observe push-back from investors when managers share the perceived cost of capital on conference calls.

One may wonder if managers use their cost of capital as a signaling device, trying to convince analysts that they are safe and should have a low discount rate. The comovement between analyst beliefs and the perceived cost of capital could support such stories. However, the average perceived cost of capital is on the high side relative to standard estimates of expected returns (Table 1), making it unlikely that firms on average try to signal safety. The analysis of within-firm timing in Section 3.2 also showed that firms are not more likely to report their cost of capital when they are particularly underpriced (see Table A1), which otherwise would be a period where the returns to signalling a low cost of capital presumably would be higher. More generally, the lack of predictable timing in the reporting of the perceived cost of capital is difficult to align with a signaling motive. Finally, the perceived cost of capital shapes the investment decisions of firms (see Table 2), so any signaling comes with costly distortions to capital allocation.

7 Cost of Capital Distortions and the Allocation of Capital

In this section, we study how deviations from the marked-based and fair-value cost of capital distort the allocation of capital in the economy. Section 4.1 shows that firms' perceived cost of capital shapes the allocation of capital, which means that excess dispersion leads to capital misallocation. We quantify the magnitude of such misallocation using the stylized framework of Hsieh and Klenow (2009). Relative to the market-based framework, we find that excess dispersion lowers GDP by almost 5%. But relative to the fair-value benchmark, there is less excess dispersion in the

perceived cost of capital and less misallocation, leading to a total factor productivity loss of around 2.5%.

The effect of the perceived cost of capital on long-run capital allocation is consistent with Gormsen and Huber (2025), Fukui et al. (2025). These paper shows that firms' required returns to capital, known as their discount rates, are sticky over time. Shocks to the perceived cost of capital are therefore not immediately incorporated into the cost of capital. But since the cost of capital is persistent, there is nonetheless a strong cross-sectional comovement between discount rates and the cost of capital, which means the cost of capital influences the capital allocation of firms (see Section 4.1).

7.1 Model of Misallocation

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

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

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

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

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

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

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

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

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

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

Firms maximize the present value of profits, π_{si},

$$\pi_{si} = \frac{P_{si} Y_{si}}{1 + r_{si}} - wL - r_{si} K, \tag{22}$$

where we discount the revenue PY as it takes one period to produce goods. The discounting reflects corporate practice, in which the cost of capital is used to calculate the present value of revenues. The distortions in the cost of capital impacts capital allocation through the discounting term. It acts similarly to the output distortions in the model by Hsieh and Klenow, distorting both capital and labor.

Solution Total output is

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

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

$$\text{TFP}_s = \left[\sum_{i=1}^{M_s} \left(A_{si} \frac{\overline{\text{TFPR}_s}}{\text{TFPR}_{si}} \right)^{\sigma - 1} \right]^{\frac{1}{\sigma_1}} \tag{24}$$

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

$$\text{TFPR}_{si} = (r_{si})^{\alpha_s} \frac{1}{1 - \alpha_s} \left(\frac{1 - \alpha_s}{\alpha_s} \right)^{\alpha_s}. \tag{25}$$

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

sectoral TFP.

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

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

The constant Λ is given by $2\Lambda = \sigma(\alpha^s)^2 + \alpha^s(1-\alpha^s) + \sigma\alpha^s c_1 + \sigma \times (c_1)^2$, where $c_1 = \bar{r}/(1+\bar{r})$ is a constant that arises from approximating $\text{cov}\left(r_{si}, (1+r_{si})^{-1}\right)$ and $\text{var}\left((1+r_{si})^{-1}\right)$ from $\text{var}(r_{si})$. Expression (26) allows us to quantify the TFP loss coming from excess dispersion in the perceived cost of capital. The TFP loss is pinned down by an excess dispersion term, which equals the cross-sectional variance of the log of the cost of capital deviations τ_{si}.

7.2 Estimates of the TFP Loss due to Misallocation

We set the elasticity of substitution between products in a sector, σ, to 4 in our baseline calibration, in line with recent work that puts it between 3 and 10 (Broda and Weinstein 2006, Hendel and Nevo 2006, Hsieh and Klenow 2009). We assume a capital share of 0.45, based on estimates for the sample period (see, e.g. Karabarbounis and Neiman 2019). Below we explain how we calculate the variance of the benchmark cost of capital, $\text{var}\left(\log(r_{si}^{\text{benchmark}})\right)$, for the market-based and fair-value benchmarks.

TFP loss relative to market-based benchmark We take two approaches to quantifying $\left(\text{var}\left(\log(r_i^{\text{perc.}})\right) - \text{var}\left(\log(r_i^{\text{market-based}})\right)\right.$ under the market-based benchmark. The first approach assumes that the perceived cost of capital captures the market-based cost of capital plus an orthogonal error. In this case, the relevant metric is the variance of the perceived cost of capital times the fraction of excess dispersion, which is around 80%. The estimate in Table 4 comes from a regression in levels rather than in logs, but we get identical results when we estimate the fraction using log of

the ICC and the log of the perceived cost of capital. The resulting estimate of the variance of the market-based cost of capital is modest — only 20% of the variance of the perceived cost of capital. We discuss this magnitude in the paragraph below, in which we explore an alternative approach.

The alternative approach is to directly estimate var $\left(\log(r_i^{\text{market-based}})\right)$ in the data and compare it to var $\left(\log(r_i^{\text{perc.}})\right)$. The challenge with this approach is that the market-based cost of capital is based on long-run expected stock returns, which are unobserved. A large literature documents cross-sectional variation in expected stock returns over short horizons. The smaller literature on cross-sectional variation in long-run expected stock returns generally reaches the conclusion that there is limited and often statistically insignificant cross-sectional variation in long-run expected stock returns (Cohen et al. 2009 and Keloharju et al. 2021). Moreover, our sample is skewed towards large firms, which exhibit much less variation in expected stock returns than small firms (Fama and French 1993). The empirical evidence thus suggests that the variance of the market-based cost of capital could be modest.

To estimate var $\left(\log(r_i^{\text{market-based}})\right)$, we first construct estimates of expected 10-year stock returns for the firms in our sample. We do so using stocks returns going back to 1980. We use the implied cost of capital as our predictor variable. This approach is consistent with the assumption in Section 5.1, that is, the implied cost of capital measures the market-based cost of capital plus noise. We can then calculate the variance of the log of the predicted returns. This variance is only one input into the variance of the market-based cost of capital, as we also need leverage and cost of debt elements. We do not observe these measures without noise, so we cannot estimate variance without a set of instruments to extract the true variation. Rather than using instruments, we assume that debt is risk-free, in which case the variance of the market-based cost of capital is bounded above by $E[1-\omega]^2 \text{ var}\left(\log(r_i^{\text{equity}})\right)$.

The resulting estimates of misalloation are presented in Table 7. For both approaches for estimating var $\left(\log(r_i^{\text{market-based}})\right)$, we find a TFP loss in the order of 5%. If we assume $\sigma = 3$, the TFP loss is around 4% and if we assume $\sigma = 5$, the TFP loss is around 6%. While the estimates are associated with substantial uncertainty, they highlight that deviations from the market-based cost of capital could be a quantitatively relevant contributor to the large capital misallocation that has been found in the literature (David et al. 2016, Restuccia and Rogerson 2017, David

and Venkateswaran 2019).[8]

TFP loss relative to fair-value benchmark We calculate var $\left(\log(r_i^{\text{fair-value}})\right)$ based on the CAPM. We assume that var $\left(\log(r_i^{\text{fair-value}})\right)$ is equal to var $\left(\log(r_i^{\text{CAPM}})\right)$ plus an orthogonal error, such that we can calculate var $\left(\log(r_i^{\text{CAPM}})\right)$ based on the fraction of the var $\left(\log(r_i^{\text{perc.}})\right)$ explained by our proxy of the fair-value cost of capital. This fraction is around 0.5 (see Table 4 Panel B for comparison based on returns that are not in logs), so var $\left(\log(r_i^{\text{CAPM}})\right)$ is around half the variance of var $\left(\log(r_i^{\text{perc.}})\right)$.

The TFP loss is presented in Panel B of Table 7. The TFP loss relative to the fair-value approach is around 3% using both our approaches. The estimates vary from 2.5% to 3.5% as we vary σ from 3 to 5. The estimates are substantially lower than the estimates obtained from the market-based approach.

8 Conclusion

According to standard theory, firms should invest in all projects for which the expected return exceeds the cost of capital. In theory, this straightforward investment rule leaves little room for error. In practice, however, the rule is complicated by the fact that firms cannot directly observe their cost of capital. The cost of capital depends on the returns that financial investors expect to earn from holding a given firm's debt and equity. Since estimating these expected returns is notoriously difficult, firms' perceptions about their own cost of capital may deviate from the benchmark assumptions of standard models. Such deviations would distort investment decisions, lead to misallocation of capital, and reduce aggregate output.

In this paper, we study hand-collected data on firms' perceived cost of capital. The perceived cost of capital predicts firms' long-run capital allocation in line with theory, but it deviates from standard benchmarks of the cost of capital. These deviations lead to capital misallocation and reduce aggregate total factor productivity by around 5% in a standard model.

[8] In Appendix E.2, we find that misallocation based on discount rates is even larger than misallocation based on the perceived cost of capital.

References

Benjamini, Y. and Y. Hochberg (1995): "Controlling the false discovery rate: a practical and powerful approach to multiple testing," *Journal of the Royal statistical society: series B (Methodological)*, 57, 289–300.

Bordalo, P., N. Gennaioli, R. La Porta, and A. Shleifer (2024): "Finance without exotic risk," .

Bordalo, P., N. Gennaioli, R. LaPorta, and A. Shleifer (2022a): "Belief Overreaction and Stock Market Puzzles," .

Bordalo, P., N. Gennaioli, and A. Shleifer (2022b): "Overreaction and diagnostic expectations in macroeconomics," *Journal of Economic Perspectives*, 36, 223–244.

Broda, C. and D. E. Weinstein (2006): "Globalization and the Gains from Variety," *The Quarterly journal of economics*, 121, 541–585.

Campbell, J. Y. and R. J. Shiller (1988): "Stock Prices, Earnings, and Expected Dividends," *Journal of Finance*, 43, 661–676.

Cho, T. and C. Polk (2024): "Putting the Price in Asset Pricing," *Journal of Finance*, 79, 3943–3984.

Cho, T. and A. Salarkia (2020): "Which Asset Pricing Model Do Firms Use? A Revealed Preference Approach," .

Claus, J. and J. Thomas (2001): "Equity premia as low as three percent? Evidence from analysts' earnings forecasts for domestic and international stock markets," *The Journal of Finance*, 56, 1629–1666.

Cochrane, J. H. (2001): *Asset Pricing*, Princeton, NJ: Princeton University Press.

Cohen, R. B., C. Polk, and T. Vuolteenaho (2009): "The price is (almost) right," *Journal of Finance*, 64, 2739–2782.

Cooper, M., H. Gulen, and M. Ion (2024): "The use of asset growth in empirical asset pricing models," *Journal of Financial Economics*, 151, 103746.

Daniel, K. and S. Titman (1997): "Evidence on the Characteristics of Cross Sectional Variation in Stock Returns," *Journal of Finance*, 52, 1–33.

David, J. M., H. A. Hopenhayn, and V. Venkateswaran (2016): "Information, Misallocation, and Aggregate Productivity," *The Quarterly Journal of Economics*, 131, 943–1005.

David, J. M. and V. Venkateswaran (2019): "The Sources of Capital Misallocation," *American Economic Review*, 109, 2531–2567.

De Bondt, W. F. M. and R. Thaler (1985): "Does the Stock Market Overreact?" *Journal of Finance*, 40, 793–805.

Easton, P. D. (2004): "PE ratios, PEG ratios, and estimating the implied expected rate of return on equity capital," *The accounting review*, 79, 73–95.

Engelberg, J., R. D. McLean, and J. Pontiff (2020): "Analysts and Anomalies," *Journal of Accounting and Economics*, 69, 101249.

Eskildsen, M., M. Ibert, T. Jensen, and L. Pedersen (2024): "In Search of the True Greenium," *Copenhagen Business School Working Paper*.

Fama, E. F. and K. R. French (1988): "Dividend Yields and Expected Stock Returns," *Journal of Financial Economics*, 22, 3–25.

——— (1993): "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics*, 33, 3–56.

——— (1996): "Multifactor explanations of asset pricing anomalies," *Journal of Finance*, 51, 55–84.

——— (1997): "Industry Costs of Equity," *Journal of financial economics*, 43, 153–193.

——— (2015): "A Five-Factor Asset Pricing Model," *Journal of Financial Economics*, 116, 1–22.

Fukui, M., N. J. Gormsen, and K. Huber (2025): "Sticky Discount Rates," .

Gabaix, X. and R. S. Koijen (2021): "In Search of the Origins of Financial Fluctuations: The Inelastic Markets Hypothesis," .

Gebhardt, W. R., C. M. Lee, and B. Swaminathan (2001): "Toward an implied cost of capital," *Journal of accounting research*, 39, 135–176.

Giroud, X., G. Matvos, A. Seru, and R. C. Silva (2022): "Managing Resource (Mis)allocation," .

Gormsen, N. J. and K. Huber (2025): "Corporate Discount Rates," *American Economic Review*, 115.

Gormsen, N. J., K. Huber, and S. Oh (2023): "Climate capitalists," *University of Chicago Working Paper*.

Graham, J. R. (2022): "Presidential Address: Corporate Finance and Reality," *Journal of Finance*, 77, 1975–2049.

Graham, J. R. and C. R. Harvey (2001): "The Theory and Practice of Corporate Finance: Evidence from the Field," *Journal of Financial Economics*, 60, 187–243.

Greenwood, R. and A. Shleifer (2014): "Expectations of Returns and Expected Returns," *Review of Financial Studies*, 27, 714–746.

Hadlock, C. J. and J. R. Pierce (2010): "New Evidence on Measuring Financial Constraints: Moving beyond the KZ Index," *Review of Financial Studies*, 23, 1909–1940.

Hassan, T. A., S. Hollander, L. Van Lent, and A. Tahoun (2019): "Firm-Level Political Risk: Measurement and Effects," *Quarterly Journal of Economics*, 134, 2135–2202.

Hendel, I. and A. Nevo (2006): "Measuring the implications of sales and consumer inventory behavior," *Econometrica*, 74, 1637–1673.

Hommel, N., A. Landier, and D. Thesmar (2025): "Corporate Valuation: An Empirical Comparison of Discounting Methods," .

Hou, K., C. Xue, and L. Zhang (2015): "Digesting Anomalies: An Investment Approach," *Review of Financial Studies*, 28, 650–705.

Hsieh, C.-T. and P. J. Klenow (2009): "Misallocation and manufacturing TFP in China and India," *The Quarterly journal of economics*, 124, 1403–1448.

Jacobs, M. T. and A. Shivdasani (2012): "Do You Know Your Cost of Capital?" *Harvard Business Review*, 90, 118–124.

Jagannathan, R., D. Matsa, I. Meier, and V. Tarhan (2016): "Why Do Firms Use High Discount Rates?" *Journal of Financial Economics*, 120, 445–463.

Jensen, T. I. (2022): "Subjective Risk and Return," .

Jensen, T. I., B. Kelly, and L. H. Pedersen (2023): "Is there a replication crisis in finance?" *The Journal of Finance*, 78, 2465–2518.

Karabarbounis, L. and B. Neiman (2019): "Accounting for factorless income," *NBER Macroeconomics Annual*, 33, 167–228.

Kelly, B., D. Xiu, et al. (2023): "Financial machine learning," *Foundations and Trends® in Finance*, 13, 205–363.

Keloharju, M., J. T. Linnainmaa, and P. Nyberg (2021): "Long-term Discount Rates Do Not Vary Across Firms," *Journal of Financial Economics*, 141, 946–967.

Krüger, P., A. Landier, and D. Thesmar (2015): "The WACC fallacy: The real effects of using a unique discount rate," *Journal of Finance*, 70, 1253–1285.

Lakonishok, J., A. Shleifer, and R. W. Vishny (1994): "Contrarian Investment, Extrapolation, and Risk," *Journal of Finance*, 49, 1541–1578.

Lee, C. M., E. C. So, and C. C. Wang (2021): "Evaluating firm-level expected-return proxies: implications for estimating treatment effects," *The Review of Financial Studies*, 34, 1907–1951.

Modigliani, F. and M. H. Miller (1958): "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, 48, 261–297.

Mukhlynina, L. and K. G. Nyborg (2016): "The Choice of Valuation Techniques in Practice: Education versus Profession," .

Ohlson, J. A. and B. E. Juettner-Nauroth (2005): "Expected EPS and EPS growth as determinantsof value," *Review of accounting studies*, 10, 349–365.

Pástor, L., R. F. Stambaugh, and L. A. Taylor (2022): "Dissecting green returns," *Journal of Financial Economics*, 146, 403–424.

Pedersen, L. H. (2019): *Efficiently inefficient: how smart money invests and market prices are determined*, Princeton University Press.

Poterba, J. M. and L. H. Summers (1995): "A CEO survey of US companies' time horizons and hurdle rates," *MIT Sloan Management Review*, 37, 43.

Restuccia, D. and R. Rogerson (2017): "The Causes and Costs of Misallocation," *Journal of Economic Perspectives*, 31, 151–174.

Rogers, J. L., A. Van Buskirk, and S. L. Zechman (2011): "Disclosure Tone and Shareholder Litigation," *The Accounting Review*, 86, 2155–2183.

Shleifer, A. and R. W. Vishny (1997): "The limits of arbitrage," *The Journal of finance*, 52, 35–55.

Stein, J. (1996): "Rational Capital Budgeting in an Irrational World," *Journal of Business*, 69, 429.

Table 1
Summary Statistics

This table reports summary statistics at the level of firm-quarter observations. The perceived cost of capital, the perceived cost of debt, and the discount rate are 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 sample includes the years between 2002 to 2022.

	N	mean	p5	p95
Perceived cost of capital	3,139	8.67	5.30	13.0
Perceived cost of debt	5,165	4.66	1.70	8.90
Perceived cost of equity	485	10.3	5.00	15.0
Discount rate	3,286	15.4	8.00	25.0

Table 2
Capital Allocation and the Perceived Cost of Capital

This table reports panel regressions of firm-level real outcomes on the firm's ex ante perceived cost of capital. In columns (1) and (2), 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 minus financial investments]. In columns (3) and (4), the left-hand side variable is the ratio of capital to labor. We measure capital as net property, plant, and equipment (PPEN) and labor as number of employees. In columns (5) and (6), the left-hand side variable is long-run investment. Long-run investment is the average net investment rate over the subsequent five years. We calculate net investment as capital expenditure minus depreciation over the lagged value of property, plant, and equipment (PPEN). Panel B augments these regressions with the implied cost of capital as well as interest expense of the firm in the same quarter. The sample includes 2002 to 2022. Standard errors are double clustered at the firm and year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)
	$ROIC_{i,t}$		$Capital/labor_{i,t}$		$Long\text{-}run\ investment_{i,t+5}$	
Perc. $CoC_{i,t}$	0.74**	0.63**	-17.3***	-18.6***	-0.78**	-0.84*
	(0.31)	(0.25)	(2.91)	(3.26)	(0.36)	(0.43)
Implied $CoC_{i,t}$		-0.40*		-3.74**		0.24
		(0.23)		(1.65)		(0.21)
$Interest\ expense_{i,t}$		-0.035		-2.89***		0.23
		(0.16)		(1.09)		(0.31)
Country-year FE	X	X	X	X	X	X
Observations	1,979	1,546	2,338	1,892	1,371	1,133
R^2	0.036	0.049	0.24	0.25	0.088	0.099

Table 3
Time Variation in the Perceived Cost of Capital

This table reports regressions of the firm-level perceived cost of capital on the contemporaneous earnings yield plus expected inflation of the stock market in the country of the firm as well as on the long-term interest rates in the country. Firms are denoted by i and k denotes the country of residence of firm i. The sample includes 2002 to 2022. Standard errors are clustered by firm. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)
VARIABLES	US only	US only		Global
Earnings yield	0.56***	0.63***	0.48***	0.43***
	(0.11)	(0.19)	(0.083)	(0.11)
lt_rate	0.27***	0.33***	0.37***	0.28***
	(0.071)	(0.049)	(0.034)	(0.039)
Constant			5.79***	
			(0.31)	
Observations	1,700	1,700	3,282	3,282
R-squared	0.052	0.873	0.127	0.883
FE	None	Firm	None	Firm
R^2	0.052	0.87	0.13	0.88
Within R^2	0.052	0.16	0.13	0.13

Table 4
Excess Dispersion in the Perceived Cost of Capital

This table present estimates of excess dispersion for the market-based (Panel A) and the fair-value (Panel B) approaches to the cost of capital. In Panel A, we project forecast errors in the perceived cost of capital onto the the perceived cost of capital. Forecast errors are defined as the difference between the perceived cost of capital and either the ex post realized cost of capital (column 1 and 2 of Panel A) or the implied cost of capital (column 3 and 4 of Panel A) . In Panel B, the forecast errors are relative to two fair-value estimates of the cost of capital: the CAPM-based cost of capital (column 1 and 2 of Panel B) and the Fama-French cost of capital (column 3 and 4 of Panel B). All variables are defined in Section 5.1 and Section 5.2. The slope coefficients in column 1 and 3 of Panel A and B represent the share of excess dispersion (as defined in equation 20) relative to different benchmarks. The sample includes 2002 to 2024. Standard errors in Panel A column 1 and 2 are double clustered at the firm and year level and standard errors while column 3 and 4 clusters at the industry year level. Panel B clusters at the industry and 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***	0.84***
	(0.34)	(0.33)	(0.047)	(0.043)
FE	None	Year	None	Year
P(slope = 1)	0.54	0.67	0.000049	0.0077
Observations	2,590	2,590	2,281	2,281
R^2	0.0057	0.18	0.29	0.35

Panel B: Excess dispersion relative to fair-value benchmarks

	$\upsilon^{\text{CAPM}}_{i,t+1} = r^{\text{perc.}}_{i,t} - r^{\text{CAPM}}_{i,t+j}$		$\upsilon^{\text{FF5}}_{i,t+1} = r^{\text{perc.}}_{i,t} - r^{\text{FF5}}_{i,t}$	
$r^{\text{perc.}}_{i,t}$	0.50***	0.53***	0.67***	0.69***
	(0.039)	(0.037)	(0.075)	(0.073)
FE	None	Year	None	Year
P(slope = 1)	0	2.9e-09	0.00022	0.0045
Observations	3,282	3,282	3,236	3,236
R^2	0.17	0.37	0.096	0.25

Table 5
Excess Dispersion Relative to Analyst Beliefs

This table reports excess dispersion in the perceived cost of capital, measured relative to the cost of capital perceived by analysts. We measure an analyst cost of capital using analysts' subjective expectations of stock returns as the cost of equity (see Section 6). We consider expected stock returns from both IBES or Value Line. The IBES sample is global from 2002 to 2024 for the Value Line sample is US only from 2002 to 2019. Standard errors are double clustered at the firm and year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	IBES expectations $v^{\text{IBES}}_{i,t+1} = r^{\text{perc.}}_{i,t} - r^{\text{IBES}}_{i,t}$		Value Line expectations $v^{\text{VL}}_{i,t+1} = r^{\text{perc.}}_{i,t} - r^{\text{VL}}_{i,t}$	
$r^{\text{perc.}}_{i,t}$	-0.13	-0.0034	0.016	0.18
	(0.19)	(0.19)	(0.14)	(0.16)
Observations	2,434	2,434	961	961
R-squared	0.128	0.251	0.000	0.169
FE	Ex	Ex/year	None	Year
P(slope = 1)	5.0e-06	1.1e-06	1.1e-06	0.000065
R^2	0.13	0.25	0.000016	0.17

Table 6
The Perceived Cost of Capital and Past Returns

This table reports results of regressions of the perceived cost of capital on past realized alpha and return. The realized alpha is calculated as the past realized return, minus the market beta times the past realized market risk premium. The sample is from 2002 to 2024. Standard errors are double clustered at the firm and year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	Perceived cost of capital			
Past 5-year alpha	0.011***			
	(0.0035)			
Past 10-year alpha		0.029***		
		(0.0082)		
Past 5-year return			0.0093**	
			(0.0037)	
Past 10-year return				0.019*
				(0.0099)
Observations	2,437	2,148	2,437	2,148
R-squared	0.197	0.203	0.195	0.196
FE	Ex/year	Ex/year	Ex/year	Ex/year

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

This table quantifies TFP loss under various definition of the benchmark cost of capital. The quantification follows equation 26,

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

We calculate the variance of the log of the benchmark cost of capital in multiple ways. In Panel A, we consider the market-based benchmark. We calculate the variance of the log of the market-based cost of capital based on the fraction of the perceived cost of capital that is explained by the market-based cost of capital (column 4, Panel A, Table 4). This approach assumes that the perceived cost of capital incorporates all variation in the market-based cost of capital plus error. We also calculate the variance of the true cost of capital by using the implied cost of capital as instrument to measure variation in the market-based cost of capital. In Panel B, we consider the fair-value benchmark. We calculate the variance of the log of the fair-value cost of capital based on the fraction of the perceived cost of capital that is explained by the CAPM cost of capital (column 2, Panel B, Table 4). The constant Λ is a function of the elasticity of substitution, σ, and the capital share α^s, which we set to 4 and 0.45.

Panel A: TFP loss relative to market-based benchmark

$\text{var}\left(\log(r^{\text{market-based}}\right)$ inferred from $r^{\text{perc.}}$	4.95%
$\text{var}\left(\log(r^{\text{market-based}}\right)$ inferred from r^{ICC}	4.81%

Panel B: TFP loss relative to fair-value benchmark

$\text{var}\left(\log(r^{\text{fair-value}}\right)$ based on CAPM	2.94%

Figure 1
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 for $j \neq 1$ and 9 by averaging φ_j across the two nearest js.

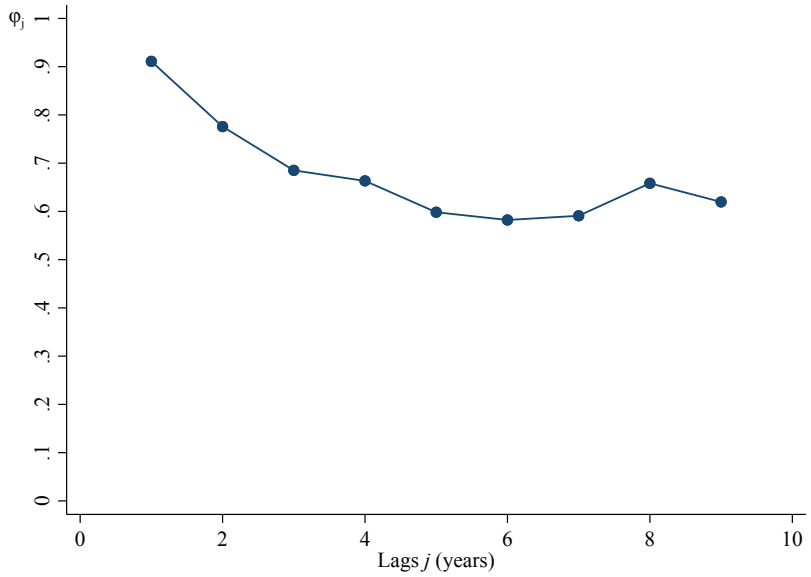


Figure 2
The Perceived Cost of Capital and Future Real Investment

This figure shows slope coefficients β_j from regressions of a future net investment rate on the ex ante perceived cost of capital:

$$\text{Net Investment}_{i,t+j} = a_j + \beta_j r_{i,t}^{\text{perc.}} + FE_t + e_{i,t+j},$$

where Net Investment$_{i,t+j}$ is the net investment rate of firm i in period $t+j$, measured as (capex$_{t+j}$ - depreciation$_{t+j}$)/PPEN$_{t+j-1}$. The regressions include year fixed effects.

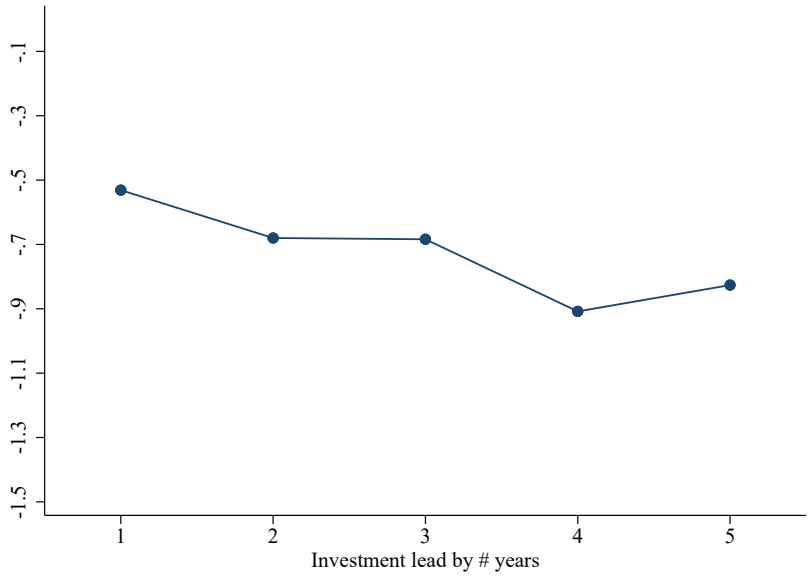


Figure 3
The Time Series of the Perceived Cost of Capital

In the left-hand figure, we plot the average cost of capital of US firms along with the earnings yield for the US stock market (the inverse of the CAPE ratio) plus expected long-run inflation from the Michigan survey. In the right-hand figure, we plot the average cost of debt of US firms along with the long-term Treasury yield.

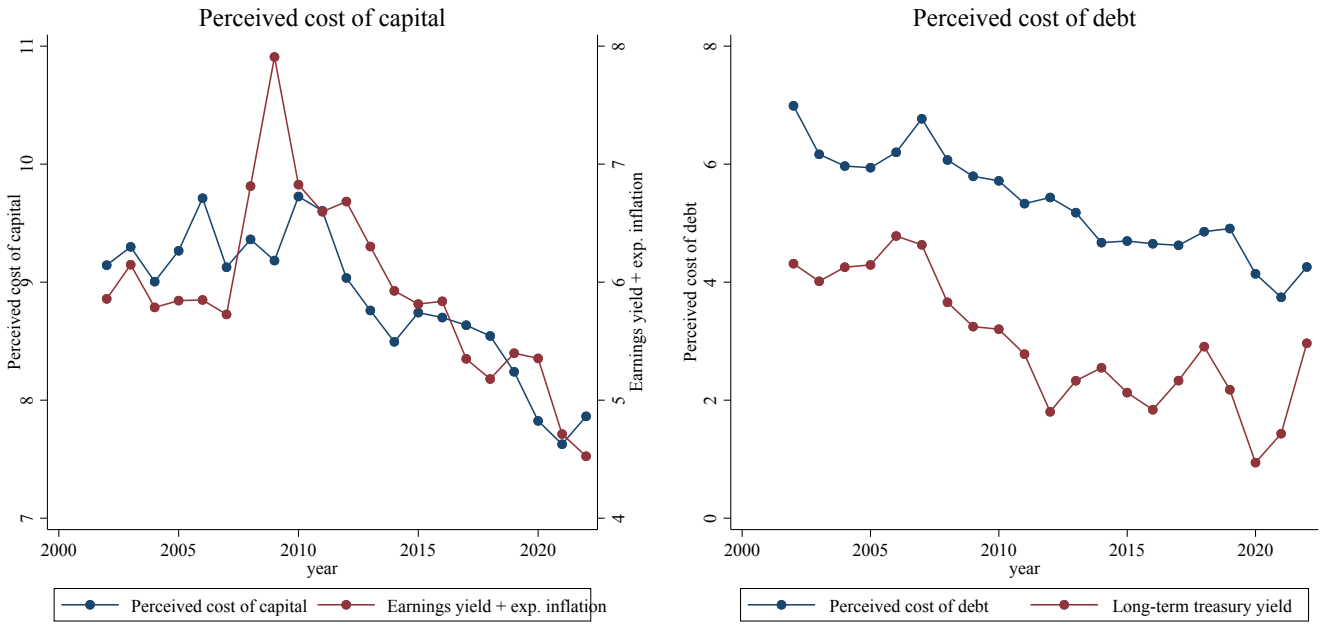


Figure 4
The Cross Section of the Perceived Cost of Capital

This figure shows the perceived of capital for firms sorted into bins based on four firm-level characteristics. The characteristics are leverage, market beta, size, and value. Leverage, beta, and, book-to-market are measured in cross-sectional percentiles of the population of firms in a country in a given quarter. For size, we assign all firms to one of 5 size categories based on the categorization by Jensen et al. (2023). The three other characteristics are sorted into equal-sized groups. The sample includes 2002 to 2022.

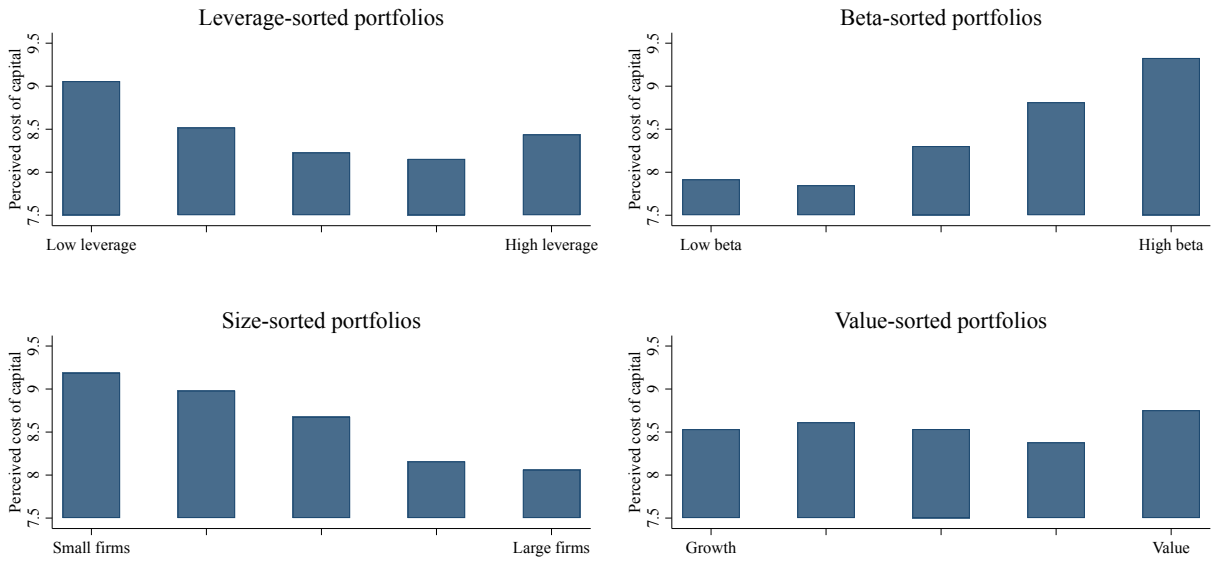


Figure 5
A Parsimonious Model of the Perceived Cost of Capital

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 risk factors in Jensen et al. (2023)—which are measured by firm characteristics—as well as a dummy for the region (US versus European firm). 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 points higher for firms with the highest characteristics relative to firms with the lowest. The sample includes firms in Europe and the US between 2002 and 2022.

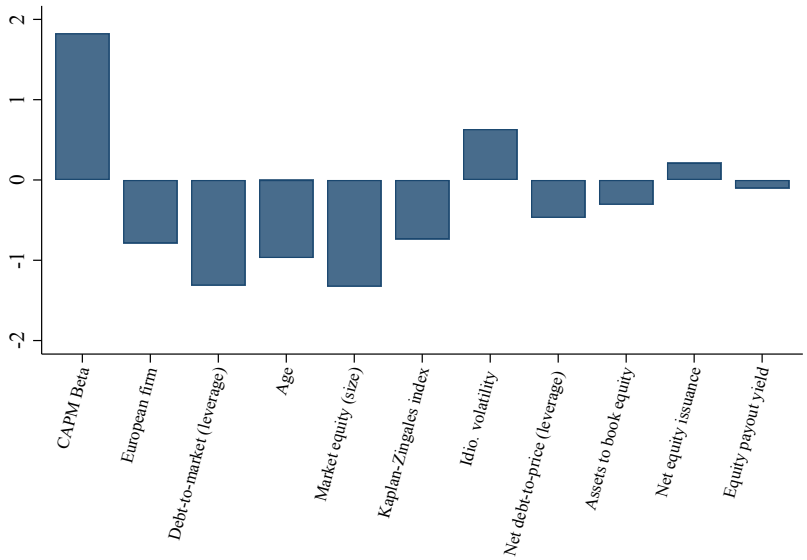


Figure 6
Excess Dispersion in the Perceived Cost of Capital, Equity, and Debt

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, Panel B. 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 true 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.

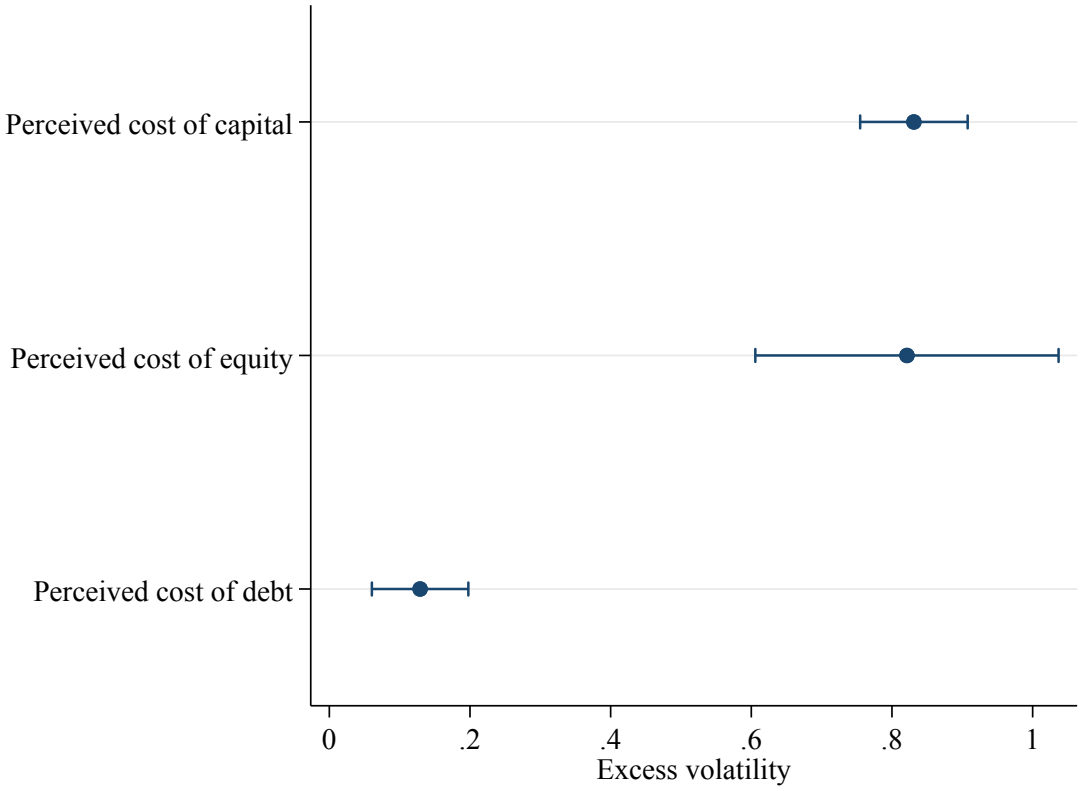
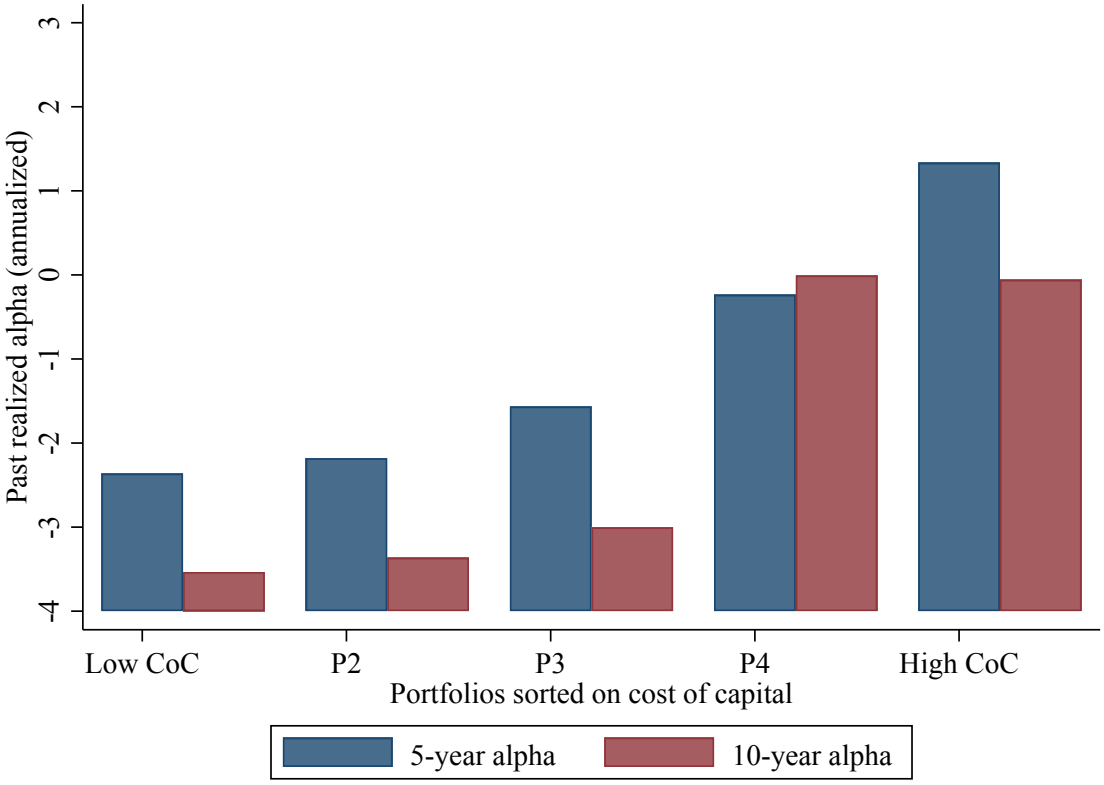


Figure 7
The Perceived Cost of Capital and Past Returns

This figure shows past CAPM alpha for five portfolios of firms sorted on their perceived cost of capital. The CAPM alpha is calculated as the average return over the five (ten) years leading up to the observation of the perceived cost of capital, minus the market beta of the firm time the average realized market risk premium over the same period. The returns and alphas are annualized. Portfolio returns are weighted by the market cap of the firm at the time of the observation of the perceived cost of capital. The sample is from 2002 to 2024.



Online Appendix

Appendix A Figures and Tables

Figure A1
Histograms for the Perceived Cost of Capital and Equity

This figure shows histograms for the perceived cost of capital and the perceived cost of equity for all observations in the conference call data.

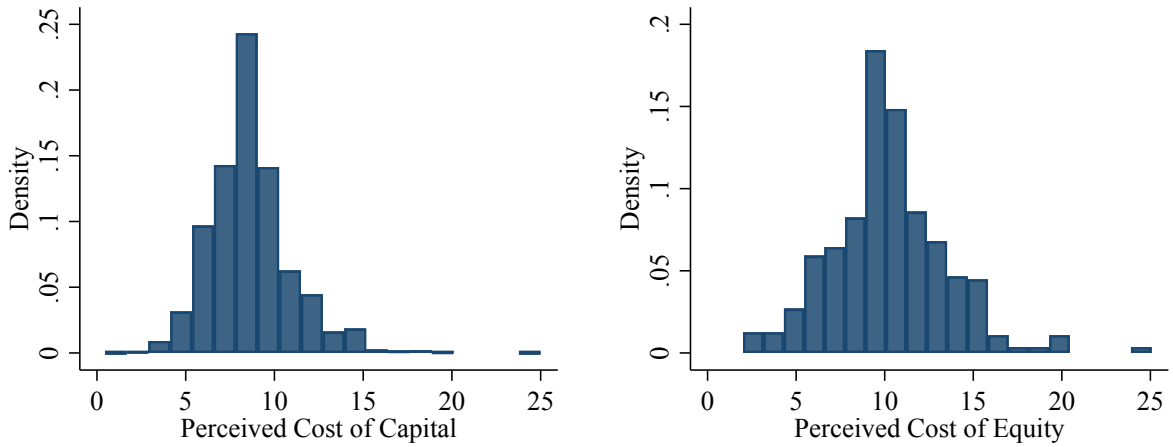


Figure A2
Excess Dispersion in the Perceived Cost of Capital: Heterogeneity

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 based on the median characteristic measured in ex ante percentiles of a given country at a given time. We estimate excess dispersion using the method based on the implied cost of capital, as in Table 4, Panel B. The five characteristics are market capitalization, book-to-market, dependence on external finance (measured using the Kaplan-Zingales index), net issuance relative to assets, and market beta based on 5 years of monthly data. The sample includes 2002 to 2022. Standard errors are double clustered at the firm and year level. The bars represent 95% confidence intervals.

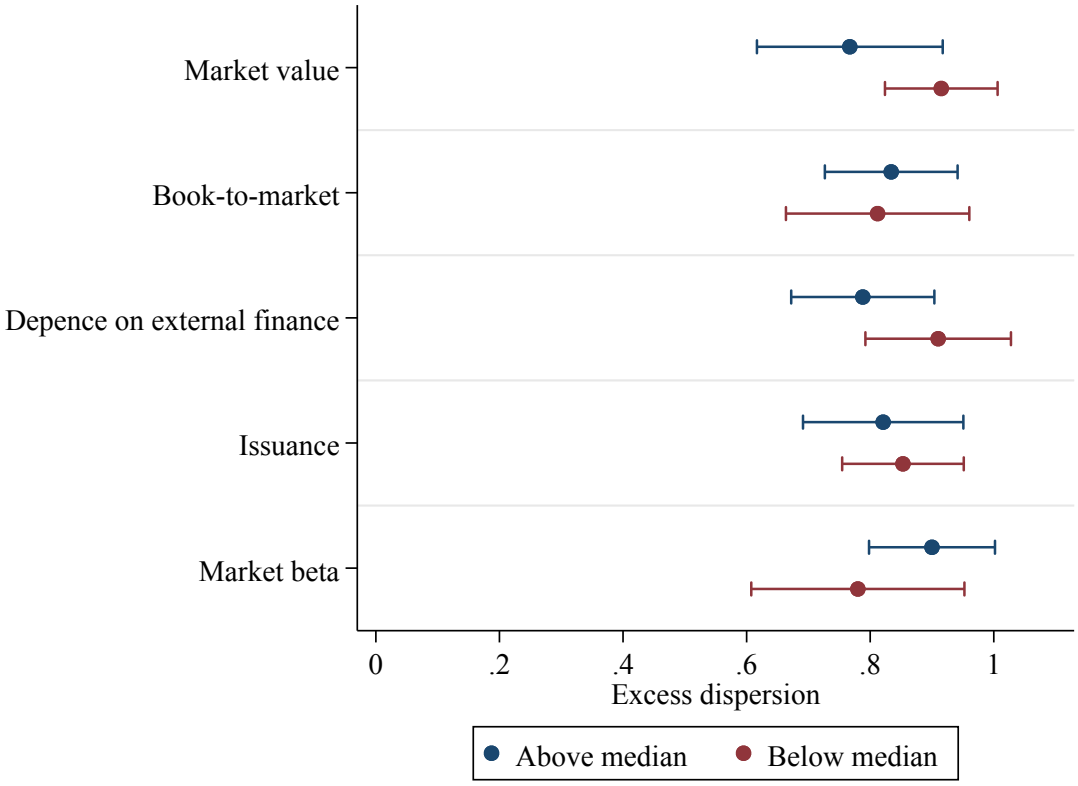


Figure A3
Excess Dispersion Relative to The Implied Cost of Capital Year-by-Year

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.

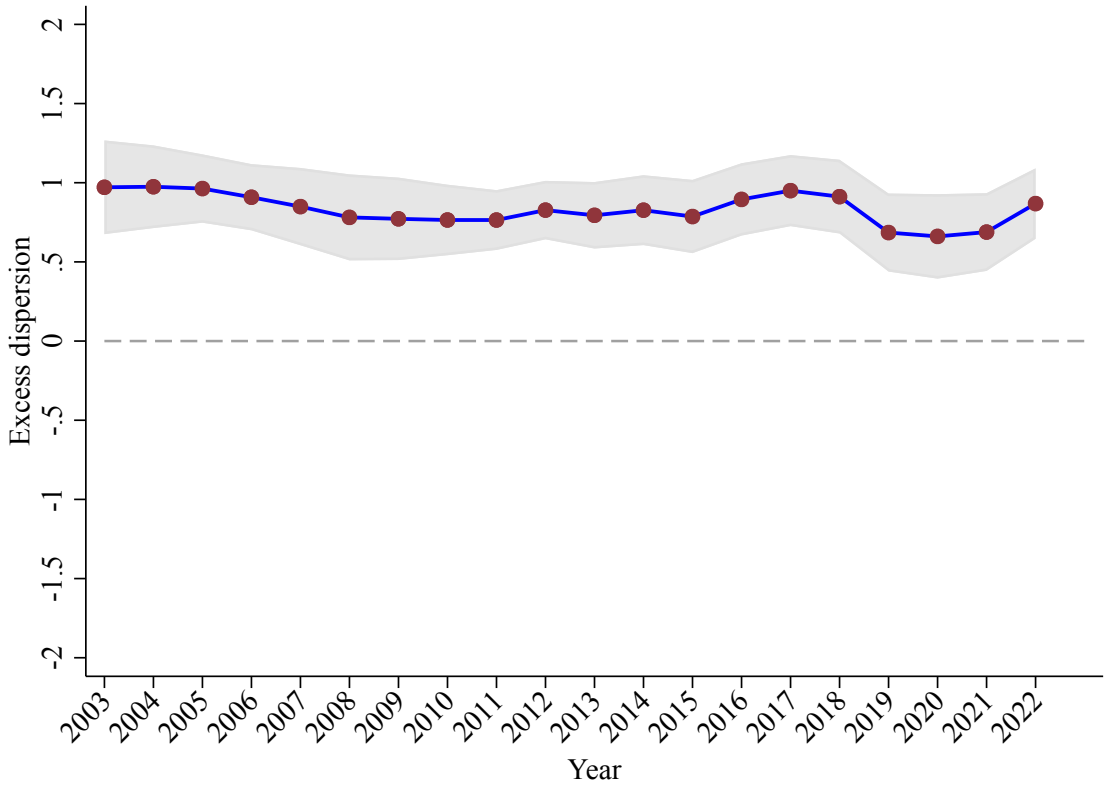


Figure A4
Excess Dispersion Relative to Analyst Cost of Capital Year-by-Year

This figure shows the excess dispersion in the perceived cost of capital relative to the analyst-based cost of capital, by year since 2010. Each estimate reflects a three-year moving average. The analyst-based cost of equity is calculated as the expected stock returns obtained from IBES.

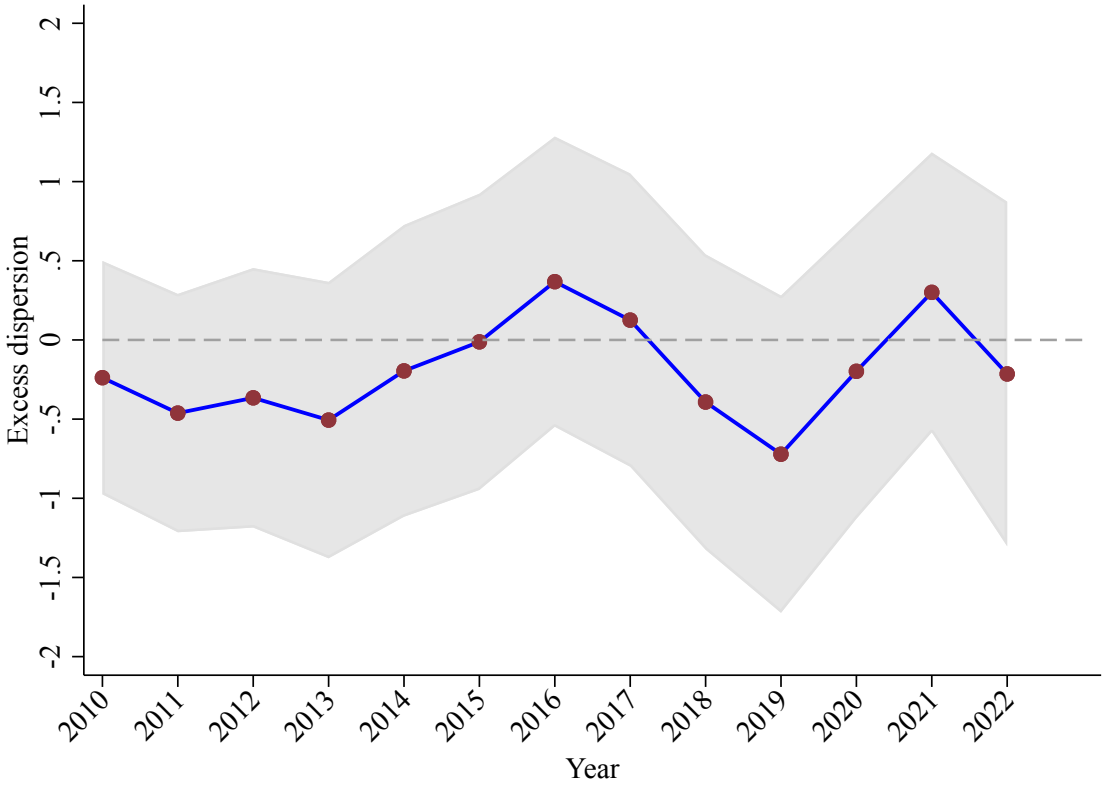


Figure A5
Analyst Perceptions and Excess Dispersion in the Perceived Cost of Equity

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 stock returns obtained from IBES or Value Line price estimates. The sample is Global 2002-2024 for IBES and US 2002-2019 for Value Line.

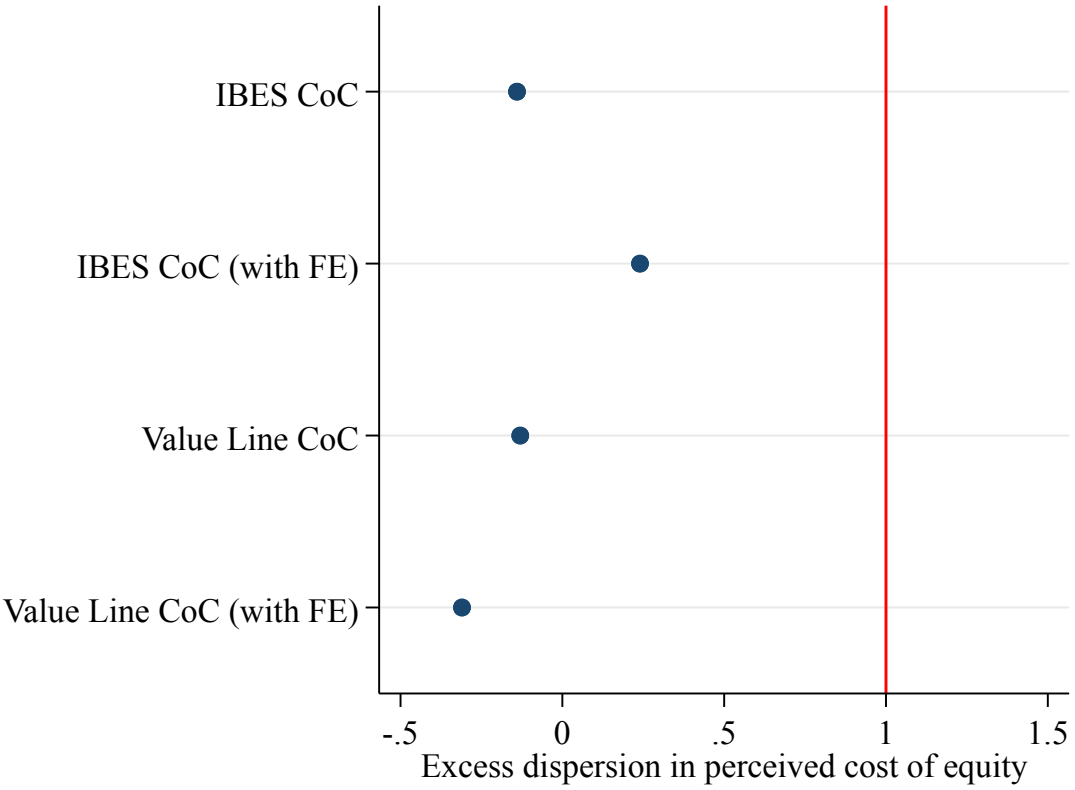


Figure A6
Perceived versus True Premia for Risk Factors

This figure shows slope coefficients from regressions of risk premia reflected in the perceived cost of capital and the "true" risk premia estimated in financial markets. For each group of risk factors M, we run the regressions

$$\lambda_k^{\text{perc.}} = a_M + \beta_M \lambda_k^{\text{true}} + e_{i,t},$$

where $\lambda_k^{\text{perc.}}$ and λ^{true} are the risk premia for the k^{th} risk factor in M. For each factor k, the associated risk premium is estimated in a model that controls for the market risk factor. The true risk premia are from Cho and Polk (2024) and the perceived risk premia are estimated as explained in the text. We observe 153 risk factors in total that are grouped into six groups following Jensen et al. (2023). Standard errors are double clustered at the firm and year level. The bars represent 95% confidence intervals.

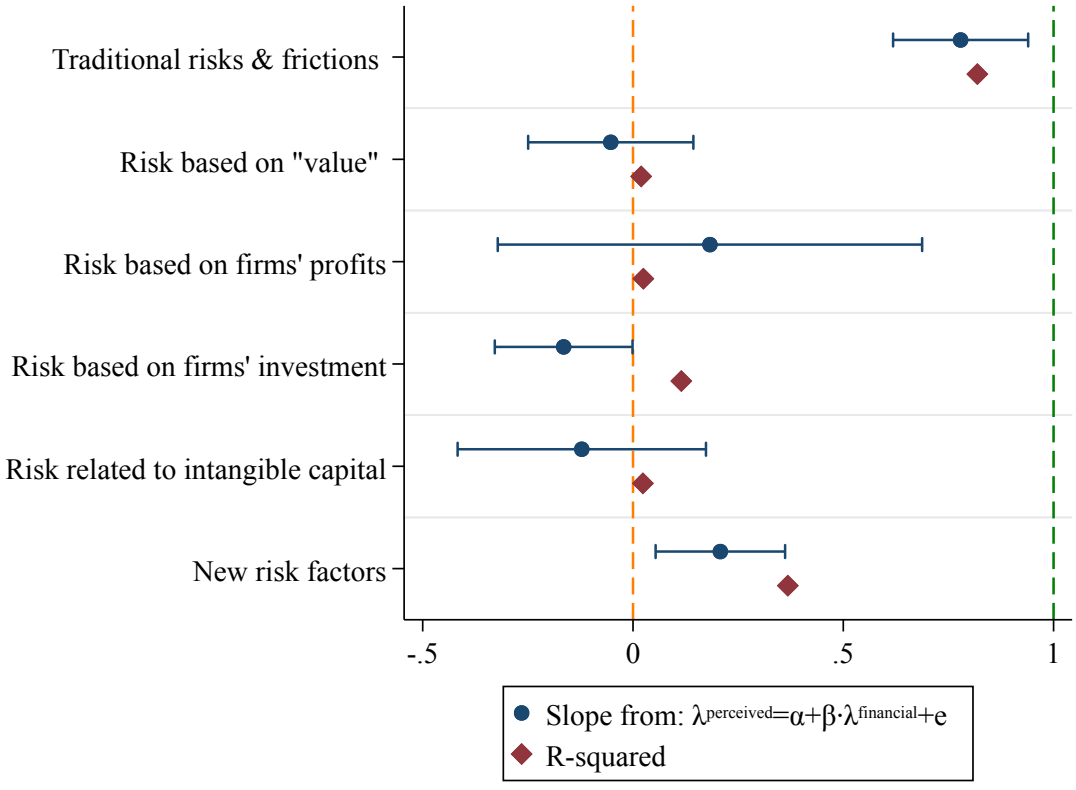


Figure A7
Testing the Investment CAPM

This figure shows binscatters of future realized stock returns and the perceived cost of capital against the firm-level investment rate. The left-hand figure plots the realized future 3-year return against the ex ante investment of the firm. Investment is measured as asset expansion and in cross-sectional percentiles of the population of firms in the same country and year. The right-hand figure plots the perceived cost of capital against firm-level investment. Both plots control for country-quarter fixed effects as well as profit bins of the given firms. Profit bins are based on the return on equity, which is measured in cross-sectional percentiles of the full population of firms in the country in a given quarter. The sample includes 2002 to 2022.

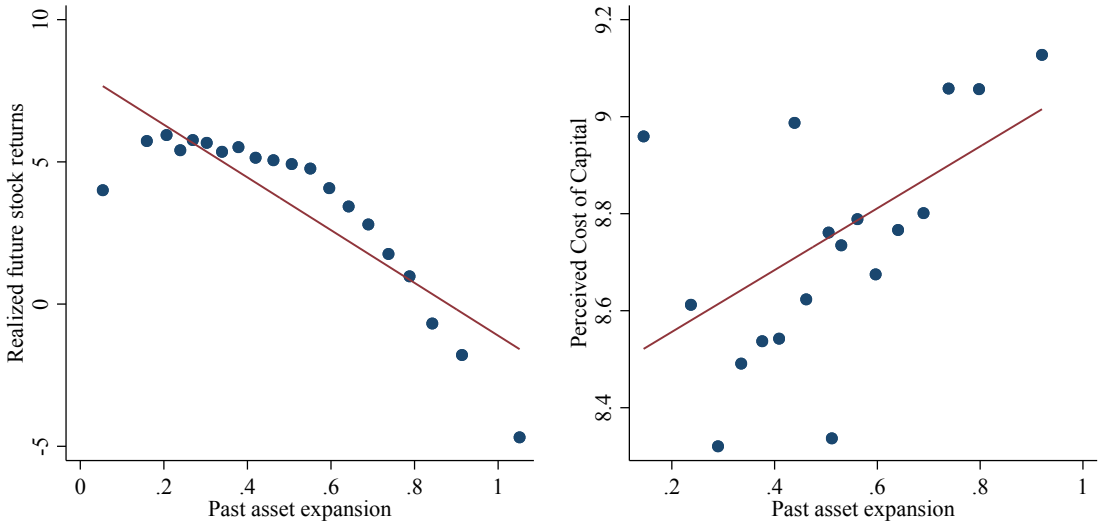


Figure A8
A Parsimonious Model of Firm Discount Rates

This figure shows slope coefficients from regressions of predicted values of the firm-level discount rate on the variables selected by the Lasso procedure. The dependent variable in the Lasso regression is the firm-level discount rate in a given quarter. The set of possible explanatory variables includes firm exposure to the 153 risk factors in Jensen et al. (2023)—which are measured by firm characteristics—as well as a dummy for the region (US versus European firm). 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 discount rate is predicted to be 1 percentage points higher for firms with the highest characteristics relative to firms with the lowest. The sample includes firms in Europe and the US between 2002 and 2022.

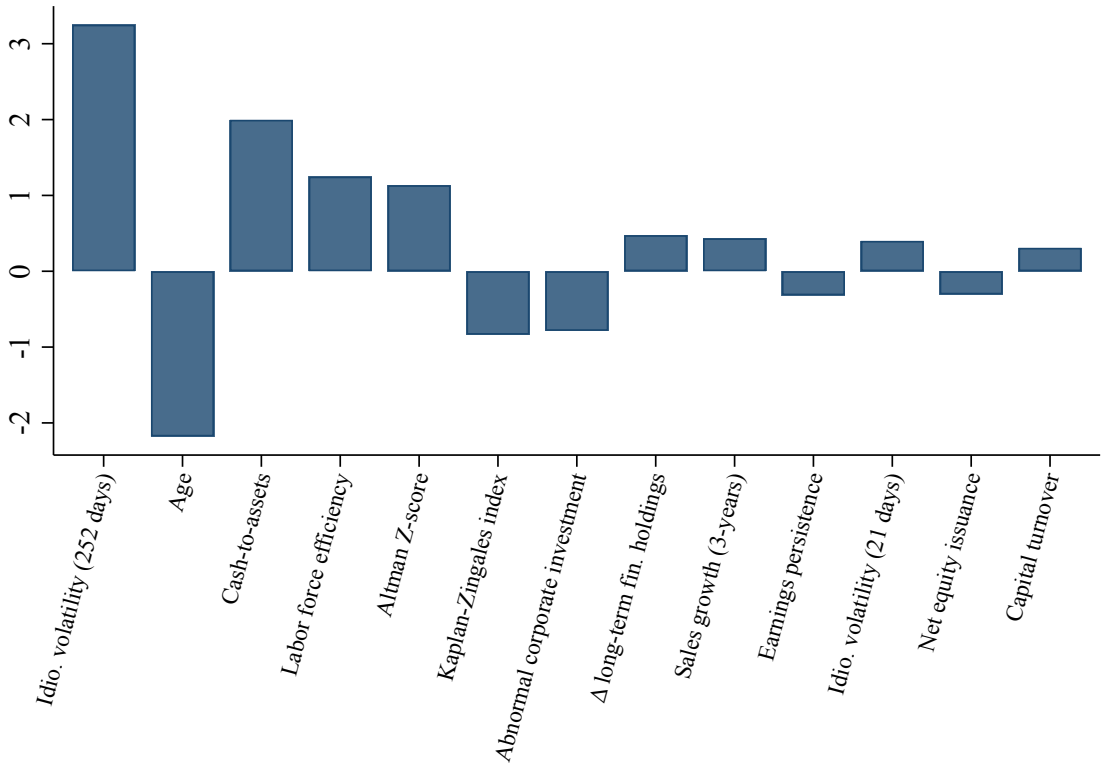


Table A1
Representativeness of the Conference Call Data

Panel A reports characteristics of firms for three samples: firms for which we observe at least one discount rate; at least one perceived cost of capital; and at least one perceived cost of equity or debt. Characteristics are measured in percentile ranks relative to the universe of firms in Compustat in the same year and same country of listing. A mean value close to 50 indicates that the average rank of firms in our dataset is close to the average rank of firms in the Compustat year-country population. Financial constraints are measured using the index by Hadlock and Pierce (2010). Panel B reports firm-level panel regressions using a dataset at the firm-quarter level. The outcome is 100 when we observe the firm's discount rate (columns 1 and 2), the perceived cost of capital (columns 3 and 4), or the perceived cost of debt or equity (columns 5 and 6) in the given quarter, and 0 otherwise. The samples in Panel B include the full panel of firm-quarter observations between 2002 and 2021 for all firms, for which we observe at least once a discount rate, perceived cost of capital, perceived cost of debt, or perceived cost of equity. The regressors are in percentile ranks relative to the universe of firms in Compustat in the same year and country of listing. Standard errors are clustered by firm. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

Panel A: Characteristics of included firms in cross-sectional percentiles

	Firms with observed discount rates			Firms withobserved perc. cost of capital			Firms with observed perc. cost of debt/equity		
	mean	min	max	mean	min	max	mean	min	max
Market value	79.02	8.54	100	82.74	3	100	83.98	7.60	100
Return on equity	58.44	0.64	100	59.87	0.81	100	58.45	0.15	100
Book-to-market	46.64	0.16	100	49.36	0.17	100	45.87	0.26	100
Investment rate	53.77	1.36	100	53.68	0.41	100	53.43	0.13	100
Physical capital to assets	60.58	2.36	100	59.62	2.16	100	65	2	100
Z-score (bankruptcy risk)	49.53	6.56	98.98	48.41	0.77	99.02	37.18	1.40	99.36
Financial constraints	23.28	0.05	90.67	20.17	0.05	100	24.64	0.05	91.52
Leverage	58.88	0.53	100	60.02	1.17	100	61.21	0.84	100

Panel B: Within-firm variation in characteristics and timing of inclusion

	(1)	(2)	(3)	(4)	(5)	(6)
	Discount rate observed in quarter		Perc. cost of capital observed in quarter		Perc. cost of equity or debt observed in quarter	
Z-score (bankruptcy risk)	0.0016		0.00073		-0.00030	
	(0.0022)		(0.0018)		(0.0023)	
Return on equity		0.0018		0.0012		0.0031*
		(0.0014)		(0.0012)		(0.0016)
Book-to-market		0.0015		0.0028		-0.0022
		(0.0017)		(0.0017)		(0.0028)
Investment rate		-0.00057		0.00081		0.00011
		(0.0013)		(0.0014)		(0.0018)
Financial constraints		0.0033		0.0031		0.0017
		(0.0032)		(0.0052)		(0.0047)
Leverage		-0.0028		-0.000033		0.0088***
		(0.0028)		(0.0022)		(0.0031)
Observations	208,596	208,596	208,596	208,596	208,596	208,596
FE	Firm/year	Firm/year	Firm/year	Firm/year	Firm/year	Firm/year
Within R^2	9.0e-06	0.000055	1.7e-06	0.000047	2.5e-07	0.00016

Table A2
The Perceived Cost of Capital and the Fama-French Model

This table reports regressions of the firm-level perceived cost of equity on measures of firm-level exposure to the Fama and French (1993) factors. Exposure to the factors is measured using the characteristic of the underlying factor, such as size and book-to-market. The perceived cost of capital is in percent and characteristics are in cross-sectional percentiles ranging from 0 to 1. The sample includes 2002 to 2022. Standard errors are clustered by firm. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)
		Perceived cost of capital$_t$	
Market Beta$_t$		2.91***	2.81***
		(0.29)	(0.27)
Market size$_t$			-1.49**
			(0.63)
Book-to-market$_t$			0.11
			(0.34)
Leverage ratio$_t$	-7.02***	-5.53***	-4.85***
	(1.85)	(1.57)	(1.54)
Leverage ratio$_t^{\text{squared}}$	4.26***	2.76**	2.10
	(1.59)	(1.37)	(1.37)
Observations	2,099	2,099	2,099
R-squared	0.231	0.335	0.343
FE	Ex/Year	Ex/Year	Ex/Year
Cluster	Firm/year	Firm/year	Firm/year
Within R^2	0.050	0.18	0.19

Table A3
Summary of Factor Regressions

This table reports average coefficients from factor regressions, separately for different groups of factors. For each factor in our sample, we project the firm-level perceived cost of capital on the firm-level market beta, leverage, leverage squared, and the characteristic associated with the factor. The characteristics are measured in cross-sectional percentiles ranging from 0 to 1 and the perceived cost of capital is measured in percent. The factors are signed such that higher exposure is associated with higher CAPM alpha in financial markets. The factors are grouped as in Jensen et al. (2023). For each group of factors, we report the average factor premium (λ^i), the number of factors in the group, the percent of factors for which λ^i has the same sign as that observed in financial markets, and the percent of factors that are significant against the one-sided alternative of having a different sign than the sign observed in financial markets. A factor is significant if it has a $p-$value above 5% after doing a Benjamini and Hochberg (1995) correction for number of factors tested in the group. The sample includes 2002 to 2021.

Factor category	Average λ^i	# of factors	% Correct sign	% Significant
Value	0.25	16	0.65	0.12
Trading frictions	0.22	24	0.66	0.16
Intangibles	0.15	29	0.53	0.20
Profitability	0.04	22	0.36	0.22
New	-0.09	14	0.33	0.00
Investment	-0.19	32	0.18	0.00
Momentum	-0.23	9	0.22	0.00
All	0.04	146	0.43	0.12

Table A4
The Cost of Capital Factor

This table reports time series regressions of the return to the cost of capital factor on the Fama and French (1993) factors. We construct the cost of capital factor as follows. Each month, we rank all firms based on their most recently reported perceived cost of capital (going at most ten years back). We then split firms based on the median market size in the sample. For each size group, we sort firms into three value-weighted portfolios based on the 30th and 70th percentile of the perceived cost of capital. Each month, the cost of capital factor goes long fifty cent in each of the two portfolios with high perceived cost of capital and short fifty cent in each of the two portfolios with low perceived cost of capital. Portfolios weights are refreshed and balanced every month. The sample starts in January 2005, to ensure at least three years of data on perceived cost of capital, and ends in December 2022. The first column shows the weighted-average perceived cost of capital for the factor (the perceived cost of capital of the firms in the long leg minus the firms in the short leg). The next three columns show the realized returns on the factor. All returns are in monthly percent. The sample includes only the US. Standard errors are double clustered at the firm and year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)
	Perceived. CoC_t	Realized $return_{t,t+1}$		
Constant	0.41***	0.0067	-0.17	-0.11
	(0.0026)	(0.18)	(0.17)	(0.15)
$MKT_{t,t+1}$			0.25***	0.16***
			(0.037)	(0.036)
$SMB_{t,t+1}$				0.27***
				(0.066)
$HML_{t,t+1}$				0.26***
				(0.049)
Observations	216	216	216	216
P(intercept = 0.41)		0.026		
R-squared	0.000	0.000	0.173	0.355

Table A5
Testing for Bias in Machine-Learning Estimates of Expected Returns

This table reports panel regressions of realized one-month stock returns on ex ante predicted values of returns from Kelly et al. (2023). The predicted values are constructed out of sample in the sense that they use only information available ex ante. We thank Dacheng Xiu for sharing data. The data cover US firms from 1987 to 2021. Standard errors are clustered at the date level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1) R_{t+1}	(2) R_{t+1}
$\widehat{E_t[R_{t+1}]}$ from Kelly and Xiu (2024)	0.71***	0.91***
	(0.21)	(0.13)
Constant	0.0029	0.0014
	(0.0035)	(0.0010)
FE	None	Date
Observations	1,870,957	1,870,957
R^2	0.0011	0.098

Table A6
Testing the Investment CAPM

This table reports panel regressions of firm-level expected return measures on firm-level characteristics that are used by the "Investment CAPM". In columns (1) to (3), we regress future 3-year realized stock returns on ex ante investment characteristic, along with controls. In columns (4) to (6), we run the same regression for subset of firm-quarter observations where we also observe the firm-level perceived cost of capital. In columns (7) to (9), we run the same regressions but instead using perceived cost of capital as the dependent variable. All regressions include country and quarter fixed effects. We control for three different ex ante firm-level characteristics, namely fixed effects for 10 bins of beta, size, and return on equity (profitability). The asset expansion (investment) characteristic is growth in total assets over the previous year, measured in cross-sectional percentiles ranging from 0 to 1. The sample includes 2002 to 2022. Standard errors are double clustered at the firm and year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	All firm/quarters			Firm/quarters with observed perceived cost of capital					
	Realized stock returns			Realized stock returns			Perceived cost of capital		
Asset expansion	-1.43**	-6.58***	-4.61***	-3.01	-4.60*	-4.40*	0.40	0.57**	
	(0.61)	(1.35)	(1.19)	(2.28)	(2.45)	(2.20)	(0.24)	(0.25)	
Controls:									
Profits bins		X	X		X	X		X	
Beta bins			X			X			
Size bins			X			X			
Observations	739,481	723,243	722,926	1,352	1,334	1,334	2,000	1,960	
R-squared	0.118	0.158	0.183	0.215	0.230	0.264	0.187	0.217	
Cluster	Country/Quarter	Country/Quarter	Country/Quarter	Country/Quarter	Country/Quarter	Country/Quarter	Firm/Quarter	Firm/Quarter	Firm

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A7
Testing the Investment CAPM Using Discount Rates

This table reports panel regressions of firm-level discount rates on firm-level characteristics that are used by the "Investment CAPM". All regressions include country and quarter fixed effects. We control for three different ex ante firm-level characteristics, namely fixed effects for 10 bins of beta, size, and return on equity (profitability). The asset expansion (investment) characteristic is growth in total assets over the previous year, measured in cross-sectional percentiles ranging from 0 to 1. The sample includes 2002 to 2022. Standard errors are double clustered at the firm and year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)
		Discount rates	
Asset expansion (investment)	0.012	0.029***	0.012
	(0.010)	(0.011)	(0.0089)
Controls:			
Profits bins		X	X
Beta bins			X
Size bins			X
Observations	1,896	1,816	1,816
R-squared	0.130	0.198	0.286
FE	Country/Quarter	Country/Quarter	Country/Quarter
Cluster	Firm/Quarter	Firm/Quarter	Firm/Quarter

Table A8
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 US firms. Standard errors are double clustered at the firm and year level. Statistical significance is denoted by *** p<0.01, ** p<0.05, * p<0.1.

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

Appendix B Maximizing Market Value Using the SDF

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

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

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

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

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

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

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

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

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

we can rewrite (A2) as,

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

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

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

[A1] See Cochrane (2001) for derivation.

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

Appendix C Details on Measurement

We follow the data collection procedure established by Gormsen and Huber (2025). We extend that dataset by adding conference calls for all years from FactSet and for the years 2021 and 2022 from FactSet and Refinitiv.

Appendix C.1 Extraction of Paragraphs from Conference Calls

We access all calls held in English during the period January 2002 to December 2022 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 110,000 paragraphs containing a keyword.

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

Appendix C.2 Guidelines for Manual Data Entry

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

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

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

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

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

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

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

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

Appendix C.3 Data Collection Team

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

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

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

Appendix D The Perceived Cost of Capital and Expected Returns: Extensions

This section contains additional analysis linking the perceived cost of capital to expected returns in financial markets. In Section Appendix D.1, we introduce a cost of capital factor and study its risk premia. In Section Appendix D.2, we study how the perceived cost of capital relates to a large set of risk factors.

Appendix D.1 The Cost of Capital Factor

We construct a cost of capital factor by sorting firms into different portfolios based on their perceived cost of capital. Each month, we assign each firm to portfolios based on the firm's market capitalization and its most recently observed perceived cost of capital. We assign firms to portfolios following the methodology of Fama and French (1993).

Table A4 reports the performance of this cost of capital factor. In column (1), we report the average spread in the perceived cost of capital between the long leg and the short leg of the factor. The average spread is a 0.4% monthly return, translating to an annualized spread of around 6%. This spread is stable over time, leading to tight standard errors.

In column (2), we report the average return to the cost of capital factor. The factor has earned 0.007% per month, which is statistically indistinguishable from zero and statistically different from the spread in the perceived cost of capital of 0.4% per month. The expected return on the factor is the spread in the perceived cost of equity, which need not be the spread in the perceived cost of debt. However, we find that the spread in the perceived cost of debt is smaller than the spread in the perceived cost of capital, which means the spread in the perceived cost of equity must be even larger than the spread in the perceived cost of capital. The test therefore implies that the spread in

the perceived cost of equity is not an unbiased predictor of future realized returns.

In columns (3) and (4), we control for the market, size, and value factors. These regressions represent an alternative approach to studying whether the factors are represented in the perceived cost of capital. These regressions reveal whether returns on firms with higher cost of capital behave more like, for instance, returns on small or large firms. The results generally confirm the findings from the characteristics-based analysis in Section 4. Namely, firms with higher cost of capital have higher market betas, smaller size, and higher valuation ratios. However, the evidence for the value effect is now substantially stronger than when looking at the characteristics. In fact, the loading on the value factor is higher than the loading on the market factor and as high as the loading on the size factor. The loading is also highly statistically significant. One potential interpretation of these findings is that there is an economically important difference between characteristics and factor loadings, as first pointed out by Daniel and Titman (1997).

Appendix D.2 Perceived Cost of Capital in the Factor Zoo

In addition to the Fama-French characteristics, the asset pricing literature has uncovered hundreds of other factors that could influence the cost of equity and thereby the cost of capital. In this section, we conduct an initial exploration of these other factors. The main takeaway is that most factors are not reflected in the perceived cost of capital and, to the extent that they are, often have the wrong sign.

We consider all factors identified by Jensen et al. (2023). For each factor k, we extract factor premia from slope coefficients in the regression

$$r_{i,t}^{\text{cost of capital}} = b^0 + b^1 X_{i,t}^{\text{beta}} + b^2 X_{i,t}^{\text{lev}} + b^3 X_{i,t}^{\text{lev squared}} + b^4 X_{i,t}^{k} + \varepsilon_{i,t}^{k}, \tag{A4}$$

where, as before, $r_{i,t}^{\text{cost of capital}}$ is the perceived cost of capital of firm i at time t, $X_{i,t}^{k}$ is the characteristic associated with the k$^{\text{th}}$ factor, and b^k is the parameter estimate for the k$^{\text{th}}$ characteristic. The specification thus studies each characteristic k separately, controlling for the CAPM beta, leverage, and leverage squared. We control for the CAPM beta because the equity factors we study are associated with positive CAPM alpha, not necessarily positive expected returns. We control for leverage to account for the mechanical effect of leverage on the cost of capital. We consider the factors in univariate specifications, only conditioning on the above controls, as these factors have typically been studied in univariate specifications.

To create an overview, we categorize the factors into the groups proposed by Jensen et al. (2023) and study average properties across groups. There are seven groups of factors based on well-known major drivers of stock returns: value, profitability, investment, trading frictions, intangibles, momentum, and a final group called "new", which captures a range of recent factors.

Table A3 reports results averaged across the different factor groups. We sign all factors such that a higher factor is associated with a higher monthly CAPM alpha in financial markets. The

first column reports the average factor premium in the group. For the group of value factors, the average premium is around 0.25 percentage points. While substantially smaller than the beta and size premia established in Table A2, it is larger than the average risk premium in any other factor group, most of which are either close to zero or negative.

The next column shows the percentage of factors in a given group that have the correct sign. We see that a reasonable fraction of the factors based on value and trading frictions have premia with the correct sign (66% and 67%). The other groups produce factors that consistently have the correct sign (intangibles is close to 50%).

The last column shows the percentage of the factors in a given group that have the correct sign and are statistically significant. That is, for each factor, we test whether the factor loading is equal to zero against the one-sided alternative that it has the same sign as observed in financial markets (i.e., whether the coefficient positive). To give the factor the best possible chance, we consider a factor to be statistically significant if it has a p-value below 5% in the one-sided test using conventional OLS errors. We correct for the number of factors tested within a group using the Benjamini and Hochberg (1995) method and setting a false discovery rate at 5% (this is lenient once again relative to, for instance, a Bonferroni adjustment).

Despite the arguably generous method for assessing significance, we find that most groups do not have many significant factors. Only a handful of factors are significant in the value, trading friction, intangible, and profitability groups. None of the factors in the investment, new, and momentum groups are significant with the correct sign.

The last row of Table A3 summarizes all factors. Overall, the average factor premium across the 146 factors tested is zero and less than 50% of the factors have the correct sign. Moreover, only 9% of the factors have premia with the correct sign that are statistically significant. Overall, these results leads us to conclude that the majority of factors studied in the asset pricing literature are not reflected in firms' perceived cost of capital. Complementary recent work also shows that most factors do not affect subjective return expectations of financial analysts (Engelberg et al. 2020, Jensen 2022).

Finally, many investment factors have the wrong sign. This finding seriously challenges the Investment CAPM and production-based asset pricing more generally, as discussed in Section Appendix F.

Appendix E Auxiliary Analyses on Misallocation

Appendix E.1 Estimating Long-Run Excess Dispersion

We estimate long-run excess dispersion based on expected values of the future perceived cost of capital. For firm i at time t, we can calculate the expected cost of capital nine years in the future as

$$E_t[r^{\text{perc.}}_{i,t+9}] = \varphi_{\text{constant}} + \varphi_9 \times r^{\text{perc.}}_{i,t}, \tag{A5}$$

where $\varphi_{\text{constant}}$ and φ_9 are the intercept and slope in regressions of the perceived cost of capital on lagged values of the perceived cost of capital (see regression specification (12) and estimation results in Figure 1). We then calculate the long-run variance as the variance of the expected value of the future perceived cost of capital:

$$\text{var}_{\text{long-run}}(r_{i,t}^{\text{perc.}}) = \text{var}_t\left(E_t[r_{i,t+9}^{\text{perc.}}]\right) \tag{A6}$$

$$= (\varphi_9)^2 \times \text{var}_t\left(r_{i,t}^{\text{perc.}}\right). \tag{A7}$$

We assume that the fraction of excess dispersion in the long- and short-run variance is equal, so we write long-run excess dispersion as

$$\text{var}_{\text{long-run}}(r_{i,t}^{\text{perc.}}) \times \gamma^{\text{excess}} = \text{var}_t\left(r_{i,t}^{\text{perc.}}\right) \times \tilde{\gamma}^{\text{excess}}, \tag{A8}$$

where $\tilde{\gamma}^{\text{excess}} = (\varphi_9)^2 \times \gamma^{\text{excess}}$.

Appendix E.2 Misallocation Based on Discount Rates

In this robustness exercise, we quantify the TFP loss due to excess dispersion that would occur in the model if firm discount rates shaped the long-run allocation of capital. We conduct this exercise to show that deviations between discount rates and the true cost of capital are, in fact, larger than deviations between the perceived and true cost of capital. We find that the TFP loss implied by the model increases to roughly 20% if discount rates determine capital allocation across firms.

Discount rates are higher than the perceived cost of capital for almost all firms (Graham 2022, Gormsen and Huber 2025). While this may, in principle, lead to additional misallocation of capital, it does not influence the estimates of misallocation in our model. We follow Hsieh and Klenow (2009) and assume a fixed capital supply, which means that level distortions do not influence estimates of misallocation (see equation 26).

Appendix F Production-Based Asset Pricing Meets the Perceived Cost of Capital

Our results challenge models in which rational expectations about the cost of capital are important. One example is production-based asset pricing. In this section, we argue that mistakes in firms' perceived cost of capital challenge this literature. We first discuss general challenges and we then reject the "Investment CAPM," a popular production-based asset pricing model.

Appendix F.1 Implications for Production-Based Asset Pricing

The starting point for most of production-based asset pricing is the idea that firms know the stochastic discount factor (SDF) and make decisions to maximize the value of the firm implied by

the SDF. Firms' investment decisions are therefore optimal given the prevailing SDF. From this starting point, production-based asset pricing attempts to learn the parameters of the SDF through firms' investment decisions and to explain cross-sectional variation in expected returns through the lens of optimal investment decisions by firms.

If firms know the SDF and use it to make investment decisions, then firms should set their perceived cost of capital in line with the SDF. Specifically, firms' perceived cost of capital should be the best available estimate of expected returns on firms' outstanding securities. The results presented so far show that this is not the case.

Despite the large mistakes in the perceived cost of capital, there are certain aspects of expected returns that are properly incorporated into the perceived cost of capital. The analysis in Section 4.2 suggests that time variation in expected returns and certain cross-sectional risk factors are properly incorporated. These findings raise the possibility that production-based asset pricing models revolving around these dimension may work well.

To explore the potential scope of production-based asset pricing, we analyze the range of common risk factors studied in asset pricing. We estimate risk premia implied by the perceived cost of capital—which we refer to as "perceived risk premia"—for each of the 153 risk factors in the dataset of Jensen et al. (2023). We use a multifactor model that controls for the market and leverage, as explained in Section Appendix D.2. We compare these risk premia to the "true" long-run risk premia associated with the different factors, as estimated by Cho and Polk (2024).

Figure A6 illustrates the relation the between the perceived and the true risk premia. Jensen et al. (2023) group the 153 factors into seven main groups. Within each group, we project the perceived factor premia on the true premia. The figure reports the associated slope coefficients along with R^2 values for all groups except momentum.[A2]

The figure reveals a strong relation between perceived and true factor premia for the category called "traditional risk factors and liquidity." This group includes risk factors based on volatility and skewness of stock returns as well as measures of liquidity. It also includes the size factor.[A3] The slope coefficient and R^2 are both close to 1, suggesting a strong relation between perceived and true factor premia within this category. In unreported results, we find that the intercept is close to zero for this group, which suggests that the perceived premia are correct on average (given the slope is almost 1). The strong relation between perceived and true factor premia within this category is consistent with the results on the stylized drivers in Section 4.2.

For most other categories, however, we observe a weak relation between true and perceived factor premia. The slopes coefficients are close to zero. This finding suggests a limited relation between true and perceived factor premia within a category, but it does not rule out that the risk premia on

[A2] We exclude the momentum factors as these are transient factors that should not explain the cost of capital under the standard view. We indeed find slope coefficients close to zero, although standard errors are very large.

[A3] Jensen et al. (2023) refers to the group as "trading frictions," but we refer to it as traditional risk given the inclusion of standard risk measures such as volatility, skewness, and size.

average are correct within a category. For the value factors, for instance, the average perceived factor premium is positive, as is the case for the true premia, but the slope is low because the ranking of the perceived value premia is largely orthogonal to the ranking of the true value premia. For investment factors, the average factor premium has the wrong sign, and for the remaining groups the average factor premium is close to zero (see Appendix D.2). Taken together, the findings suggest that production-based asset pricing models revolving around traditional risk factors may be consistent with firms' perceptions of their cost of capital, but models revolving around other factor groups are more difficult to reconcile with data on firm perceptions.

Appendix F.2 Testing the Investment CAPM

We illustrate the challenges for production-based asset pricing through a test of the Investment CAPM (Hou et al. 2015). This model is used to account for cross-sectional variation in expected stock returns through the lens of rational behavior of firms. It is sometimes branded a rational explanation of asset pricing anomalies because it is consistent with rational expectations of managers. The model relies on specific assumptions about how firms' perceived cost of capital varies with expected stock returns. We test and reject these assumptions.

In the model, firm investment depends on the cost of capital and thereby expected stock returns. The model argues that expected returns, profitability, and investment are all directly related. If a firm is highly profitable but invests sparingly, it must be because the firm has a high cost of capital (i.e., high expected stock return). Following this argument, Hou et al. (2015) construct investment and profit factors and estimate that firms with high investment indeed have low expected stock returns (keeping profitability fixed). The authors, through the lens of the model, argue that this empirical finding must be driven by the fact that firms with high investment rates perceive that they have a low cost of capital and adjust their investment accordingly.

We showed in Table 2 that firms with high perceived cost of capital indeed invested less. On the surface, the data on the perceived cost of capital may thus appear consistent with the Investment CAPM. We document, however, that the perceived cost of capital does not align with the formulation of the model by Hou et al. (2015) and that the variation in the perceived CAPM, in fact, runs counter to the predictions of the model.

The issue relates to how Hou et al. (2015) measure investment. Our regressions in Table 2 measure investment as future net capital expenditure relative to the current value of property, plant, and equipment, as is standard in the literature on corporate investment. Hou et al. (2015) instead use past asset expansion (i.e., $\text{AssetExpansion}_t = \text{Assets}_t/\text{Assets}_{t-1}$). Asset expansion is a highly transitory investment measure that is almost orthogonal to the traditional capital expenditure measure that we consider (the correlation between the characteristics, measured in cross-sectional percent, is around 0.1). The Investment CAPM hinges on this choice of investment measure, as the model does not work if one uses traditional measures of investment (Cooper et al. 2024). For the Investment CAPM by Hou et al. (2015) to hold, it is thus crucial that the predictions work for the

asset expansion measure.

Contrary to the prediction of the model, we find that firms with high past asset expansion do not have lower perceived cost of capital. If anything, the relation points toward a positive cross-sectional relation between past asset expansion and the perceived cost of capital. This finding suggest that firms with high asset expansion do not have high asset expansion because they perceive a low cost of capital, challenging the basic idea behind the Investment CAPM's interpretation of the data.

Our tests of the Investment CAPM are reported in Table A6. In the first three columns, we replicate the empirical finding of the Investment CAPM literature by regressing future realized stock returns on past asset expansion. We measure asset expansion in cross-sectional percentiles of the population of firms in the country in a given quarter (ranging from 0 to 1). In the first three columns, we consider all firms in the CRSP/Compustat sample and all quarters between January 2002 and December 2022. We find similar results to Hou et al. (2015). The relation between future stock returns and past asset expansion is strong, negative, and significant in column (1). It becomes even stronger when we condition on bins for deciles of firm profitability in column (2). Further controlling for market beta and size does not change the coefficient much in column (3).

In columns (4) to (6), we confirm that the same results also hold in the subsample of firm-quarter observations where we observe the perceived cost of capital. The slope coefficients are similar to the full sample, suggesting that our sample of firms is similar to the population along this dimension (see also Section 3.2).

In columns (7) to (9), we use the perceived cost of capital on the left-hand side instead of realized future stock returns. The slope coefficients are now of the opposite, positive sign: the greater asset expansion, the greater the perceived cost of capital. The effect is significant once we condition on profitability, as prescribed by the Investment CAPM. These results reject the fundamental idea behind the Investment CAPM. Firms with asset expansion (for a given level of profitability) do not have a low perceived cost of capital. The low future realized returns on high investment firms therefore cannot be interpreted as the outcome of an optimal capital budgeting decision where firms with low expected returns use a low cost of capital. We find similar results using discount rates (required returns to investment) on the left-hand side in Appendix F.3, suggesting that "as if" behavior cannot save the Investment CAPM.

We visualize the rejection of the Investment CAPM in Figure A7 using two binscatters. The left-hand panel shows a negative relation between future realized stock returns and past asset expansion (controlling for country, quarter, and profitability). The right-hand panel shows a positive relation between the ex ante perceived cost of capital and past asset expansion (using the same controls). The opposite slopes are inconsistent with the Investment CAPM. The analysis of the Investment CAPM thus shows how our new data on the predicted cost of capital can be used to test production-based asset pricing models.

Appendix F.3 Can "As if" Behavior Save the Investment CAPM?

One may be tempted to rationalize the results on the Investment CAPM without rejecting the model by invoking an "as if" argument. The argument could be that low-investment firms do not explicitly articulate that they have a high cost of capital, but instead they implicitly know that they should require a high return on their investments. For instance, these firms may perceive that they face substantial risks, which then causes managers to require a higher return on new investments. Under this argument, firms behave "as if" they had a high perceived cost of capital. The argument could in principle be correct because many firms indeed maintain discount rates (i.e., required returns on new investment) that differ from their perceived cost of capital (Graham and Harvey 2001, Gormsen and Huber 2025).

We can test this hypothesis because the conference call data also contain firms' discount rates. In Table A7, we reproduce the regressions of Table A6, except we now use the firm-level discount rate on the left-hand side. The cross-sectional relation between the investment rate and discount rates is positive. The coefficient is significant when we condition on profitability, as the Investment CAPM does (in column 2). These results suggest that high-investment firms do not behave "as if" they have low discount rates.

It is important to emphasize that a firm's discount rates is negatively related to investment, once one uses a traditional investment measure and conditions on the investment opportunities available to firms. Indeed, Gormsen and Huber (2025) show that, conditional on firm fixed effects, discount rates negatively predict future capital expenditure in a manner that is quantitatively consistent with a simple Q-model. More generally, the results are not a rejection of the idea that the cost of capital raises discount rates and, ultimately, lowers investment. However, the results reject the specific Investment CAPM formulated by Hou et al. (2015), which uses asset expansion to measure investment.

Appendix G 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 G.1 A Multivariate Model of Discount Rates

We follow the procedure in Section 4.2 to estimate a similar model for firms' discount rates.

The Lasso procedure selects 13 variables that predict discount rates. The in-sample R^2 of the selected model is 16%. Figure A8 shows the slope coefficients for each of the 13 selected variables.

These slope coefficients directly tell us how much the predicted value of the discount rate increases if we go from the bottom to the top of the cross section of a characteristic (keeping the other 12 characteristics constant). We control for the fact that some firms do not account for overhead in the discount rate reported on conference calls (see Gormsen and Huber 2025 for details). The predicted values refer to discount rates that fully account for overhead.

The most important characteristic is idiosyncratic volatility, which is measured over 252 days relative to the CAPM (see Jensen et al. 2023 for formal definitions). The coefficient is 3.2, which means that the perceived cost of capital is predicted to be 3.2 percentage points higher for firms with the highest volatility, relative to those with the lowest volatility. The second most important characteristic is age. The coefficient shows that the oldest firms in the economy have roughly 2 percentage points lower hurdle rates than the youngest firms. The next variable is cash-to-assets. Firms with more cash have higher hurdle rates. Firms with higher labor force efficiency and lower risk of default (higher Z-score) also have higher hurdle rates. Discount rates are lower for firms with abnormally high investment. This last finding is consistent with the idea that lower hurdle rates leads to higher investment.

Appendix G.2 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 and Appendix G.1. 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 US and Europe. The European countries consists 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 G.3 Validation

We validate the predictive power of our data in an out-of-sample test. We use the predicted values to predict the perceived cost of capital and discount rates observed in the seminal Duke CFO survey, a quarterly survey of corporate managers (Graham and Harvey 2001). In some of the surveys,

managers are asked about their cost of capital and their discount rates (referred to as hurdle rates in the survey). We use these data to test how well our predictive value work out of sample.[A4]

The results are in Table A8. The first two columns shows 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 three 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.