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We investigate whether the quality of investors' information across horizons influences corporate investment. In our theory, managers under-invest because their stock price imperfectly reflects the value created by their projects. This effect is stronger when there is a mismatch between the horizon of the projects' cash flows and the horizon at which investors obtain information. Using a new hand-collected measure of projects' horizon, we find that improvements in the quality of investors' long-term (short-term) information induce firms with long-term (short-term) projects to invest more, particularly when managers prioritize current stock prices. Hence, the quality of investors' information across horizons matters.

Keywords: Project Horizon; Short-termism; Information Quality; Forecasting Horizon; Forecasts' Informativeness; Managerial Incentives.
JEL Classification: D84 ; G14 ; G17 ; M41

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I Introduction

Asset valuation relies on investors' ability to forecast cash flows over various horizons. Naturally, short-term forecasts tend to be of higher quality than long-term forecasts (e.g., Patton and Timmermann (2010) and Dessaint, Foucault, and Fresard (2022)). Recent evidence suggests that this quality gap between short-term and long-term forecasts has widened over time.[1] This trend could have implications for the allocation of capital between short and long-term projects in the economy if the quality of investors' information about cash-flows at different horizons matters for corporate investment. Is this the case? Answering this question has important ramifications, for instance, for understanding the real effects of information production in financial markets or firms' ability to respond to challenges and opportunities whose effects will materialize in the long run (e.g., climate or technological change).[2] To our knowledge, it has not yet been studied.

To make progress on this question, we analyze whether the informativeness of investors' signals about cash flows at various horizons affects firms' investment through the so called "improved incentives channel" (e.g., Bond, Edmans, and Goldstein (2012)). According to this channel, an improvement in the informativeness of investors' signals incentivizes managers to invest more because the value created by any new investment is then better reflected in stock prices. One important, yet previously overlooked, implication of this mechanism is that if this improvement is about the informativeness of investors' short-term signals, it should have a stronger positive effect on the investment of firms with short-term projects than firms with long-term projects, leading to a decrease in the share of the latter in aggregate investment. Our main contribution is to test this implication.

To guide our empirical analysis, we consider a model in which a manager decides the investment amount in a project that generates cash flow either quickly (short-term) or slowly (long-term). The horizon of the project is longer if its cash flow takes more time to mate-

[1] Dessaint, Foucault, and Fresard (2022) find that equity analysts' long-term forecasts have become less informative over time while analysts' short-term forecasts have become more informative. Based on survey evidence, Graham (2022) reports that managers' ability to make long-term forecasts has declined.

[2] Addressing climate change requires firms to invest in projects whose cash flows will likely materialize in the distant future. If a drop in the quality of investors' long-term forecasts reduces firms' incentives to make such investments then they might be less prepared to cope with the associated risks.

rialize. In the baseline version, the project's horizon is fixed and the manager chooses the investment amount that maximizes a weighted average of the firm's current stock price (e.g., due to price-based compensation or the short horizon of incumbent shareholders) and its long-term fundamental value. After the investment is made, investors receive two imperfect signals: (i) a *short-term signal* about the project's cash flow if it materializes quickly, and (ii) a *long-term signal* about the project cash flow if it materializes slowly. As investors trade on these signals, the firm's stock price reflects their information about the project's future cash flow, albeit imperfectly.

In equilibrium, the manager under-invests relative to the efficient level. Indeed, a cut in investment saves on costs and the corresponding loss in the firm's long run value is not immediately factored in the firm's stock price because (i) the manager's investment decision is not immediately observed (e.g., as in Stein (1989)) and (ii) investors' signals on future cash-flows are imperfect. Consistent with the improved incentives channel, the resulting investment distortion is less pronounced when investors' signals are more informative. However, this effect is weaker when there is a mismatch between the horizon at which the project pays off and the horizon at which investors' signals become more informative. That is, if the project has a long horizon, an improvement in the quality of investors' long-term signal has a stronger effect on investment than an identical improvement in the quality of their short-term signal. Conversely, when the project has a short horizon, an improvement in the quality of investors' short-term signal matters more for investment than an improvement in the quality of their long-term signal. Thus, the horizon of investors' signal matters for investment.

Our main goal is to test this prediction. In addition, the model generates four ancillary implications that we also test. Firstly, the mismatch effect should be stronger for (a) firms whose managers are more likely to care about the impact of their decision on their current stock price and (b) firms whose investment is not easily observable. Moreover, it should be weaker when the cost of capital is higher because efficient investment is smaller in this case (due to discounting). Lastly, when the manager can control the average project's horizon of the firm by allocating capital between a short-term and a long-term project, the model predicts that he allocates more capital to the long-term project when the quality of investors' long-term signal improves, or the quality of their short-term signal deteriorates.

Testing these predictions is challenging because we cannot directly observe the horizon of firms' projects or the quality of investors' information about cash flows at specific horizons. We address the first challenge by leveraging the fact that the horizon of projects varies across economic activities due to differences in firms' production and operation cycles, and the useful life of their capital. For example, shipbuilding projects generally have longer horizons than apparel retail projects. Based on this heterogeneity, we predict that shipbuilders' investment should be more (less) sensitive to the quality of investors' long-term (short-term) signals compared to retailers. We measure projects' horizon based on the horizon of the *business plans* disclosed by managers in the text of regulatory filings, who routinely refer to their "3-year business plan" or "5-year strategic plan". We search for expressions such as "-year business plan" or "-year strategic plan" through all filings and manually retrieve information about the exact horizon of firms' business plans. We obtain these horizons for 3,925 firms and calculate the average horizon by industry, which provides a time-invariant measure of project horizons for each industry. The average horizon is 4.45 years across all industries and ranges between 1 and 8 years.

To measure the quality of investors' signals for a given horizon, we assume (e.g., as in Bouchaud, Landier, and Thesmar (2019)) that analysts' information is representative of investors' information and we use the measure of sell-side equity analysts' forecasts informativeness (denoted R^2) developed by Dessaint, Foucault, and Fresard (2022) (hereafter DFF2022). The R^2 for a given analyst-date-horizon is calculated by regressing realized earnings at that horizon on the analyst's earnings forecasts. A higher R^2 indicates that an analyst's forecasts have higher predictive power for the earnings of the firms she covers (e.g., $R^2 = 1$ if the analyst has perfect foresight). We compute the average R^2 across all analysts by year and horizon to obtain two aggregate proxies for the quality of investors' signals: one for short-term horizons (between 1 and 2 years) and another for long-term horizons (beyond 2 years). We argue that variations in aggregate short-term and long-term R^2 likely reflect aggregate economic factors that are plausibly exogenous to firm-specific determinants of investment.

To test our main prediction, we estimate a standard investment equation and add interaction terms between firms' project horizon and the informativeness of investors' signals at short and long horizons (as suggested by the model). This approach allows us to measure separately the sensitivity of firms' investment to the informativeness of investors' long and short-term signals, and to examine how it varies across firms with short and long project horizons. Consistent with our theory, we find that the investment of firms with longer project horizons respond more strongly to an increase in the informativeness of investors' long-term signals than the investment of firms with shorter horizons. Symmetrically, the investment of firms with shorter project horizons increases more than the investment of firms with long-term horizons when the informativeness of investors' short-term signals increases. These results indicate that the quality of investors' information across horizons is important and hold when we control for other well-known factors affecting investment, especially the value of new investment opportunities (measured using Tobin's Q, corrected for measurement errors following Erickson, Jiang, and Whited (2014)).

We also find empirical support for our ancillary predictions. First, the above results are amplified for firms in which managers are more likely to prioritize their firm's current stock price. The literature suggests that this is the case when: (i) managers' compensation and wealth are tied to their stock price; (ii) shareholders' horizon is short; (iii) firms need to raise external funds; and (iv) takeover threat is high. We find stronger effects in all four situations. Second, we confirm that the effects of projects' horizon on the sensitivity of firms' investment to the informativeness of investors' signals are weaker when investment is easier to observe, measured by the extent to which firms issue guidance on capital expenditures, disclose information about investment plans, or the speed with which they report financial statements. Third, as predicted, we find weaker effects for firms facing a higher cost of capital. Last, multi-division firms allocate relatively more capital to divisions operating in industries with long-horizon projects when the informativeness of investors' long-term signals is higher or when that of short-term signals is lower. This test allows us to include firm-year fixed effects absorbing any confounding firm-specific and time-*varying* determinants of investment.

Overall, our findings indicate that the quality of investors' information across horizons matters for corporate investment, consistent with the "improved incentives channel." Of course, our findings could have alternative explanations (discussed in Section VI). However, to challenge our interpretation, alternative channels must explain (a) the different effects (and opposite signs) of project horizon on the sensitivity of firms' investment to the informativeness of investors' short-term and long-term signals, and (b) all observed cross-sectional patterns implied by our ancillary predictions. We are not aware of an alternative theory that can explain all our results. Nevertheless, we show that our results cannot be explained by potential variation in the term-structure of discount rates that could correlate with our measures of investors' forecast informativeness, nor by the possibility that managers learn information about investment opportunities from stock prices.

Our analysis suggests that the widening of the quality gap between short-term and long-term forecasts (documented in recent research) could discourage investments in long-term projects. Preliminary analyses confirm this prediction. In particular, we report that between 1994 and 2015 investment has been lower in industries with long-horizon projects. Over the same period, the horizon at which corporate acquirers expect synergies to materialize has decreased, implying that firms are increasingly engaging in acquisition projects paying off more quickly.

The rest of the paper is organized as follows. In the next section, we position the contribution of our paper in the literature. In Section III, we present the theory that guides our empirical analysis. Section IV presents the data and our new measure of project horizon. In Section V, we report our findings. Section VI discusses alternative explanations and the implications of our findings. Section VII concludes. All definitions for the variables used in our tests and the proofs of the theoretical claims are reported in the Appendix.

II Contribution to the Literature

Our paper is related to two strands of literature. First, it contributes to the literature on the real effects of trading in secondary markets (see Bond, Edmans, and Goldstein (2012) and Goldstein (2023) for surveys). This literature largely focuses on the "learning channel", whereby the information produced by stock markets affects real decisions because managers learn information from stock prices. Our paper focuses on another channel, "the improved incentives channel" (see Bond, Edmans, and Goldstein (2012), Section 3) that has received much less attention.

Fishman and Hagerty (1989) develop a theory of corporate disclosure based on this channel. Our theory builds on their model but accounts for the fact that firms differ in the horizon of their projects.[3] It highlights one novel implication of the improved incentives channel, namely that investment inefficiencies (under-investment in our model) should be smaller when investors possess information about future cash flows at the horizon that matches that of firms' projects, and our tests provide support for this implication.[4] We are not aware of other studies relating the informativeness of investors' signals for various horizons to investments in projects generating cash flows at different horizons. In addition, we propose a novel text-based approach to measure the horizon of firms' projects based on that of their business plans.[5]

The improved incentives channel assumes that managers care about the effect of their decisions on their firms' current stock prices. For this reason, our paper is also related to the literature on the real effects of managerial myopia (or "short-termism"). Previous research contends that one source of managerial myopia comes from contractual arrangements linking managers' compensation to their current stock prices. Several theories (e.g., Stein (1988), Stein (1989), Bebchuk and Stole (1993), Bizjak, Brickley, and Coles (1993), Goldman and Slezak (2006), Benmelech, Kandel, and Veronesi (2010), or Edmans et al. (2012)) predict

[3]Dow, Han, and Sangiorgi (2021) consider a model in which firms choose the maturity of their investment. In their model, firms with projects that mature faster attract more informed traders because their future stock price reflects fundamentals more quickly, enabling informed investors to cash in and exit their positions (to recycle their capital) more quickly. In turn, firms with more informed traders can better incentivize managers using compensation schemes based on the current stock price. This leads firms to excessively reduce the maturity of their investment projects (relative to the social optimum). Our analysis focuses on the level of investment in a project, holding its maturity fixed.

[4]In Edmans (2009), the presence of a large blockholder mitigates under-investment in long-term projects because a blockholder has incentives to produce information about these projects and is, therefore, less likely to sell her stake (and depress the stock price) following bad news when long-term projects are sound. To the extent that the informativeness of investors' signals about firms' long-term cash flows is higher in firms with large blockholders, our model would also imply a positive effect of block ownership on long-term investment.

[5]In contrast, the existing literature relies on the type of investment (R&D and patent applications are assumed to correspond to long-term investment) or the nature of firms' assets (e.g., Hubert de Fraisse (2022)). Instead, we measure the horizon of projects directly from textual mentions in firms' disclosures.

that this type of contractual arrangements can induce managers to take actions (e.g., reduce investment) that boost their firm's stock price in the short run at the expense of its long-run value.[6] Recent studies (e.g., Asker, Farre-Mensa, and Ljungqvist (2016), Edmans, Fang, and Lewellen (2017), Ladika and Zautner (2020), Edmans, Fang, and Huang (2022)) provide empirical support for this possibility. By contrast, we focus on a different implication of managerial myopia, arguing that the allocation of resources across projects with different horizons depends on the quality of investors' information about cash flows at different horizons. In this way, we contribute to the scarce literature studying the share of long-term investments in the economy and its determinants (e.g., Aghion, Angeletos, Banerjee, and Manova (2010)).

III Theory

A Baseline model with fixed project's horizon

Figure I shows the timeline of the model. At date 0, the manager of an all-equity firm must choose the scale I_m of investment in a project. The cost of the investment is $C(I_m) = \frac{I_m^2}{2}$. The investment is funded by the firm's cash holdings, M. The residual $(M - C(I_m))$ is distributed to incumbent shareholders as a dividend at date 0. The manager's investment decision, I_m (and the firm's cash holdings) is not directly observed when the stock price of the firm is determined at date 1.[7]

[Insert Figure I about here]

With probability $(1-h)$ the project generates a (per share) cash flow $\theta_{st}(I_m) = \kappa I_m + \eta_{st}$ at date 2 and zero at date 3. With probability h, it generates a cash flow of zero at

[6] A related literature explains why, despite this possibility, shareholders can find optimal to tie managers' compensation to stock prices, in the presence of agency issues (e.g., Bolton, Scheinkman, and Xiong (2006)). More broadly, various papers analyze how performance-based compensation (e.g., based on earnings) affect managers' choices between long-term and short-term projects (e.g., Narayanan (1985), Von Thadden (1995) or Thakor (2020)).

[7] One reason could be that there is a delay between the moment investment decisions are made in a year and when these decisions are reported to investors. Another possible reason is that investment plans take time to be implemented (see Lamont (2000) and Christano and Todd (1996)) and thus that investments are realized (and expensed) over multiple periods (see Luo (2022)).

date 2 and a cash flow of $\theta_{lt}(I_m) = I_m + \eta_{lt}$ at date 3, where $\eta_j \sim N(0, \sigma^2_{\eta_j})$ for $j \in \{st, lt\}$ and $Cov(\eta_{st}, \eta_{lt}) = 0$.[8] Thus, parameter $h \in [0, 1]$ controls the horizon of the project.[9] The higher is h, the longer is the horizon. We assume that h is a fixed firm characteristic, known to the manager and investors. In contrast, the cash flows are uncertain because the $\eta_j s'$ are unknown. Henceforth, we refer to $\theta_{st}(I_m)$ as the short-term cash flow and to $\theta_{lt}(I_m)$ as the long-term cash flow.

Given these assumptions, at date 0, the manager expects the firm's cash flows (per share) at dates 2 and 3 to be respectively $(1-h)\kappa I_m$ and hI_m. Parameter κ allows to control the relative profitability of short-term vs. long-term projects. For instance, when κ decreases, short-term projects (those with low h) become relatively less attractive since their expected payoff decreases.

At date 1, as in Kyle (1985), one risk-neutral informed investor and noise traders can trade shares of the firm stock with a risk-neutral competitive market maker. The informed investor has two signals s_{st} (the "short-term signal") and s_{lt} (the "long-term signal") such that:

$$s_j = \theta_j(I_m) + (\tau_j)^{-1/2}\varepsilon_j, \text{ for } j \in \{st, lt\}. \tag{1}$$

where $\varepsilon_j \sim N(0, \sigma^2_{\eta_j})$. When τ_j increases, the precision of the signal of type j increases. Let $R^2_j \equiv \frac{\tau_j}{1+\tau_j}$. It is easily checked that R^2_j is the R-squared of a regression of the cash flow $\theta_j(I_m)$ on the signal s_j. Thus, the higher R^2_j, the higher the predictive power of the signal at horizon j for the cash flow at this horizon. For this reason, we refer to R^2_{st} (R^2_{lt}) as the informativeness of the informed investor's signal (or forecasts) about the short-term (long-term) cash flow. We assume that the noise terms in the informed investor's signal are independent ($Cov(\epsilon_{st}, \epsilon_{lt}) = 0$).

We denote by $x(s_{st}, s_{lt})$ the market order submitted by the informed investor and by z the noise traders' aggregate demand. As in Kyle (1985), z is normally distributed with mean zero and variance σ^2_z. The risk-neutral dealer observes the aggregate order flow $O = z + x(s_{lt}, s_{st})$

[8]The assumption that the cash flow of the project is proportional to the investment is as in Fishman and Hagerty (1989) or Edmans (2009).

[9]When $h = 0$ or $h = 1$, the model is identical to Fishman and Hagerty (1989). The fact that the horizon is uncertain is not important. The results are identical if the project pays a cash-flow $h\theta_{st}(I_m)$ at date 2 and $(1-h)\theta_{st}(I_m)$ at date 3. In this case, h controls the "duration" of the project.

and sets the stock price so that she breaks even:

$$p_1(O; I_b, h) = \mathrm{E}(V(I_b, h)\,|O = z + x(s_{lt}, s_{st}))\,, \tag{2}$$

where

$$V(I_b, h) = \begin{cases} \dfrac{\theta_{st}(I_b)}{1+r} \text{ with prob. } (1-h), \\ \dfrac{\theta_{lt}(I_b)}{(1+r)^2} \text{ with prob. } h, \end{cases} \tag{3}$$

and r is the firm's cost of capital. That is, $V(I_b, h)$ is the discounted value of the firm's future cash flow (its fundamental value) given that the market maker and the informed investor expect the manager to invest I_b. At date 1, the firm's fundamental value is unknown because (i) the date at which the project generates its cash flow is uncertain, and (ii) this cash flow is uncertain because the $\eta_j s'$ are unknown.

At date 0, the manager chooses the investment that maximizes a weighted average of the expected stock price at date 1 (the firm's short-term stock price) and the expected long-run value of the firm plus the firm's cash holdings (M) net of the cost of investment. Specifically, the manager solves the following problem[10]:

$$I_m^* \in \mathrm{Argmax}_{I_m} \quad \omega \mathrm{E}(p_1^*(O; I_b, h)) + (1-\omega)\mathrm{E}(V(I_m, h)) + M - C(I_m), \tag{4}$$

where $\omega \in [0, 1]$ (the weight given to the short-term stock price in the manager's objective function) is a measure of managerial myopia (short-termism). There could be several reasons why the manager cares about the impact of her investment decision on the firm's stock price in the short-run (see Stein (1989)). One possibility is that the manager's compensation is tied to the stock price. For instance, Edmans, Fang, and Lewellen (2017) shows that the amount of vesting equity in a given quarter has a negative effect on the growth of investments in research and capital expenditures (see also Ladika and Zautner (2020)). In this case, $\omega \times \mathrm{E}(p_1^*(O; I_b, h))$ can be interpreted as the amount of vesting equity in the next period for the manager.

In equilibrium, the informed investor and the market-maker (the "market") correctly

[10]To simplify notations, we assume that the time elapsed between date 0 and 1 is short so that we can ignore discounting between dates 0 and 1 in specifying the manager's objective function.

anticipate the manager's investment decision, that is, $I_b^* = I_m^*$. However, in solving for the equilibrium, one must entertain the possibility that $I_m \neq I_b$ because a manager's deviation from the equilibrium investment strategy is not observed at date 1 (and the manager cannot credibly commit to an investment strategy).

As shown below (see eq.(11)), the stock price at date 1, $p_1(O; I_b, h)$, depends on the market belief (I_b) about the manager's investment decision *and* the manager's actual investment decision (I_m) even though the market does not observe this decision. The reason is that the informed investor's signals about the firms' cash-flows reflect the actual investment decision since the cash-flows are proportional to the actual investment. Thus, the informed investor is more likely to receive lower signals than expected (and sells the stock) if the manager cuts investment relative to what the market expects ($I_m < I_b$) and vice versa if the manager invests more than expected. In the former case, the stock price is more likely to fall as the informed investor sells the asset (so that the order flow, O, is more likely to be negative) and in the latter case, it is more likely to increase. This is the process by which the project's true fundamental value ($V(I_m, h)$) gets reflected by the stock price at date 1. Importantly, $\mathrm{E}(p_1^*(O; I_b, h)) = \mathrm{E}(V(I_b, h)) = \mathrm{E}(V(I_m, h))$ if and only if $I_b = I_m$. Thus, for $I_m \neq I_b$, the expected stock price at date 1 differs from the manager's expectation about the long-run value of the firm. For this reason, maximizing the firm's short run value ($\mathrm{E}(p_1^*(O; I_b, h))$) is not the same thing as maximizing its long-run value ($\mathrm{E}(V(I_m, h))$) in the model.

Equilibrium definition. An equilibrium of the model is a vector $(I_m^*, I_b^*, x^*(s_{st}, s_{lt}), p_1^*)$ such that:

1. The firm's stock price at date 1 is such that the risk-neutral dealer breaks even:

$$p_1^*(O; I_b^*, h) = \mathrm{E}(V(I_b^*, h) \,|O = z + x^*(s_{st}, s_{lt}))\,. \tag{5}$$

2. The informed investor's market order, $x^*(s_{lt}, s_{st})$, maximizes her expected profit:

$$x^*(s_{st}, s_{lt}) \in \mathrm{Argmax}_x \ \mathrm{E}((V(I_b^*, h) - p_1^*)x \,|s_{st}, s_{lt})\,. \tag{6}$$

3. The investment at date 0, I_m*, maximizes:

$$I_m^* \in Argmax_{I_m} \quad \omega \mathrm{E}(p_1^*(O; I_b^*, h)) + (1-\omega)\mathrm{E}(V(I_m, h)) + M - C(I_m). \tag{7}$$

4. Market participants (the dealer and the informed investor) have rational expectations about the manager's investment decision: $I_b^* = I_m^*$.

To solve for the equilibrium, we first derive the equilibrium of the stock market at date 1, for arbitrary values of I_b and I_m (Lemma 1). Then in a second step, we derive the optimal investment decision of the manager at date 0 (Proposition 1). Let $\Delta(h, r, \kappa) = (\frac{\kappa(1-h)}{1+r} + \frac{h}{(1+r)^2})$ be the ex-ante (date 0) expected marginal present value of one dollar invested in the firm's project.

Lemma 1 ***Equilibrium of the stock market.*** *For given values of* (I_b, I_m)*, the equilibrium of the stock market at date 1 is such that:*

$$x^*(s_{st}, s_{lt}) = \beta_{st}(s_{st} - \kappa I_b) + \beta_{lt}(s_{lt} - I_b) \tag{8}$$

$$p_1^*(O; I_b, I_m, h) = \Delta(h, r, \kappa) I_b + \lambda O, \tag{9}$$

where $\lambda = \left(\frac{(\frac{(1-h)}{1+r})^2 R_{st}^2 \sigma_{\eta_{st}}^2 + (\frac{h}{(1+r)^2})^2 R_{lt}^2 \sigma_{\eta_{lt}}^2}{4\sigma_z^2}\right)^{\frac{1}{2}}$, $\beta_{st} = \frac{(1-h)}{(1+r)} \frac{R_{st}^2}{2\lambda}$, $\beta_{lt} = \frac{h}{(1+r)^2} \frac{R_{lt}^2}{2\lambda}$ *and* $O = x^*(s) + z$.

The equilibrium of the stock market is similar to that in Kyle (1985). The main difference is that the informed investor has two signals: (i) one useful to forecast the long-term cash flow (θ_{lt}), and (ii) one useful to forecast the short-term cash flow (θ_{st}). The investor trades less aggressively on both signals when her trade has a stronger impact on the equilibrium price (β_j is inversely related to λ). Moreover, the investor trades more aggressively on a given signal if the informativeness of this signal increases (β_j increases with R_j^2). Last, the investor trades relatively more on the short-term signal and less on the long-term signal when h is lower. Thus, the order flow is more informative about the short-term (long-term) cash flow when the horizon of the project is shorter (longer).

The order flow at date 1 is:

$$O = x^*(s_{st}, s_{lt}) + z = \beta_{st}\kappa(I_m - I_b + \eta_{st} + (\tau_{st})^{-1}\varepsilon_{st}) + \beta_{lt}(I_m - I_b + \eta_{lt} + (\tau_{lt})^{-1}\varepsilon_{lt}) + z, \tag{10}$$

and therefore the average stock price at date 1 is:

$$\begin{aligned}\mathrm{E}(p_1^*(O;I_b,h)) &= \Delta(h,r,\kappa)I_b + \lambda E(O) \\ &= \Delta(h,r,\kappa)I_b + \gamma(R_{st}^2, R_{lt}^2, h)(I_m - I_b).\end{aligned} \tag{11}$$

where

$$\gamma(R_{st}^2, R_{lt}^2, h) = \frac{1}{2}\left(\frac{(1-h)\kappa}{(1+r)}R_{st}^2 + \frac{h}{(1+r)^2}R_{lt}^2\right). \tag{12}$$

As explained previously, the stock price at date 1 (and therefore its value averaged across all realizations of the informed investors' signals and the demand from noise traders) depends on both the market expectation about the manager's investment decision (I_b) and the actual investment decision (I_m). If this actual decision is smaller (larger) than expected, i.e., $(I_m - I_b) < 0$, the stock price at date 1 is on average smaller (larger) than the expected present value of the project by the market ($\Delta(h,r,\kappa)I_b$). However, this adjustment depends on the extent to which the informed investors' signals are informative. Indeed, the sensitivity, $\gamma(R_{st}^2, R_{lt}^2, h)$, of the stock price to $(I_m - I_b)$ increases with the informativeness of the informed investor's signals, R_{st}^2 and R_{lt}^2. Intuitively, the stock price at date 1 reflects the effect of the firm's investment on its value faster (i.e., at date 1 rather than in the long run) when market participants (in this case the informed investor) have more informative signals.

Using eq.(7) and writing the first order condition of the manager's investment problem, we deduce that the manager's optimal investment decision solves:

$$\omega\gamma(R_{st}^2, R_{lt}^2, h) + (1-\omega)\Delta(h,r,\kappa) = C'(I_m^*) \tag{13}$$

In equilibrium, the optimal investment is such that the marginal benefit of one extra dollar invested in the project (the L.H.S of the eq.(13)) is equal to the marginal cost. Observe that the efficient level of investment, I_m^e, is obtained when $\omega = 0$ and therefore solves $\Delta(h,r,\kappa) = C'(I_m^e)$ (equalizes the present value of \$1 invested in the project to the marginal cost). As $\gamma(R_{st}^2, R_{lt}^2, h) < \Delta(h,r,\kappa)$, it is immediate that in equilibrium the manager underinvests ($I_m^* < I_m^e$). The next proposition provides the equilibrium investment level as a function of the informed investors' signals and the project horizon.

Proposition 1 *: The optimal investment of the firm at date 0, I_m^* is:*

$$I_m^* = \alpha_0 + \alpha_1 \times h + \alpha_2 R_{st}^2 + \alpha_3 (R_{st}^2 \times h) + \alpha_4 (R_{lt}^2 \times h), \quad (14)$$

with $\alpha_0 = \frac{(1-\omega)\kappa}{(1+r)}$, $\alpha_1 = \frac{(1-\omega)(1-\kappa(1+r)}{(1+r)^2}$, $\alpha_2 = \frac{\omega\kappa}{2(1+r)}$, $\alpha_3 = -\alpha_2$, *and* $\alpha_4 = \frac{\omega}{2(1+r)^2}$. *Thus, holding the horizon of the project (h) constant, the investment of the firm at date 0 increases with the informativeness of the short-term signal* ($\frac{\partial I_m^*}{\partial R_{st}^2} = \alpha_2 + \alpha_3 h > 0$) *and the informativeness of the long-term signal* ($\frac{\partial I_m^*}{\partial R_{lt}^2} = \alpha_4 h > 0$)*. However, the sensitivity of investment to the informativeness of the short-term signal decreases with the project's horizon* ($\frac{\partial I_m^*}{\partial h \partial R_{st}^2} = \alpha_3 < 0$) *while the sensitivity of investment to the informativeness of the long-term signal increases with the horizon* ($\frac{\partial I_m^*}{\partial h \partial R_{lt}^2} = \alpha_4 > 0$)*.*

Holding the horizon of the project fixed (i.e., for a given h), an increase in the informativeness of the signals used by the informed investor leads the firm to underinvest less in its project, and thus to invest more.[11] However, the magnitude of the sensitivity of investment to the informativeness of the informed investor's signal at a given horizon depends on the horizon of the project. That is, an increase in the informativeness of the short-term signal has a weaker positive effect ($\alpha_3 < 0$) on investment when the horizon of the project is longer (h increases). In contrast, an increase in the informativeness of the long-term signal has a stronger positive effect ($\alpha_4 > 0$) on investment when the project's horizon is longer. These two implications constitute our main prediction and we test it in Section V.

Proposition 1 has additional implications that we test in Section V. First, it is easily checked that an increase in the manager's focus on the short-term stock price (ω) reduces investment ($\frac{\partial I_m^*}{\partial \omega} < 0$), as found empirically by Edmans, Fang, and Lewellen (2017). More importantly for our purpose, the joint effects of the project's horizon and signals informativeness become stronger (in absolute value) when the manager's focus on the short-term stock price increases ($\mid \frac{\partial \alpha_3}{\partial \omega} \mid > 0$ and $\mid \frac{\partial \alpha_4}{\partial \omega} \mid > 0$). That is, the information produced by the stock market matters more to alleviate underinvestment due to managerial myopia when the manager's objective function depends more on the impact of her decision on the firm's short-run value.

[11] Derrien and Kecskes (2013) finds that firms losing analysts coverage reduce their investment. To the extent that a drop in analyst coverage reduces the informativeness of signals available to investors, their result is consistent with Proposition 1.

Eq.(14) also implies that investment should decrease with the level of the firm's cost of capital, r. This simply reflects the fact that the expected net present value of the firm project is then smaller. More interestingly, the effect of the informativeness of the investor's short-term and long-term signals on the sensitivity of the firm's investment to the horizon of its project should be smaller (in absolute value) when the cost of capital is higher (($| \frac{\partial \alpha_3}{\partial r} | < 0$ and $| \frac{\partial \alpha_4}{\partial r} | < 0$.)). The reason is that the marginal increase in the firm value due to reduced investment inefficiency is smaller when future cash flows are discounted more.

In contrast, the model has no clear implication for the effect of investment horizon (h) on the level of investment. Indeed, eq.(14) implies:

$$\frac{\partial I_m^*}{\partial h} = \alpha_1 + \alpha_3 R_{st}^2 + \alpha_4 R_{lt}^2. \tag{15}$$

We have $\alpha_3 < 0$, $\alpha_4 > 0$ and α_1 can be positive or negative depending on κ and r. Thus, $\frac{\partial I_m^*}{\partial h}$ can be positive or negative depending on parameter values (e.g., this effect is positive for κ low enough and negative for κ large enough for instance). This is intuitive. For identical expected cash-flows, short term projects are more attractive than long-term projects simply due to time value of money. However, if long-term projects have larger expected payoff for the same level of investment ($\kappa < 1$), as is often assumed in the literature, then the opposite holds true. In any case, our objective is not to study the effect of horizon on investment but the effect of the informativeness of the signals available at date 1 on the sensitivity of investment to the project's horizon (the interaction effects between h and R_h^2).[12]

As explained previously, the manager underinvests in equilibrium ($I_m^* < I_m^e$). The reason is that (i) the manager cares about the impact of her investment decision on the firm's stock price ($\omega > 0$) and (ii) it takes time for this price to reflect the full value created by the investment ($\gamma(R_{st}^2, R_{lt}^2, h) < \Delta(h, r, \kappa)$). In line with (i), Asker, Farre-Mensa, and Ljungqvist (2016) find that public firms under-invest relative to private firms because public firms

[12] To simplify notations, we have assumed that the discount rate, r, is identical for short-term and long-term cash flows. However, it is straightforward to extend the model to the case in which the long-term and short-term discount rates are different. In this case, all terms in $(1+r)^2$ (resp., $(1+r)$) must be replaced by $(1+r_{lt})^2$ (resp., $(1+r_{st})$) where r_{lt} (r_{st}) is the long-term (short-term) discount rate. In this case, the sensitivity of firms' investment to an increase in the long-run interest rate is negative and even more so for firms whose projects have a longer horizon (i.e., $\frac{\partial^2_{I_m^*}}{\partial r_{lt} \partial r_{lt}} < 0$).

prioritize their short-term stock price. Our theory further predicts that an improvement in the informativeness of the signals received at date 1 by the investor should alleviate this issue (investment increases with the informativeness of the informed investor's signals; see Proposition 1). Indeed, when the investor is better informed about future cash flows, the actual investment value is reflected more quickly into the stock price ($\gamma(R^2_{st}, R^2_{lt}, h)$ is larger), reducing thereby the differential between short-run and long run incentives for the manager. However, this effect should be stronger when signals are informative at the horizon corresponding to that of the firm's project . This suggests that to reduce under-investment in long-term projects, an informative stock market is useful but not sufficient. For this to be the case, it must also be informative about long-horizon cash flows.

Testing whether managerial focus on the short-term induces under-investment is notoriously difficult because the efficient level of investment is not easy to measure empirically.[13] However, the effects of the informativeness of the investor's signals on under-investment are driven by their effects on I^*_m (because the efficient level of investment, I^e, does not depend on signals' informativeness). Thus, testing whether $\alpha_3 < 0$ and $\alpha_4 > 0$ in eq.(14) is identical as testing the joint effect of signals' informativeness and projects' horizon on investment.

B Extension to multiple projects with different horizons

In the baseline model, the firm has a single project with a fixed horizon, h. In this section, we consider a firm that can allocate a fixed capital, $\bar{I}$, between two projects: (i) a short-term project that pays a cash flow $\theta_{st} = \kappa I_{st} + \eta_{st}$ at date 2, and (ii) a long-term project that pays a cash flow $\theta_{lt} = I_{lt} + \eta_{lt}$ at date 3, where I_h is the investment in the project with horizon $h \in \{st, lt\}$ and $\bar{I} = I_{st} + I_{lt}$. The total cost of investment is $C(I_{st}, I_{lt}) = 0.5(I^2_{st} + I^2_{lt})$. To simplify, we assume that $\bar{I}$ is fixed and known to the investor but she does not observe how the manager allocates capital between the two projects. In this version of the model, the firm implicitly chooses the average duration of its investment by choosing I_{st} and I_{lt}. Given

[13] Asker, Farre-Mensa, and Ljungqvist (2016) addresses this issue by comparing the investment of private firms (insulated from stock market-driven short-termism) to the investment of similar public firms.

its allocation of capital, the fundamental value of the firm is:

$$V(I_{st}, I_{lt}) = \frac{\theta_{st}}{(1+r)} + \frac{\theta_{lt}}{(1+r)^2}. \tag{16}$$

The manager chooses her capital allocation, $\{I_{st}^*, I_{lt}^*\}$ to solve:

$$\begin{aligned} Max_{\{I_{st},I_{lt}\}} \quad & \omega \mathrm{E}(p_1^*(O; I_{b,st}, I_{b,lt})) + (1-\omega)\mathrm{E}(V(I_{st}, I_{lt})) + M - C(I_{st}, I_{lt}), \\ u.c. \quad & \bar{I} = I_{st} + I_{lt} \end{aligned} \tag{17}$$

where $I_{b,h}$ is the market expectation about the manager's investment in the project with horizon h. The analysis of this case is very similar to that in the baseline case. We obtain the following result.

Proposition 2 . *Let $I^e(\bar{I}) = \frac{\bar{I}}{2} + \frac{\kappa}{1+r} - \frac{1}{(1+r)^2}$. At date 0, the manager optimally chooses the following allocation of capital between the two projects:*

$$I_{st}^*(\omega) = I^e(\bar{I}) + \frac{\omega}{2}\left[\frac{\kappa}{1+r}(\frac{R_{st}^2}{2} - 1) + \frac{1}{(1+r)^2}(1 - \frac{R_{lt}^2}{2})\right], \tag{18}$$

and

$$I_{lt}^*(\omega) = \bar{I} - I_{st}^*. \tag{19}$$

Thus, the investment in the long-term (resp., short-term) project increases in the informativeness of the investor's long-term (short-term) signal and decreases in the informativeness of the short-term (long-term) signal.

One way to test this prediction is to consider firms that operate in multiple industries. In this interpretation, $\bar{I}$ is the total investment of the firm, and I_h^* is its investment in the division with project's horizon h. We follow this approach in Section V.C.4, in which we test whether investment in divisions characterized by long-horizon projects are more sensitive to the informativeness of investors' long-term signal and less sensitive to the informativeness of their short-term signal, controlling for the firm's total investment ($\bar{I}$).

As in the baseline case, the efficient level of investments in the short-term and long-term projects (denoted I_{st}^e and I_{lt}^e) are obtained when $\omega = 0$. Thus, from Proposition 2, $I_{st}^e = I^e(\bar{I})$ and $I_{lt}^e = \bar{I} - I^e(\bar{I})$. In contrast to the baseline case, there can be under-investment ($I_h^* < I_h^e$) or over-investment ($I_h^* > I_h^e$) in the project with horizon h. In particular, there can be over-investment in the long-term project (and therefore under-investment in the short-term project) when $\kappa(1+r) > \frac{2-R_{lt}^2}{2-R_{st}^2}$.[14] As R_{lt}^2 increases, over-investment in the long-term project increases. This implication highlights again the importance of the horizon of the information produced by the stock market. If investors focus too much on the production of long-term information, one can obtain situations in which the manager invests too much in long-term projects, especially if r and κ are large.[15]

C Discussion and extensions

Public information vs. private information: The assumption that the investor's signals are private is not key for our testable implications. Consider again the baseline version of the model but assume that the informed investors' signals are public information (i.e., observed by the market maker). In this case, the price at date 1 is:

$$p_1^{*public}(s_{st}, s_{lt}; I_b, h) = \mathrm{E}(V(I_b, h)\,|s_{st}, s_{lt}) = (\frac{(1-h)\kappa}{(1+r)}R_{st}^2)s_{st} + (\frac{h}{(1+r)^2}R_{lt}^2)s_{lt}. \qquad (20)$$

Hence, the expected price at date 0 is:

$$\begin{aligned}\mathrm{E}(p_1^{*public}(s_{st}, s_{lt}; I_b, h)) &= (\frac{(1-h)\kappa}{(1+r)}R_{st}^2 + \frac{h}{(1+r)^2}R_{lt}^2)I_m \\ &= \Delta(h, r, \kappa)I_b + 2\gamma(R_{st}^2, R_{lt}^2, h)(I_m - I_b).\end{aligned} \qquad (21)$$

This is the same expression as the expected price in the baseline case (eq.(11)), except that the sensitivity of the price to the actual investment of the firm is higher ($\gamma(R_{st}^2, R_{lt}^2, h)$ is multiplied by 2). It follows that Proposition 1 still holds but the equilibrium level of investment is larger when signals are public than when they are private. The reason is

[14] In the knife-edge case in which $\kappa(1+r) = 1$, it is efficient to allocate capital equally between the two divisions. However, this is not the case if the informativeness of the long-term signal is different from the informativeness of the short-term signal.

[15] Managerial myopia does not necessarily imply that managers invest too much in short-term projects. It just means that their decision does not maximize the firm's long-run value. Bebchuk and Stole (1993) also obtain the possibility of over-investment in a long-term project when a short-termist manager allocates a fixed amount of capital between a short-term and a long-term project. However, in Bebchuk and Stole (1993), this happens only when the allocation of capital is perfectly observed. In Bebchuk and Stole (1993), the information possessed by investors about future cash flows when the stock price is set plays no role (investors are implicitly assumed to have no information on the cash flow of the long-term project when investment is non-observable). As our analysis shows, this is not innocuous since when investors have too good long-term signals relative to short-term signals, one can also obtain over-investment in long-term projects even if the manager's investment is not observed.

that the stock price better reflects the actual value of the firm when the signals are public. When they are private, the equilibrium stock price is less informative about the fundamental value of the firm because the informed investor trades strategically on her information, which reduces the amount of information impounded into prices.[16] As a result, the level of investment is smaller with private information than with public information.[17]

Multiple Informed Traders: For simplicity, we have assumed that there is only one informed investor. However, this assumption is not key. When the number of informed investors increases, the sensitivity of the expected stock price to investment increases from γ (the case with one informed investor) to 2γ (when the number of informed investors is infinite) because the order flow (and therefore the price) becomes more informative about investors' signals.

Endogenous information acquisition: We have assumed that the precision of informed investor's signals is exogenous. In the online appendix, we allow the informed investor to choose this precision, assuming that more precise signals are more costly to obtain. We show that Proposition 1 is unchanged because the informed investor's choice for the precision of her signals (and therefore the informativeness R_{st}^2 and R_{lt}^2 of each signal) is independent of the amount invested in the project. The reason is that the informed investor and the market maker have the same expectation about this investment. As a result, the informed investor's expected profit in equilibrium is independent from the level of investment. This means that our investment equation (eq.(14)) is valid even if R_{st}^2 and R_{lt}^2 are endogenous. It is the case however that the optimal precision of the investor's long-term (short-term) signal increases (decreases) with the horizon of the firm's project. This suggests that, empirically, investors should produce relatively more precise long-term (short-term) signals for firms with longer horizons.

Stock price informativeness vs. signals informativeness: In the model, an increase in the informativeness of the investor's signal at a given horizon makes the stock price at date

[16]This comparison is other things equal. It is possible that, in reality, public signals are less informative than private signals.

[17]When signals are public and perfect, there is no under-investment in equilibrium ($I_m^* = I_m^e$), even if $\omega > 0$. This is not the case when signals are perfect but private because they are not fully revealed via the trading process (due to noise trading).

1 more informative about the firm's fundamental value (i.e., it reduces $Var(V(I_m^*, h) \mid p_1^*)$, the residual uncertainty about V after observing the price). However, our main predictions cannot be tested with a proxy for price informativeness in place of separate measures for the informativeness of the investor's long-term and short-term signals. Indeed, price informativeness is a weighted average of the informativeness of short-term and long-term signals. Thus, one cannot attribute variations in price informativeness to either R_{lt}^2 or R_{st}^2, which precludes testing Proposition 1 using price informativeness as a proxy for these variables (since they have opposite effects on the sensitivity of investment to the horizon of the firm's project).

IV Data and measurements

To test the predictions of the model, we need measures of (i) the horizon of firms' projects (h), and (ii) the informativeness of investors' signals about short-term and long-term cash flows (R_{st}^2 and R_{lt}^2). This section explains how we construct these measures (Appendix I provides a summary of all the variables used in our tests and their definition).

A Project horizon (h)

We use the horizon of firms' business plans as a proxy for the horizon of their projects. Business plans describe companies' objectives and detail the time frame and investments needed to achieve these objectives as well as the associated cash flow projections. Thus, variations in the horizon of business plans should correlate positively with variations in the horizon of the corresponding projects' cash flows.

We measure the horizon of business plans from the text of firms' disclosures. We systematically search for the terms "year business plan", "year strategic plan", "year growth plan", "year investment plan", "year capital expenditure plan", "year expansion plan", "year development plan", "year extension plan", and "year plan" through the content of all SEC filings (including 10Ks, 10Qs, 8Ks,...) between 1994 and 2015. We find 13,908 filings matching at least one of the above expressions. We drop cases where the horizon cannot be identified (e.g., when managers refer to their "multi-year" plan) and then manually collect the information about the horizon in number of years when it is explicitly mentioned (e.g., "3-year business plan" or "5-year strategic plan"). When several horizons are mentioned in the same filing, we take the average horizon. For example, if managers refer to their "3 to 5-year plan", we assign a horizon of 4 years. In this set of filings, the shortest horizon is 1 year and the longest is 30 years (e.g., Huntington Ingalls Industries (shipbuilding), Oklahoma Gas & Electric (utilities), or Molycorp (mining)). At the end of this process, we obtain information on the horizon of the business plans for 3,925 distinct firms.

[Insert Figure II about here]

On average, the business plan horizon is 4.3 years. Figure II shows that 3-year and 5-year horizons are the most common horizons. Most of the heterogeneity is cross-sectional, suggesting that the horizon of a firm's business plan is highly persistent. Indeed, firm fixed effects explain up to 70% of variation in business plan horizon. Business plan horizon also clusters by industry. This persistence within firms over time, and across firms within industry shows that the horizon of firms' projects primarily reflects permanent economic characteristics (e.g., business specificities such as the length of production and consumption cycle or the useful life of assets). These are outside managerial control, as assumed in the baseline version of our model.

We focus on the average horizon by two-digit SIC industry across all available filings, denoted *Project Horizon*. *Project Horizon* is thus time-invariant. Moreover, for any given firm i, $\textit{Project Horizon}_i$ corresponds to its industry average, even if firm i never mentions the horizon of its business plan. This aggregation serves three purposes. First, it allows us to extract the time-invariant component of projects' horizon by industry and thus to better identify structural differences in project horizon across firms. Second, it reduces noise coming from heterogeneous capital budgeting practices. Third, it increases the power of our tests, since we can include all firms with a clear industry assignment.

[Insert Table I and Figure III about here]

Table I shows the ranking of industries with the longest horizons (left panel) and the shortest ones (right panel). Firms in the "utility", "mining", "steel", and "shipbuilding" industries use the longest business plans, and firms operating in "defense", "candy and soda", "banking" and "health services" use the shortest ones.[18] This ranking is consistent with Graham (2022). His survey data indicate that the shortest expected life for new projects is in "retail" and "finance", and the longest in "tech" and "manufacturing".[19] Figure III shows that our horizon measure closely matches Graham (2022)'s project life measure for the six sectors considered in his analysis. The differences in the number of years between the two measures are never statistically significant, and the correlation between the two exceeds 0.9. Our industry rankings are also in line with Hubert de Fraisse (2022) and Dew-Becker (2012) who use accounting depreciation rates to measure projects' horizon.

Compared to (the inverse of) accounting-based depreciation rates, one benefit of our measure is that it is better connected to the real life of firms' projects. For example, some assets may fully depreciate (e.g., software) before the projects' actual termination, while others may never depreciate (e.g., land) despite the projects having a finite horizon.[20] Another benefit of our measure is that it is an *ex-ante* measure of horizon that does *not* depend on past, current, or expected future investment choices (as is the case for price-based duration measures or duration measures using ex-post cash flow realizations).

B The informativeness of investors' signals (R^2)

We obtain variation in the overall informativeness of signals available to investors for cash flows realized at different horizons from the forecasts of sell-side analysts. Following a large literature on beliefs formation and asset prices, we assume that sell-side analysts' forecasts are representative of investors' information, and that these forecasts are a good approximation for the signals available to investors at short and long horizons (e.g., Landier and Thesmar (2020) or Hong, Wang, and Yang (2021)).

[18]Business plan horizon is surprisingly short for firms in the "Defense" industry. This is because the demand for firms in this industry depends on the Bipartisan Budget, which is a two-year plan that sets spending for the Pentagon and other federal agencies.

[19]See Figure 7, Panel B in Graham (2022).

[20]Another limitation of depreciation-based measures inferred from accounting statements is that they depend on past investment and the age of existing assets. A low depreciation rate could indicate that the assets employed have a long useful life, or that these assets are obsolete and need to be replaced. Because depreciation rates reflect assets' obsolescence speed, they will tend to systematically capture re-investment needs.

We capture the informativeness of investors' signals about cash flows at short and long horizons using the measure developed by DFF2022. DFF2022 measures the informativeness of the forecasts issued by an analyst at a given time for a given horizon by the R-squared (R^2) of a regression of the realized earnings (of the firms she covers) on the forecasted earnings, based on data from I/B/E/S. Higher R^2 implies that the forecasts of a given analyst for a given horizon explain a larger fraction of realized earnings at that horizon, and thus that her forecasts are more informative. DFF2022 considers horizons ranging from one day to five years. We use the same analyst-date-horizon R^2 data and we average the informativeness across all available analysts by year and horizon. We focus on two aggregate proxies for investors' signals' informativeness for each year t: one for short-term horizons (from 12 months to 23 months), denoted $R^2_{st,t}$ (a proxy for R^2_{st} in our theory), and another one for long-term horizons (from 24 months to 59 months), denoted $R^2_{lt,t}$ (a proxy for R^2_{lt} in our theory).

We consider the above aggregate measures of signals' informativeness, as opposed to firm-level measures for four main reasons. First, aggregation reduces measurement error. This is especially important because forecast informativeness is noisy at the analyst level, especially long-term forecasts. Second, aggregation avoids reverse causality concerns, since firm-specific variation in investment is unlikely to affect the informativeness of forecasts made by *all* analysts on *all* firms. Third, aggregation mitigates concerns about omitted variables because *aggregate* variation in forecasts informativeness that is common to all analysts should be arguably less related to the characteristics of individual firms and analysts. Finally, the aggregation of $R^2_{st,t}$ and $R^2_{lt,t}$ reflects the informativeness of the forecasts for distinct horizons made by a myriad of analysts, and are thus more likely to capture overall investors' signals about cash flows materializing in the short-term or long-term.

Table IA.1 of the online appendix reports the aggregate value of $R^2_{st,t}$ and $R^2_{lt,t}$ by year between 1993 and 2015. Short-term forecasts are more informative than long-term forecasts. Moreover, the informativeness of short-term forecasts has improved over time, as R^2_{st} increases by 0.3 percentage points per year, and the increase is statistically significant with t-statistics of 2.57. In contrast, the informativeness of long-term forecasts has deteriorated, with R^2_{lt} decreasing by 0.2 percentage points per year, a trend that is also significant

(t-statistic of -1.76).[21] The (Pearson) correlation between the two time series is 0.34, indicating a substantial variation in the relative informativeness of investors' signals about short and long-horizon cash flows.

V Empirical evidence

This section tests Proposition 1 and the model's ancillary predictions. To this end, we study how different firms (some with short-horizon projects and others with long-horizon projects) modify their investment in response to the same aggregate changes in the informativeness of investors' signals about short and long-term cash flows.

A Baseline specification

Our main specification derives from the theory (see Section III). We take eq.(14) to the data and test whether $\alpha_4 > 0$ and $\alpha_3 < 0$ by estimating:

$$Capex_{i,t} = b_1(\text{Project Horizon}_i \times R^2_{lt,t-1}) + \\ + b_2(\text{Project Horizon}_i \times R^2_{st,t-1}) + \gamma X_{i,t-1} + \phi_i + \eta_t + \varepsilon_{i,t} \quad (22)$$

where $Capex_{i,t}$ is the capital expenditures (scaled by lagged PPENT) of firm i in fiscal year t, Project Horizon$_i$ is the average business plan horizon corresponding to firm i's industry, and $R^2_{st,t-1}$ and $R^2_{lt,t-1}$ are aggregate measures for the informativeness of investors' signals about short and long-term cash flows. The main coefficients of interest are b_1 and b_2 (the empirical counterparts of α_4 and α_3 in eq.(14)). Proposition 1 predicts that the sensitivity of investment to the informativeness of investors' long-term signal increases with project horizon (i.e., $\alpha_4 > 0$ in eq.(14)), and thus that $b_1 > 0$. In contrast, the sensitivity of investment to the informativeness of investors' short-term signal should decrease with project horizon (i.e., $\alpha_3 < 0$ in eq.(14)), implying $b_2 < 0$.

We estimate eq.(22) with firm (ϕ_i) and fiscal year (η_t) fixed effects and include control variables for known determinants of investment, namely, the log of total assets, cash flows,

[21] These two opposite trends are analyzed in details by DFF2022. Their economic magnitude in our paper differs from that reported in DFF2022 because the time period and the definition we use for short and long horizons are different.

the inverse of PP&E, and Tobin's Q. The fixed effects and control variables aim at capturing determinants of investment that are absent from our model but could nevertheless influence the estimation of b_1 and b_2.[22] We cluster standard errors by SIC2 and fiscal year. We estimate eq.(22) on a sample comprising all U.S. firms from Compustat (fic=USA, loc=USA, and curcd=USA) that (i) are not active in the financial sector (SIC between 6000 and 6999) or the utility sector (SIC between 4900 and 4999), (ii) have non-missing information on total assets, sales, capital expenditures, property, plant and equipment (PP&E), equity, debt, cash and net income, and (iii) can be merged with CRSP and I/B/E/S. We further require that total assets and sales are both greater than $1 million, and that sales are greater than net income. The sample starts in 1994, when SEC filings became available in electronic format, and ends in 2015 as R^2 for long-term forecasts cannot be estimated after because earnings realizations are not yet available.

[Insert Table II about here]

Table II shows summary statistics. On average, *Capex* is 0.34 and Project Horizon is 4.35 years. In line with DFF2022, who show that the term-structure of forecasts informativeness is downward sloping, R^2_{st} is approximately 60% in our sample, and is greater than R^2_{lt} (approximately 40%). All other variables are defined in Appendix I. Variables based on Compustat data are winsorized by fiscal year at the 2% level in each tail.

B Main results

Table III presents various estimations of eq.(22). The first column reports results obtained without the inclusion of control variables or firm fixed effects (but with year fixed effects), contrasting the variation in investment observed in a given year across firms with short and long projects' horizons. Supporting our predictions, we observe that $b_1 > 0$ and $b_2 < 0$, and both are statistically significant. All else equal, firms with longer project horizons invest more than firms with shorter horizons in years in which the informativeness of investors' long-term signals is high. Similarly, firms with shorter project horizons invest more than firms with longer horizons when the informativeness of investors' short-term signals is high.

[22] Notice the fixed effects absorb the direct effects of h as well as that of R^2_{st} and R^2_{lt}.

[Insert Table III about here]

Columns (2) and (3) show similar results when controlling for firm fixed effects and for firm size, capital stock, cash flows, and Tobin's Q. A specification with these controls, especially the inclusion of Q, is particularly important since it further lessens the concerns that the results stem from a correlation between the informativeness of investors' short and long-term signals and firms' (time-varying) characteristics, such as their size or the attractiveness (i.e., expected cash flows) of their projects at different horizons, or variation in discount rates (as suggested by the model). Indeed, investors may have more informative signals at short (long) horizons for larger (smaller) firms or when firms have more (less) valuable opportunities at specific horizons. Our use of aggregate (as opposed to firm-specific) signals informativeness is designed to limit this concern. The stability of the results obtained with controls for firms' time-varying characteristics should also alleviate it.

Overall, our main results imply that firms with long-term projects increase (decrease) investment relative to firms with short-term projects when R^2_{lt} (R^2_{st}) increases. To gauge the economic magnitude of this differential effect, we normalize all variables by their within-firm standard deviation in the specification reported in Column (3) of Table III (except *Project Horizon* which is constant within-firm). We find estimates of b_1=.054 and b_2=-.040.[23] Hence, all else equal, the differential effect of a one standard deviation increase in R^2_{lt} on the investment of firms with different project horizons (say with horizon H_i and H_j) corresponds to $b_1 \times (H_i - H_j)$. This difference amount to 21.6% of within-firm standard deviation in investment if one compares firms with five-year ($H_i = 5$) and one-year ($H_j = 1$) project horizons ($(5-1)\times 5.4\%$). By the same token, the differential effect of a one standard deviation increase in R^2_{st} corresponds to 16% of within-firm standard deviation in investment across these firms ($(5-1)\times 4\%$).

To further address the potential correlation between the informativeness of investors' signals and firms' characteristics (other than the horizon of their projects), we add interaction terms between each control variable and both measures of signals' quality ($R^2_{st,t-1}$ and $R^2_{lt,t-1}$). The results, reported in Column (4), are unchanged. In addition, in the last column of

[23]See online appendix, Section 3, Table IA.2

Table III, we alter the estimation approach and replace OLS with the cumulant estimator developed by Erickson, Jiang, and Whited (2014) to make sure that our results are not due to unobserved investment opportunities that might correlate with signals' informativeness. Existing research indicates that Q (the ratio of market value to assets) might be a poor proxy for firms' investment opportunities, leading to biased estimates in investment specifications like ours. However, we obtain similar conclusions when we limit these biases following Erickson, Jiang, and Whited (2014).

The results in Table III are robust to using alternative measures of firms' project horizons. For example, using the equity duration measure of Goncalves (2021) or that of Weber (2018) averaged by industry as a proxy for average project horizon by industry leads to similar conclusions. Results are also the same if we proxy for projects' horizons using sales growth (i.e., higher growth reflecting longer horizons) or the inverse of firms' depreciation rates (i.e., lower depreciation of assets reflecting longer horizons). We also obtain similar results when we define investment as research and development (R&D) expenses (scaled by lagged intangible capital) as opposed to capital expenditures, indicating the our results do not reflect potential variation in the composition of firms' investment. We present all these results in the online appendix.[24]

C Ancillary results

The results so far corroborate the model's main prediction: the sensitivity of firms' investment to the informativeness of investors' long-term signals increases with the firms' project horizon while the sensitivity to the informativeness of investors' short-term signals decreases with project horizon. To ensure that this result stems from the mechanisms highlighted by the model, we test four ancillary predictions.

C.1 Differential effects by managerial incentives (ω)

First, as shown in our theoretical analysis, the effects documented in the previous section should be stronger when the weight of firms' current stock price in managers' objective (ω) is larger. Because managers' objective is not directly observable, we test this prediction using

[24]See online appendix, Section 4, Table IA.3, and Section 5, Table IA.4, respectively.

four groups of variables used by prior research to capture situations in which managers' focus on their firm's current stock price is likely larger (as proxies for ω) : managers' compensation schemes (e.g., Edmans, Fang, and Lewellen (2017)), shareholders' trading horizon (e.g., Derrien, Kecskes, and Thesmar (2013)), firms' reliance on external financing (e.g., Baker, Stein, and Wurgler (2003)), and takeover pressures (e.g., Stein (1989)).

First, we rely on the scaled wealth-performance sensitivity developed by Edmans, Gabaix, and Landier (2009) (i.e., the dollar change in CEO wealth for a 100 percentage point change in firm market value, scaled by annual compensation) and the fraction of equity shares owned by the CEO. A larger wealth-performance sensitivity and more ownership should induce managers to focus more on their firm's current stock price. Second, we follow Derrien, Kecskes, and Thesmar (2013) and use the fraction a firm's shares held by institutional shareholders with short trading horizons (measured by the intensity of their portfolio turnover). Managers acting on behalf of incumbent shareholders who plan to liquidate their stake in the short-term should focus more on their firm's current stock price.[25] Third, we measure firms' short-term reliance on external financing based on their predicted likelihood to issue stocks in the next 12 months as well as the maturity of their debt. Fourth, we measure firms' exposure to takeover pressure using the presence of a poison pill or a classified board, and firms' takeover defense score (from Capital IQ) which summarizes the strength of takeover defenses (across various aspects of corporate governance and takeover defenses mechanisms). Managers facing short-term financing needs and takeover pressure should pay more attention to their firm's current stock price. To complement these proxies, we measure managers' short-term orientation as the fraction of words in SEC filings referring to "short-term" (i.e., "short-term", "short-run", "current" and "currently") over words referring to both "short-term" and "long-term" (i.e., "long-term" and "long-run"). The construction of each variable is detailed in Appendix I. Table II shows summary statistics.

[Insert Table IV about here]

[25]Note that we do not claim that investors with shorter horizons are less likely to produce long-term information. In fact such investors may have incentive to produce both short-term and long-term information, for instance, to liquidate their holdings when they think a firm is making bad long run investment decisions. Thus, the effect of such investors on R^2_{lt} and R^2_{st} might well be positive at the firm level. This makes the interpretation of the effect of this proxy for managerial myopia more difficult for our tests in Table IV.

To test whether the joint effects of project horizon and investors' signal informativeness on investment is stronger when managers are more likely to focus on their short-term stock price (i.e., larger ω), we augment eq.(22) by interacting R^2_{st}, R^2_{lt}, project horizon, and their respective interaction with binary variables indicating whether each (lagged) proxy for ω is above the sample mean. The coefficients of interest in these augmented models are those on these two triple interactions. Consistent with the model's prediction, Table IV confirms that, across all eight proxies, the effects documented in Table III are amplified in situations in which managers are more likely to focus on their current stock price. For instance, columns (1) and (2) indicate that firms with longer project horizons invest more than firms with shorter horizons when the informativeness of investors' long-term signals is high only when CEOs' wealth-performance sensitivity or equity ownership is above average. Although we recognize that each proxy captures the heterogeneity of managers' objectives only imperfectly, the fact that we obtain similar results in all specifications suggests that the model's specific prediction regarding the effect of ω is supported by the data.

C.2 Differential effects by investment observability

As is common in the literature on managerial myopia (e.g., Fishman and Hagerty (1989), Stein (1989), or Edmans (2009),), our model assumes that the manager's investment decision at date 0 is not observed by investors at date 1. This assumption can be relaxed to some extent: our predictions hold as long as *part* of the firm's investment is unobserved by investors at date 1.[26] However, when investment is fully observed, the manager makes the efficient decision independently of the informativeness of investors' signals. Thus, the effects predicted by the model should be weaker when firms provide more timely information about their investment. We test this prediction using three measures capturing the timeliness of firms' information disclosure on their investment.

First, we consider the average time lag (in days) between the announcement of firms' earnings and their reported financial statements. We conjecture that a longer lag reflects

[26] One possible reason is that date 1 (the horizon at which the manager cares about her stock price) arises before the firm releases information about its investment. For instance, Edmans, Fang, and Lewellen (2017) show empirically that managers cut investment (and sell equity) in the quarter in which large amounts of equity vest, presumably before the annual investment is observed by investors.

less timely available information on investment. The effects documented in Table III should thus be more pronounced when reporting lags are longer. Second, we consider whether firms issue guidance about the dollar amount of capital expenditures (from I/B/E/S). Third, we consider whether firms voluntarily disclose information about their investment policy or expansion plans through press releases and company communication (from Capital IQ Key Development). Guidance and voluntary disclosure about investment should provide investors with more timely information about firms' investment.

[Insert Table V about here]

We again introduce interaction terms between our main explanatory variables and these three proxies (denoted ψ) in eq.(22), and focus on the triple-interaction coefficients. Table V confirms the empirical relevance of our assumption. The first column indicates that the difference in investment sensitivity to the informativeness of long-term forecasts between firms with short and long-horizon projects concentrates among firms with longer reporting lags. The remaining two columns show that this difference narrows significantly when firms disclose more information about their investment through guidance and specific disclosures.

C.3 Differential effects by cost of capital (r)

Next, we test whether the main effects are weaker when discount rates are higher, as our model predicts. We estimate a weighted average cost of capital for every firm and year (hereafter $wacc_{i,t}$) and add interaction terms between the main explanatory variables in eq.(22) and the inverse of $(1 + wacc_{i,t})$.[27] The results are reported in Table VI.

[Insert Table VI about here]

In column (1), firms' WACC is calculated using the equity risk premium of Martin (2016). We find that the coefficient on the triple interaction between $Horizon$, R^2_{lt} and $(1+wacc)^{-1}$ is positive and significant, indicating that when the WACC is larger (i.e., $(1+wacc)^{-1}$ is lower), the difference in the sensitivity of investment to the informativeness of investors' long-term

[27] We provide a detailed description of the method we use to calculate the WACC in Appendix I. We do not directly interact with $wacc_{i,t}$ because the discounting function is not linear but obtain similar results if we do.

signals between firms with short and long-horizon projects becomes weaker. As predicted, we observe the symmetric effect for the sensitivity of investment to the informativeness of investors' short-term signals. The coefficient on the triple interaction between $Horizon$, R^2_{st} and $(1+wacc)^{-1}$ is negative and significant. The rest of the table shows similar results when we calculate firms' WACC using three alternative measures of equity risk premium.

C.4 Extension to multi-division firms

Section II.B indicates that we can also test our theory considering multi-division firms. Proposition 2 implies that more informative investors' long-term signals should lead these firms to shift capital from divisions with short-term projects to divisions with long-term projects. More informative short-term signals should have the opposite effect. We test this prediction using firms' operating divisions across industries with different average project horizon. Holding total investment fixed, these firms should reallocate capital toward divisions with longer projects' horizon when the informativeness of investors' long-term signals increases or when the informativeness of their short-term signals decreases. We investigate whether this within-firm capital reallocation is supported by the data by estimating the following regression:

$$\begin{aligned} Capex_{i,d,t} = b_1(\textit{Project Horizon}_{i,d} \times R^2_{lt,t-1}) + \\ + b_2(\textit{Project Horizon}_{i,d} \times R^2_{st,t-1}) + \gamma X_{i,d,t-1} + \phi_{i,t} + \varepsilon_{i,d,t} \quad (23) \end{aligned}$$

where $Capex_{i,d,t}$ is the capex of division d of firm i in year t and $R^2_{st,t-1}$ and $R^2_{lt,t-1}$ are defined as before. The average project horizon of each division, $\textit{Project Horizon}_{i,d}$ is that of its corresponding industry. We include firm×year fixed effects ($\phi_{i,t}$) to absorb any time-*varying* unobserved firm-specific characteristics that may correlate with the informativeness of investors' signals, firms' project horizon, and their overall investment level. The vector X includes (lagged) control variables, namely, the log of division assets, one divided by the division depreciation and amortization, and the average Tobin's Q of the corresponding industry as a proxy for the division's investment opportunities. We cluster standard errors by SIC2 and year.

We use Compustat Segment data and define divisions by aggregating firms' activities (e.g., investment or assets) in specific (two-digit SIC) industries. We keep all U.S. firms with at least two divisions in a given year that (i) are not active in the financial (SIC between 6000 and 6999) or utility sectors (SIC between 4900 and 4999), and (ii) have non-missing (non-negative) assets and sales. As before, we focus on the period between 1994 and 2015. Because data on property, plant and equipment is often missing at the division level, we define divisions' investment as capital expenditures divided by depreciation and amortization.[28] A ratio greater than 1 indicates that the amount of net invested capital in the division increases. Table IA.5 of the online appendix presents summary statistics for this sample and shows that the average division's investment ratio is 1.24. All other variables are defined in Appendix I. Variables based on Compustat data are winsorized by year at the 2% level in each tail.

[Insert Table VII about here]

The coefficients of interest in eq.(23) are again b_1 and b_2. Proposition 2 predicts that $b_1 > 0$ and $b_2 < 0$. Table VII shows that this prediction is supported by the data. Consistent with our theory, multi-division firms lengthen (shorten) the average horizon of their projects by allocating more (less) capital to divisions with longer project horizons when the informativeness of investors' long-term signals improves (deteriorates). In contrast, they decrease their average projects' horizon by allocating more (less) capital to divisions with shorter project horizons when the informativeness of investors' short-term signals increases (decreases). The estimates of b_1 and b_2 are statistically significant in all specifications. They hold with or without controls, irrespective of the estimation methods (i.e., OLS or the cumulant estimator of Erickson, Jiang, and Whited (2014)).

VI Alternative explanations and implications

The findings in Tables III-VII are consistent with our predictions. In this section, we investigate whether omitted factors could affect the interpretation of our results. We also discuss alternative channels, as well as the implications of our main findings for the evolution of real

[28]We show in the online appendix (Section 7) that our results are robust to various ways to scale divisional capital expenditures, see Table IA.7.

investment horizon over time.

A Main identification concerns

OLS estimates are typically subject to three identification concerns: reverse causality, measurement error, and omitted variables. In Tables III to VII, reverse causality should not be a concern because it is unlikely that the investment decision of one firm affects the informativeness of *all* US analysts' forecasts. Moreover, the robustness of our results to using alternative measures of horizon strongly mitigates concerns about measurement error.[29] However, omitted factors correlating with R^2_{lt} and/or R^2_{st} might explain our results.

For this to be the case, any such factor should confound *all* our results. In particular, it should simultaneously explain why $b_1 > 0$ *and* $b_2 < 0$ in eq.(22), which is only possible if this factor is both positively correlated with R^2_{lt} *and* negatively correlated with R^2_{st} (or vice versa) because R^2_{lt} and R^2_{st} are *positively* correlated. That is, the correlation of a confounding factor with R^2_{lt} and with R^2_{st} must be of *opposite* sign. Moreover, any such factor should also explain our ancillary results. Specifically, its interaction with proxies for ω, ψ, and r should yield the *same* results as those reported in Tables IV-VII, which are as predicted by our theory. We cannot rule out the existence of such a factor, but we are not aware of any other theory that predicts all these effects.

To further mitigate this omitted variable concern, we perform a battery of robustness and validation tests that are reported in the Online Appendix. First, we show that our main results continue to hold when we control for a host of macro variables (e.g., GDP growth, VIX, or Treasury Yields) capturing variations in economic cycles, uncertainty, and overall financing conditions that could correlate with the informativeness of investors short-term and long-term signals.[30] Second, we show that our main results are also robust to controlling for unobserved trends by industry, state of location, and state of incorporation.[31] Finally, we verify that the differential sensitivity of investment to the informativeness of investors' short and long-term signals across firms with short and long-horizon projects is not due to

[29] See online appendix, Section 4, Table IA.3.
[30] See online appendix, Section 8, Table IA.7.
[31] See online appendix, Section 9, Table IA.8.

differential trends in the investment of these firms, unrelated to variation in R^2_{lt} and R^2_{st}. To do so, we estimate the dynamics of capital re-allocation across firms corresponding to a change in short-term or long-term R^2 in a given year.[32] Figure IV displays the results of this dynamic estimation, tracing how firms with long-horizon projects modify their investment relative to firms with short-horizon projects before and after an annual improvement of R^2_{lt} (or R^2_{st}) (controlling for previous and subsequent changes in R^2_{lt} or R^2_{st}). The pattern displayed in the figure confirms the absence of any pre-trend, suggesting that the investment of firms with short and long-horizon projects only starts to diverge following changes in the informativeness of investors' signals (but not before).

[Insert Figure IV about here]

B Cost of capital channel?

The existing literature shows that investors' expected returns vary by horizon, suggesting that the cost of capital could be different for short and long-horizon projects. Thus, one possible alternative explanation for our findings is that when the informativeness of investors' signals for a given horizon increases then the discount rate for cash flows at this horizon decreases (because investors face less uncertainty about these cash-flows). To control for and assess the importance of this channel, we augment our baseline specification with variables capturing the aggregate variation in debt and equity yields for short and long horizons, interacted with *Project Horizon*. We find that none of these interaction terms is significant.[33] Thus, all else equal, changes in the term-structure of expected returns for debt and equity do not differentially affect the investment of firms with short and long-term projects. This finding is hardly surprising because the discount rate that managers use for capital budgeting is known to be infrequently updated (Graham and Harvey (2001), Jacobs and Shivdasani (2012) and (Graham 2022)) and similar across projects with distinct levels of risk (Krüger, Landier, and Thesmar (2015)). It is therefore unlikely that managers use a different discount rate by horizon to account for the term structure of investors' required return when valuing an investment project.

[32] See online appendix, Section 10, Table IA.9.

[33] See online appendix, Section 11, Table IA.10

C Learning channel?

Another possible explanation for our findings is that managers learn information about their investment opportunities from stock prices (the "learning channel"). Their investment is therefore sensitive to stock prices and even more so when prices are more informative (see Bond, Edmans, and Goldstein (2012)).[34] As our measures of the informativeness of investors' short-term and long-term signals are arguably correlated with the informativeness of stock prices at various horizons, our results might arise because managers learn information from their stock price, not because they care about the speed at which the value of their investment decisions is reflected in their market value. For instance, firms with long-term projects could be more sensitive to an improvement in the informativeness of investors' long-term signals ($b_1 > 0$ in eq.(22)) because their stock price is more informative about their investment opportunities (which generate cash-flows in the long-run) in this case.

However, the learning channel cannot fully explain our results for two reasons. First, if our findings only reflect managerial learning from prices, we should observe that firms with long-term (short-term) projects invest more only when R^2_{lt} (R^2_{st}) *and* their stock price is high. Thus, to assess the potential role of firms' stock price on our results, we augment our baseline specification with triple interaction terms between *Project Horizon*, firms' stock price (Q), and investors' short and long-term signal informativeness (R^2_{lt} and R^2_{st}). Our main coefficients of interest b_1 and b_2 in Table IA.11 remain statistically significant. Thus, the effects of the informativeness of investors' signals on the sensitivity of firms' investment to the horizon of their projects are largely insensitive to variations of firms stock prices, unlike what the learning channel would imply.

Second, we find that the effect of the informativeness of investors' signals on investment is amplified when managers have more incentives to account for the impact of their investment decision on their current stock price (see Table IV). This finding is predicted by the improved incentives channel (see Section III) while it is not by the learning channel. Indeed, there is

[34]In contrast, with the "improved incentives channel", a firm's stock price has no direct influence on a manager's expectations about her investment opportunities. According to this channel, a manager accounts for the effect of her investment decision on the current stock price but this decision is not *influenced* by the stock price (there is no feedback effect).

no obvious reason for why the stock price of firms with more myopic managers should be more informative about their investment opportunities.[35] These observations do not imply that the learning channel does not play a role. They just indicate that it cannot be the main explanation for our baseline and ancillary findings.

D Has real investment horizon become shorter?

Our findings indicate that better investors' information about short-term cash flows generates more investment in short-term projects. Since recent research documents that the informativeness of investors' short-term forecasts has increased over time, our results suggest that we should observe (i) a negative trend in firms' projects' horizon, and (ii) a positive trend in the share of investment allocated to short-term projects.

Are both implications supported by the data? Yes. Graham (2022) provides evidence for the first one using surveys of CFOs. He shows that the expected life of firms' new projects has decreased in recent years.[36] We find consistent evidence focusing on the horizon of mergers and acquisitions (M&A) projects. At the time of deal announcement, acquiring firm managers sometimes disclose (i) when they expect synergies to materialize and/or (ii) when the deal should be EPS-accretive. We consider these disclosed horizons as possible proxies for the horizons of these large-scale investment projects. We retrieve this information from SDC Platinum. Data about the expected horizon of EPS-accretion and about the horizon at which synergies should materialize is available for 2,820 and 1,068 deals announced between 1999 and 2017 respectively.

[Insert Figure V about here]

Figure V shows that both horizons have been decreasing over time, and thus that firms are increasingly engaging in acquisition projects paying off more quickly. We formally establish that this negative trend is significant, and even more so after controlling for the project value

[35] To our knowledge, all models of the "learning channel" implicitly assume that managers maximize the long-run firm value (i.e;, assume that $\omega = 1$ in our model). We are not aware of models of this channel with myopic managers. In any case, one could argue that managerial myopia should in fact weaken the learning channel: If managers do not seek to maximize the long-term value of their firm, they have fewer incentives to collect information (including from stock prices) useful for this.

[36] See Figure 7, Panel A on Page 25 in Graham (2022).

(using revaluations around deal announcements and applying the correction for measurement error of Erickson, Jiang, and Whited (2014)).[37]

Next, we show (in the online appendix) that the share of total investment allocated to short-term projects has increased by comparing the trends in investment across industries with short and long-horizon projects. We find that, between 1994 and 2015, there has been relatively less investment in industries with long-horizon projects compared to industries with short-horizon projects.[38] This difference remains significant after we control for changes in well-known determinants of investment (e.g., Tobin's Q and size) as well as potential changes in the composition of our sample (through the inclusion of firm fixed effects). Hence, the second implication (that an increasing share of aggregate investment by public firms should be allocated to short-horizon projects) is also supported by the data.

VII Conclusion

Recent research indicates that the informativeness of investors' signals about long-term cash flows has decreased over time, whereas the quality of their signals about short-term cash flows has improved. In this paper, we study whether these opposite trends could have real effects. To do so, we analyze whether the informativeness of investors' signals at various horizons affects firms' investment through the so called "improved incentives channel." According to this channel, an improvement in the informativeness of investors' signals accelerates the speed at which stock prices reflect the value of new investment projects. As a result, managers have greater incentives to choose investment decisions that maximize the firm long-run value, in particular when they are short-sighted and care about the impact of their investment decision on their current stock price rather than the long run firm value. As we show theoretically, this effect should be stronger when the informativeness of investors' signals improves at a horizon corresponding to the horizon of firms' projects. In particular, an improvement in the informativeness of investors' long term signals has a stronger positive effect on the investment of firms with long horizons than on firms with short horizons.

Our main contribution is to test this prediction. Using a measure of projects' horizon

[37]See online appendix, Section 13, Table IA.12.
[38]See online appendix, Section 13, Table IA.13.

obtained from the text of firms' regulatory filings, we find that the investment of firms with long-term projects is more positively related to the informativeness of investors' long-term signals than the investment of firms with short-term projects. Symmetrically, the investment of firms with short-term projects is more positively related to the informativeness of investors' short-term signals than the investment of firms with long-term projects. Importantly, consistent with the improved incentives channel, these relationships are stronger when managers are more likely to focus on the impact of their decision on their current stock price (e.g., when their wealth is more sensitive to their firm's stock price).

In sum our results indicate that the horizon at which financial markets produce information affects the allocation of capital across short and long-term projects in the economy. One implication is that the decline in the informativeness of investors' long-term signals could discourage investments in long-term projects. Preliminary evidence confirms this implication. For instance, contrasting the evolution of investment across industries with short and long-term projects highlights a decline in the share of total investment allocated to long-term projects since the late 1990s. Moreover, corroborating the survey evidence of Graham (2022), the horizon of firms' projects (e.g., the expected horizon of synergy realizations in acquisitions) has shrunk over time. A more systematic analysis of the aggregate decline in the horizon of firms' projects and the underlying mechanisms is an interesting venue for future research.

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Figure I: Timeline of the model

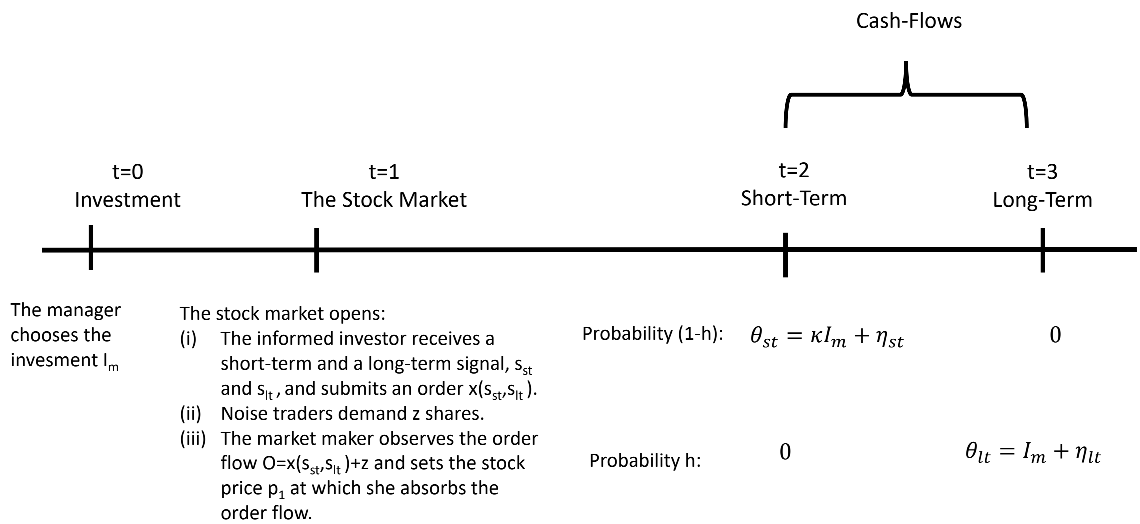
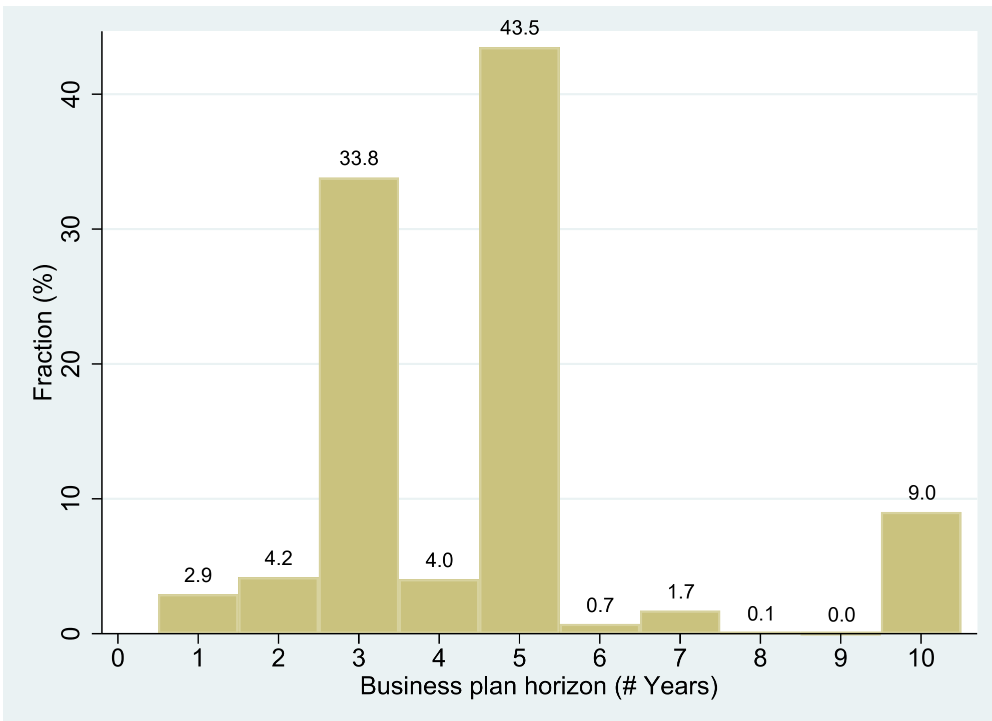
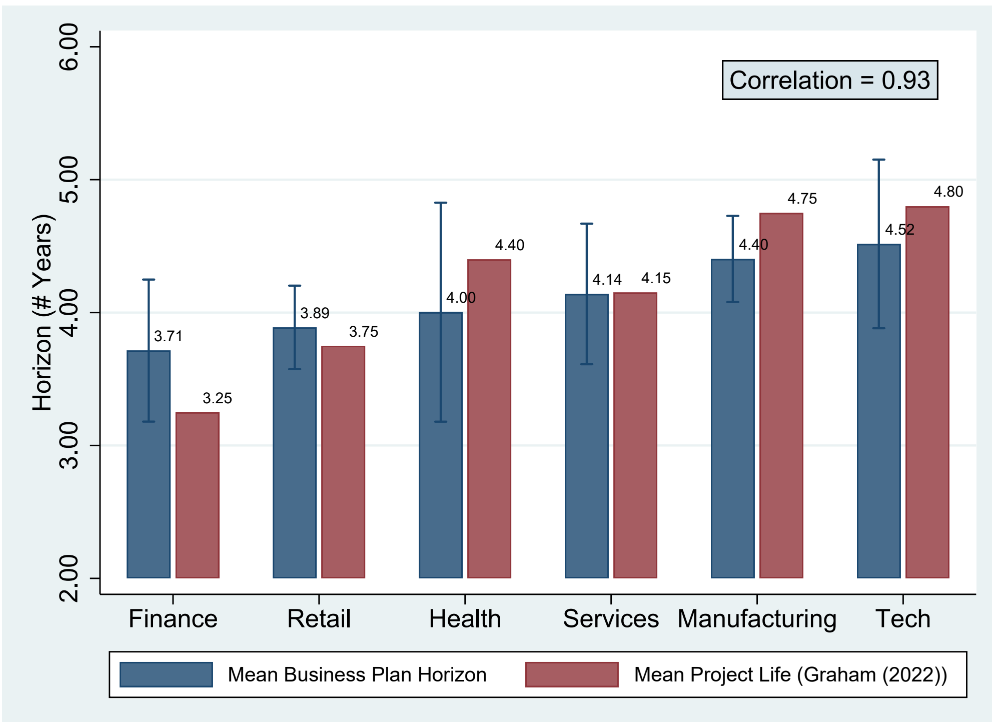


Figure II: The distribution of business plan horizon



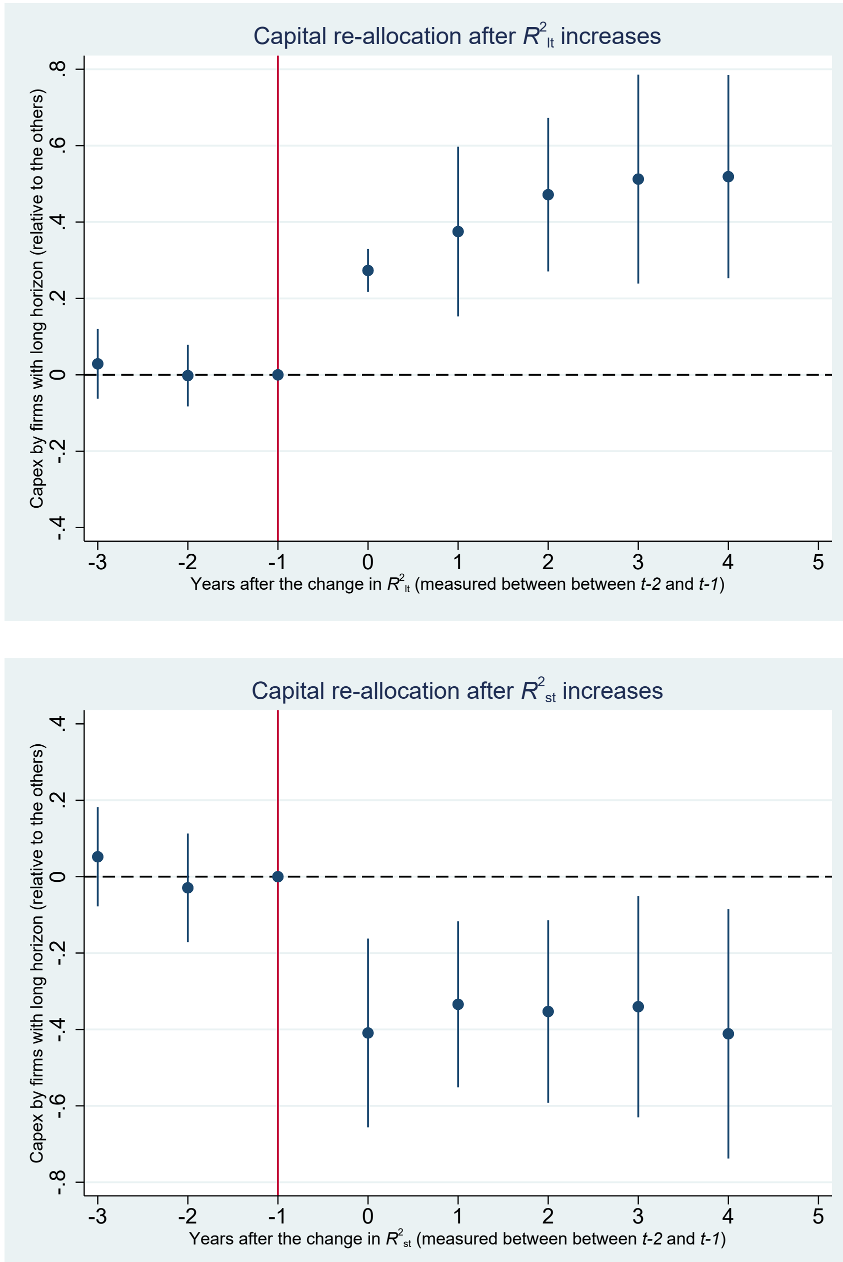
This figure shows the distribution of the horizon of the business plan that managers expect for their firms. The data is collected from the text of SEC filings and includes 13,908 observations of the business plan horizon mentioned or reported by 3,925 firms between 1994 and 2020. The "10-year horizon" bin in the graph includes business plan horizons of 10 years and beyond.

Figure III: Comparison with the average project life by sector from Graham (2022)



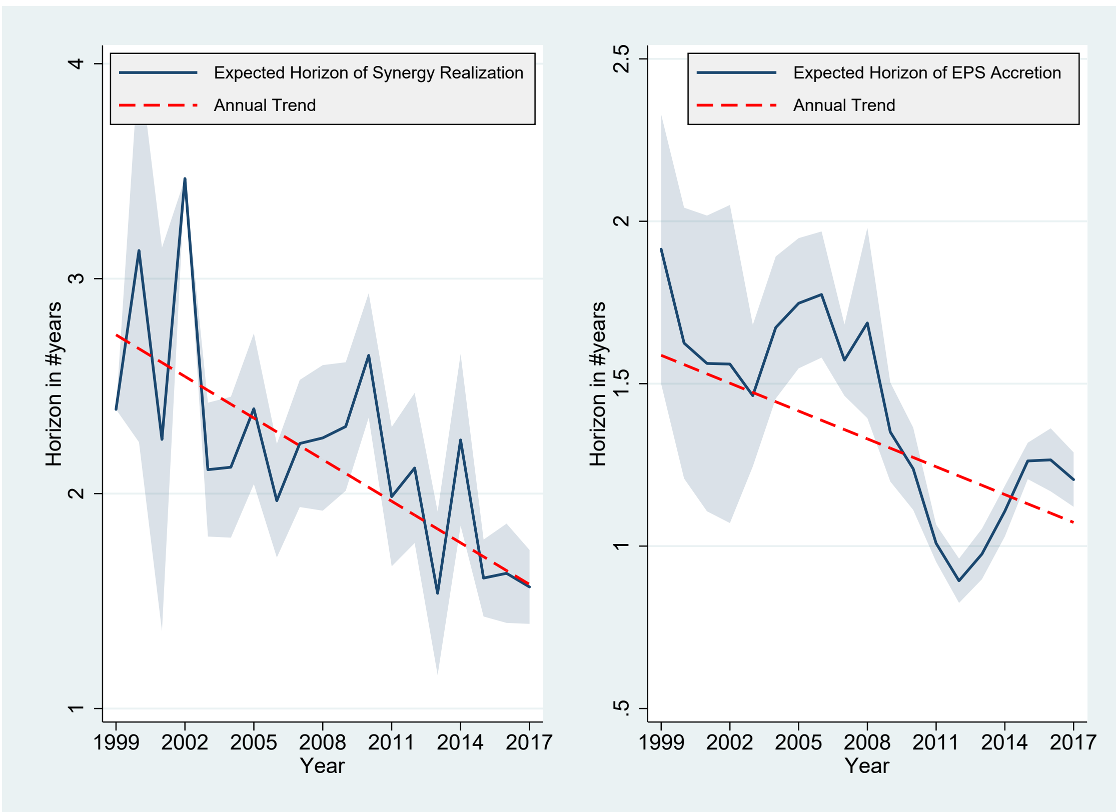
This figure compares the average business plan horizon by sector with the survey data of Graham (2022) about the average expected life for new projects by sector as of 2018 (See Figure 7, Panel B on Page 25 in Graham (2022)). Mean business plan horizon is calculated from a sample of 13,908 observations of business plan horizon mentioned in the text of the SEC filings of 3,925 firms between 1994 and 2020. The Pearson correlation between the two data series across all 6 sectors is 0.93. Reported confidence intervals are at 99% level.

Figure IV: Capital allocation dynamic between firms



This figure plots the regression coefficients reported in online appendix, Section 10, Table IA.9. The top graph shows how firms with long-horizon projects change investment every year relative to firms with short-horizon projects after R^2_{lt} improves in a given year, i.e., when the informativeness of long-term forecasts made by all US analysts increases in the reference year (controlling for possible changes in R^2_{lt} in other years). The bottom graph shows how firms with long-horizon projects change investment every year relative to firms with short-horizon projects after R^2_{st} improves in a given year, i.e., when the informativeness of short-term forecasts made by all US analysts increases in the reference year (controlling for possible changes in R^2_{st} in other years). The reference year is t-1, and the improvement in R^2 is measured relative to t-2 (as $R^2_{t-1} - R^2_{t-2}$). Reported confidence intervals are at 90% level.

Figure V: Trend in (M&A) project horizon



This figure plots the evolution of the horizon at which managers of the acquiring firm expect their investment to generate synergies (left-graph) and be EPS accretive (right-graph). Reported confidence intervals are at 90% level.

Table I: Mean business plan horizon by Fama-French 49 industry

This table shows the top-15 industries with longest business plan horizon, and the top-15 ones with shortest business plan horizon. Mean business plan horizon by Fama-French 49 industry is calculated from a sample of 13,908 observations of business plan horizon mentioned in the text of the SEC filings of 3,925 firms between 1994 and 2020.

FF49 Industries with Longest Business Plan Horizon

Rank	Industry	Mean Business Plan Horizon
1	Utilities	7.15
2	Mining	5.88
3	Steel Works	5.58
4	Shipbuilding, Railroad Equipment	5.56
5	Coal	5.48
6	Business Supplies	4.94
7	Chemicals	4.93
8	Petroleum and Natural Gas	4.92
9	Communication	4.88
10	Shipping Containers	4.85
11	Personal Services	4.84
12	Construction Materials	4.79
13	Electronic Equipment	4.75
14	Aircraft	4.72
15	Construction	4.68

FF49 Industries with Shortest Business Plan Horizon

Rank	Industry	Mean Business Plan Horizon
1	Defense	3.12
2	Candy & Soda	3.36
3	Banking	3.37
4	Health Services	3.39
5	Consumer Goods	3.54
6	Printing and Publishing	3.59
7	Tobacco Products	3.60
8	Apparel	3.66
9	Retail	3.85
10	Food Products	3.89
11	Restaurants, Hotels, Motels	3.89
12	Insurance	3.90
13	Recreation	3.91
14	Textiles	3.96
15	Wholesale	4.00

Table II: Sample descriptive statistics

This table presents descriptive statistics for the main variables employed in our main analysis. The sample includes 66,601 firm-year observations about 8,082 distinct non-financial non-utility US firms in Compustat between 1994 and 2015. Detailed variable definitions are in Appendix I.

	N	Mean	STDV	P10	P25	P50	P75	P90
Main employed variables								
Capex	66,601	0.34	0.34	0.07	0.13	0.23	0.41	0.72
R^2_{st}	66,601	0.59	0.04	0.54	0.56	0.58	0.62	0.65
R^2_{lt}	66,601	0.40	0.05	0.32	0.36	0.40	0.43	0.47
Project Horizon	66,601	4.35	0.51	3.71	3.99	4.38	4.68	4.88
Q	66,601	2.07	1.61	0.93	1.14	1.55	2.35	3.83
Cash Flow	66,601	0.03	0.17	-0.16	0.02	0.08	0.12	0.17
Size	66,601	5.71	1.93	3.32	4.27	5.56	6.98	8.31
Assets	66,601	1,812	5,070	28	72	259	1,073	4,065
Other variables used for cross-sectional analysis								
CEO Wealth Performance Sensitivity	19,449	17.68	28.39	1.81	3.75	7.68	17.03	44.12
CEO Equity Ownership	23,279	2.8%	6.6%	0.0%	0.1%	0.4%	1.7%	8.3%
Short Horizon Institutional Investors	59,219	60.4%	22.6%	29.7%	48.0%	62.9%	76.5%	87.7%
New SEO likelihood	63,350	0.11	0.11	0.03	0.04	0.08	0.13	0.23
Residual Debt Maturity	23,114	2.67	1.07	1.26	1.91	2.60	3.37	4.14
Poison Pill or Class. Board	37,466	0.59	0.49	0.00	0.00	1.00	1.00	1.00
Takeover Defense Score	62,479	0.21	0.15	0.04	0.08	0.18	0.31	0.43
#Mentions of ST vs. LT in SEC filings	54,924	80.5%	10.8%	66.4%	73.1%	80.6%	88.7%	94.7%
Reporting Lag	65,943	31.67	14.05	18.50	23.50	30.00	38.50	45.00
Capex Guidance	66,601	0.15	0.35	0.00	0.00	0.00	0.00	1.00
Expansion Plan Disclosure	66,601	0.17	0.37	0.00	0.00	0.00	0.00	1.00
WACC (Martin (2010))	52,759	8.4%	4.6%	6.3%	7.0%	8.0%	9.2%	10.2%
WACC (Campbell et al. (2008) - In sample)	66,593	11.4%	4.6%	7.8%	9.2%	10.9%	12.6%	14.8%
WACC (Campbell et al. (2008) - Out sample)	66,593	10.6%	4.5%	7.5%	8.7%	10.6%	12.3%	13.3%
WACC (Damodaran (2022))	66,593	8.0%	4.1%	6.6%	7.1%	8.0%	8.7%	9.5%

Table III: Main results

This table presents estimates of firm-level investment specifications (eq.(22)). The dependent variable is $Capex_{i,t}$ defined as capital expenditures scaled by lagged PPENT. Project Horizon$_i$ is the average horizon of firms' projects, which we proxy by the average horizon of the business plan that firms use in the industry. Project Horizon$_i$ is constant by SIC2-industry and is aimed to capture structural differences in project horizon across firms. $R^2_{st,t}$ measures the average informativeness of the short-term forecasts made by all US analysts in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. $R^2_{lt,t}$ measures the average informativeness of the long-term forecasts made by all US analysts in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. All other variables are defined in Appendix I. Explanatory variables that are collinear with the fixed effects are omitted from the regression. *t*-statistics in parentheses are based on standard errors clustered in two ways, by SIC2-industry and by fiscal year. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:			Capex$_{i,t}$		
Specification	(1)	(2)	(3)	(4)	(5)
Project Horizon$_i\times$ $R^2_{lt,t-1}$	0.36***	0.39***	0.34***	0.32***	0.20***
	(4.85)	(3.19)	(3.57)	(3.30)	(9.44)
Project Horizon$_i\times$ $R^2_{st,t-1}$	-0.31**	-0.36**	-0.29**	-0.28**	-0.17***
	(-2.21)	(-2.59)	(-2.41)	(-2.41)	(-6.07)
Project Horizon$_i$	0.04				
	(0.62)				
1/PPENT$_{i,t-1}$			0.83***	1.05***	0.78***
			(12.43)	(2.73)	(26.06)
Q$_{i,t-1}$			0.08***	0.11***	0.13***
			(13.63)	(3.46)	(40.36)
Cash Flow$_{i,t-1}$			0.32***	-0.09	0.25***
			(10.29)	(-0.41)	(17.33)
Size$_{i,t-1}$			0.01	0.03*	0.02***
			(0.59)	(1.81)	(5.23)
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	Yes	Yes	Yes
Controls Interacted	No	No	No	Yes	No
Estimation Method	OLS	OLS	OLS	OLS	EW GMM
N	66,601	66,601	66,601	66,601	66,601

Table IV: Differential effects by managerial focus on their current stock price (w)

This table presents estimates of firm-level investment specifications (eq.(22)). The dependent variable is $Capex_{i,t}$ defined as capital expenditures scaled by lagged PPENT. Project Horizon_i is the average horizon of firms' projects, which we proxy by the average horizon of the business plan that firms use in the industry. Project Horizon_i is constant by SIC2-industry and is aimed to capture structural differences in project horizon across firms. $R^2_{st,t}$ measures the average informativeness of the short-term forecasts made by all US analysts in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. $R^2_{lt,t}$ measures the average informativeness of the long-term forecasts made by all US analysts in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. In column 1, $w_{i,t}$ indicates whether CEO Wealth Performance $\text{Sensitivity}_{i,t}$ is above the sample mean. In column 2, $w_{i,t}$ indicates whether CEO Equity $\text{Ownership}_{i,t}$ is above the sample mean. In column 3, $w_{i,t}$ indicates whether the percentage of short-term institutional investors (Short Horizon Institutional $\text{Investors}_{i,t}$) is above the sample mean. In column 4, $w_{i,t}$ indicates whether the probability of a SEO is above the sample mean. In column 5, $w_{i,t}$ indicates whether residual debt $\text{maturity}_{i,t}$ is above the sample mean. In column 6, $w_{i,t}$ is equal to one if the firm adopted a poison pill or if the board is classified, and zero if not. In column 7, $w_{i,t}$ indicates whether takeover defense $\text{score}_{i,t}$ (relative to SIC4 peers) is above the sample mean. In column 8, $w_{i,t}$ indicates whether the percentage of words in SEC filings referring to "short-term" as opposed to "long-term" is above the sample mean. i indexes firm and t indexes fiscal year. All variables are defined in Appendix I. Explanatory variables that are collinear with the fixed effects are omitted from the regression. t-statistics in parentheses are based on standard errors clustered in two ways, by SIC2-industry and by fiscal year. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:				$\text{Capex}_{i,t}$				
Proxy for w	CEO Wealth-Performance Sensitivity	CEO Equity Ownership	Institutional Investors Horizon	New SEO Likelihood	Residual Debt Maturity	Poison Pill or C. Board	Takeover Defense Score	#Mentions of ST vs. LT
OLS	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Project $\text{Horizon}_i \times R^2_{lt,t-1} \times w_{i,t-1}$	0.47**	0.42***	0.26**	0.50***	-0.30**	-0.56**	-1.19**	0.36***
	(2.17)	(3.68)	(2.33)	(4.17)	(-2.59)	(-2.42)	(-2.17)	(3.77)
Project $\text{Horizon}_i \times R^2_{st,t-1} \times w_{i,t-1}$	-0.55**	-0.50**	-0.32**	-0.54**	0.30*	0.38***	0.70*	-0.37***
	(-2.15)	(-2.18)	(-2.21)	(-2.57)	(2.02)	(3.04)	(1.73)	(-3.10)
Project $\text{Horizon}_i \times R^2_{lt,t-1}$	0.07	0.06	0.19***	0.13*	0.45***	0.68***	0.35***	0.17**
	(0.70)	(0.54)	(2.99)	(1.73)	(5.65)	(3.02)	(3.79)	(2.56)
Project $\text{Horizon}_i \times R^2_{st,t-1}$	-0.07	-0.06	-0.11	-0.12*	-0.36**	-0.41***	-0.30**	-0.08
	(-0.95)	(-1.25)	(-1.37)	(-1.93)	(-2.11)	(-2.91)	(-2.45)	(-1.07)
$R^2_{st,t-1} \times w_{i,t-1}$	2.16*	2.04**	1.21*	1.81**	-1.23*	-1.59***	-3.15*	1.43***
	(2.01)	(2.07)	(1.99)	(2.15)	(-1.88)	(-3.06)	(-1.74)	(2.94)
$R^2_{lt,t-1} \times w_{i,t-1}$	-1.93**	-1.86***	-0.64	-1.75***	1.05**	2.33**	5.30**	-1.37***
	(-2.18)	(-2.98)	(-1.39)	(-3.65)	(2.42)	(2.41)	(2.25)	(-2.86)
Project $\text{Horizon}_i \times w_{i,t-1}$	0.16	0.14	0.08	0.12	-0.06	-0.02	0.15	0.08
	(1.24)	(1.13)	(1.32)	(0.96)	(-0.68)	(-0.35)	(0.66)	(1.21)
$w_{i,t-1}$	-0.59	-0.51	-0.44	-0.37	0.31	0.08	-0.49	-0.32
	(-1.06)	(-0.99)	(-1.57)	(-0.73)	(0.81)	(0.38)	(-0.50)	(-1.07)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	19,449	23,279	59,219	63,350	23,114	37,466	62,538	54,924

Table V: Differential effects by investment observability

This table presents estimates of firm-level investment specifications (eq.(22)). The dependent variable is $Capex_{i,t}$ defined as capital expenditures scaled by lagged PPENT. Project Horizon$_i$ is the average horizon of firms' projects, which we proxy by the average horizon of the business plan that firms use in the industry. Project Horizon$_i$ is constant by SIC2-industry and is aimed to capture structural differences in project horizon across firms. $R^2_{st,t}$ measures the average informativeness of the short-term forecasts made by all US analysts in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. $R^2_{lt,t}$ measures the average informativeness of the long-term forecasts made by all US analysts in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. In column 1, $\psi_{i,t}$ indicates whether the log of Reporting Lag$_{i,t}$ is above the sample median. In column 2, $\psi_{i,t}$ indicates whether a guidance was made in I/B/E/S for the corresponding capex (i.e., for the same firm and the same fiscal period). In column 3, $\psi_{i,t}$ indicates whether expansion plans were disclosed. Expansion plans are disclosed if at least one news item#31 is recorded in Capital IQ. Capital IQ defines news item#31 as news related to "the growth of a company, usually by means of increasing their current operations through internal growth, like entering into new markets with existing products, opening a new branch, establishing a new division, increasing production capacity, or investing additional capital in the current business. Growth by acquisition is not covered in this event type." i indexes firm and t indexes fiscal year. All variables are defined in Appendix I. Explanatory variables that are collinear with the fixed effects are omitted from the regression. t-statistics in parentheses are based on standard errors clustered in two ways, by SIC2-industry and by fiscal year. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:		Capex$_{i,t}$	
Proxy for ψ	Reporting Lag	Capex Guidance	Expansion Plan Disclosure
OLS	(1)	(2)	(3)
Project Horizon$_i \times R^2_{lt,t-1} \times \psi_{i,t-1}$	0.36**	-0.69***	-0.74***
	(2.25)	(-8.09)	(-3.00)
Project Horizon$_i \times R^2_{st,t-1} \times \psi_{i,t-1}$	-0.31*	0.31*	0.37**
	(-1.95)	(1.96)	(2.46)
Project Horizon$_i \times R^2_{lt,t-1}$	0.16*	0.36***	0.38***
	(1.80)	(3.44)	(3.81)
Project Horizon$_i \times R^2_{st,t-1}$	-0.15	-0.34*	-0.34**
	(-1.63)	(-2.00)	(-2.58)
$R^2_{st,t-1} \times \psi_{i,t-1}$	1.36**	-1.32*	-1.56**
	(2.08)	(-1.86)	(-2.39)
$R^2_{lt,t-1} \times \psi_{i,t-1}$	-1.66**	2.67***	3.27***
	(-2.57)	(6.10)	(3.24)
Project Horizon$_i \times \psi_{i,t-1}$	0.05	0.08	0.07*
	(0.52)	(1.27)	(1.87)
$\psi_{i,t-1}$	-0.17	-0.24	-0.35**
	(-0.45)	(-0.90)	(-2.06)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
N	65,925	66,601	66,601

Table VI: Differential effects by cost of capital (r)

This table presents estimates of firm-level investment specifications (eq.(22)). The dependent variable is $Capex_{i,t}$ defined as capital expenditures scaled by lagged PPENT. Project Horizon$_i$ is the average horizon of firms' projects, which we proxy by the average horizon of the business plan that firms use in the industry. Project Horizon$_i$ is constant by SIC2-industry and is aimed to capture structural differences in project horizon across firms. $R^2_{st,t}$ measures the average informativeness of the short-term forecasts made by all US analysts in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. $R^2_{lt,t}$ measures the average informativeness of the long-term forecasts made by all US analysts in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. $WACC_{i,t}$ is the Weighted Average Cost of Capital, first calculated by firm, then averaged by SIC2-year. Calculation details are provided in the text and in Appendix I. $WACC_{i,t}$ is centered at the mean (for readability of the baseline terms in the regression). In column 1, the source for the equity risk premium is Martin (2016). In column 2 (3), the equity risk premium is estimated every year in-sample (out-of-sample) using the same predictors and the same approach as Campbell and Thompson (2008). In column 4, the source for the equity risk premium is the implied equity risk premium from Damodaran website. i indexes firm and t indexes fiscal year. All variables are defined in Appendix I. Explanatory variables that are collinear with the fixed effects are omitted from the regression. t-statistics in parentheses are based on standard errors clustered in two ways, by SIC2-industry and by fiscal year. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Capex$_{i,t}$			
Proxy for *wacc*	Martin (2017)	Campbell & Thomson (2008)-In	Campbell & Thomson (2008)-Out	Damodaran (2022)
OLS	(1)	(2)	(3)	(4)
Project Horizon$_i\times$ $R^2_{lt,t-1}\times(1+wacc_{i,t-1})^{-1}$	12.75***	13.99**	7.63*	10.77
	(2.84)	(2.39)	(2.01)	(1.13)
Project Horizon$_i\times$ $R^2_{st,t-1}\times(1+wacc_{i,t-1})^{-1}$	-10.02**	-9.19***	-8.50***	-12.23**
	(-2.41)	(-3.49)	(-2.82)	(-2.16)
Project Horizon$_i\times$ $R^2_{lt,t-1}$	0.26**	0.23**	0.32***	0.28**
	(2.30)	(2.30)	(3.09)	(2.19)
Project Horizon$_i\times$ $R^2_{st,t-1}$	-0.28*	-0.36***	-0.37***	-0.30**
	(-1.84)	(-2.89)	(-2.72)	(-2.20)
$R^2_{st,t-1}\times(1+wacc_{i,t-1})^{-1}$	44.6	38.03***	35.63**	48.02**
	(1.55)	(3.19)	(2.65)	(2.16)
$R^2_{lt,t-1}\times(1+wacc_{i,t-1})^{-1}$	-63.78*	-67.28**	-39.29**	-59.55
	(-1.88)	(-2.56)	(-2.35)	(-1.42)
Project Horizon$_i\times(1+wacc_{i,t-1})^{-1}$	0.79	-0.15	1.72**	2.43
	(0.44)	(-0.13)	(2.28)	(0.86)
$(1+wacc_{i,t-1})^{-1}$	-0.26	4.5	-4.07	-1.86
	(-0.02)	(0.85)	(-1.29)	(-0.16)
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
N	52,759	66,593	66,593	66,593

Table VII: Investment allocation within firms

This table presents estimates of division-level investment specification (eq.(23)). The dependent variable is $Capex_{d,i,t}$ defined as capital expenditures scaled by depreciation at the division-firm-year level. Project Horizon$_{d,i}$ is the average horizon of projects by division, which we proxy by the average horizon of the business plan that firms use in the industry of the division. Project Horizon$_{d,i}$ is constant by SIC2-industry and is aimed to capture structural differences in project horizon across divisions operating different SIC2 industries. $R^2_{st,t}$ measures the average informativeness of the short-term forecasts made by all US analysts in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. $R^2_{lt,t}$ measures the average informativeness of the long-term forecasts made by all US analysts in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. i indexes firm and t indexes fiscal year. All variables are defined in Appendix I. Explanatory variables that are collinear with the fixed effects are omitted from the regression. t-statistics in parentheses are based on standard errors clustered in two ways, by SIC2-industry and by fiscal year. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Division Capex$_{d,i,t}$			
Specification	(1)	(2)	(3)	(4)
Project Horizon$_{d,i}\times R^2_{lt,t-1}$	1.26***	1.19***	1.22***	0.75**
	(3.73)	(3.66)	(3.82)	(2.21)
Project Horizon$_{d,i}\times R^2_{st,t-1}$	-1.09***	-1.02***	-1.03***	-0.36**
	(-3.44)	(-3.31)	(-3.62)	(-1.96)
Project Horizon$_{d,i}$	0.17	0.15	0.15	-0.15
	(0.81)	(0.72)	(0.71)	(-1.25)
1/D&A		0.02	-0.01	0.02
		(0.70)	(-0.03)	(1.18)
Division Q$_{d,i,t-1}$		0	-0.48**	0.06*
		(-0.20)	(-2.63)	(1.74)
Division Cash Flow$_{d,i,t-1}$		0.40***	-1.81**	0.19***
		(3.68)	(-2.63)	(5.39)
Division Size$_{d,i,t-1}$		0.03	-0.14	0.03***
		(1.67)	(-0.82)	(3.19)
Firm x Year FE	Yes	Yes	Yes	Yes
Controls Interacted	No	No	Yes	No
Estimation Method	OLS	OLS	OLS	EW GMM
N	17,416	17,416	17,416	17,416

VIII Appendices

Appendix I – Variables' Definition

A – Firm-level variables

Variable	Definition
Main variables	
Capex	*capx/ppent* (from last available financial statements in Compustat). *ppent* is measured at the end of the previous fiscal year (*fyear*).
Project Horizon	Average horizon of projects which we proxy by the average horizon of the business plan that firms use in the industry. Data on firm business plan horizon are collected from SEC filings and averaged by 2-digit SIC industry. Project Horizon is time-invariant by SIC2-industry.
R^2_{lt}	Average informativeness of the long-term forecasts made by all US analysts in I/B/E/S in a given year. Long-term forecasts are forecasts with horizon between 2 and 5 years. R^2_{lt} is obtained by averaging the measure of analysts' forecasts informativeness of Dessaint, Foucault, and Fresard (2022) across all US analysts by fiscal year. Dessaint, Foucault, and Fresard (2022) measure forecasts informativeness by analyst-day-horizon using the R^2 of a regression of realized earnings on predicted earnings across the stocks the analyst covers. A higher R^2 indicates that the forecasts of this analyst on that date at this horizon explain a larger fraction of the variation in realized earnings (e.g., if $R^2 = 1$, the analyst has perfect foresight).
R^2_{st}	Average informativeness of the short-term forecasts made by all US analysts in I/B/E/S in a given year. Short-term forecasts are forecasts with horizon between 1 and 2 years. R^2_{st} is obtained by averaging the measure of analysts' forecasts informativeness developed by Dessaint, Foucault, and Fresard (2022) across all US analysts by fiscal year.
Other variables used as controls and/or for cross-sectional analysis	
#Mentions of ST vs. LT	Percentage of words in SEC filings referring to "short-term" as opposed to "long-term" and defined as $\#ST$ words/($\#ST$ words + $\#LT$ words), where $\#ST$ words (resp. $\#LT$ words) is the total number of occurrences of the words "short-term", "short-run", "current" and "currently" (resp. "long-term" 'and "long-run") in all regulatory forms filed by the company over the fiscal year.
Assets	*at* (from last available financial statements in Compustat).
Capex Guidance	Indicator variable equal to one if a guidance was made about the dollar amount of capex in I/B/E/S for the corresponding fiscal year.
Cash Flow	$(ib + dp)/at$ (from last available financial statements in Compustat).
CEO Wealth Performance Sensitivity	Scaled Wealth-Performance Sensitivity from Edmans, Gabaix, and Landier (2009). This is the dollar change in CEO wealth for a 100 percentage point change in firm value, divided by annual flow compensation. We ignore observations with values over 200.
CEO Equity Ownership	Percentage of equity shares owned by the CEO (Item *shrown_excl_opts_pct* from last available record in Execucomp).
Expansion Plan Disclosure	Indicator variable equal to 1 if the company voluntarily discloses information over the fiscal year about its investment policy and/or its expansion plans (i.e., if one or more News item#31 are recorded in Capital IQ Key Development). According to Capital IQ, news item#31 refers to news related to "the growth of a company, usually by means of increasing their current operations through internal growth, like entering into new markets with existing products, opening a new branch, establishing a new division, increasing production capacity, or investing additional capital in the current business. Growth by acquisition is not covered in this event type."

Variable	Definition
Institutional Investors Horizon	Percentage of institutional investors with short horizon from Derrien, Kecskes, and Thesmar (2013). The horizon of investors is measured based on their portfolio turnover.
New SEO likelihood	Predicted SEO probability over the next 12 months are estimated from a probit model with a dummy equal to one if equity capital is raised as a dependent variable and the lags of Leverage, Cash Flow, Q, Sales Growth, 2-digit SIC Industry Growth, Size, Age, Cash, and an indicator variable equal to one if a dividend was paid as model predictors. Equity capital is raised in a given fiscal year if the total dollar amount of new equity issues ($sstk$) exceeds 5% of the firm market capitalisation ($csho * prcc_f$) at the end of the previous (fiscal) year. Leverage is measured as $(dlc + dltt)/(dlc + dltt + ceq)$. Cash Flow is $(ib + dp)/at$. Q is $(at - ceq + csho * prcc_f)/at$. Sales growth is the growth of sales ($sale$). 2-digit SIC Industry Growth is the average sales growth by 2-digit SIC industry. Size is the log of assets (at). Age is the log of the number of years in Compustat since inception. Cash is the amount of cash (che) as a percentage of total assets (at).
Poison Pill or Class. Board	Indicator variable equal to one if the company adopted a poison pill and/or its board is a classified board. The primary source of information on a firm statute is ISS. When no information is available in ISS, we use Capital IQ.
Q	$(at - ceq + csho * prcc_f)/at$ (from last available financial statements in Compustat).
Residual Debt Maturity	Average maturity of debt amortization defined as $(dd1 + 2 \times dd2 + 3 \times dd3 + 4 \times dd4 + 5 \times dd5)/(dd1 + dd2 + dd3 + dd4 + dd5)$ (from last available financial statements in Compustat).
Size	Log of Assets.
Takeover Defense Score	Takeover Defense Score from Capital IQ. Capital IQ determines the strength of a company's takeover defenses by assigning values to various aspects of its corporate governance and takeover defenses it has adopted and averaging these weighted points. The resulting score is between 0 and 1, with a higher number indicating stronger takeover defenses. The calculation is determined by a proprietary formula by Capital IQ.
WACC (Martin (2016))	Median weighted average cost of capital ($WACC$) by SIC2 industry and fiscal year. Before we calculate this median, $WACC$ is estimated by firm i at every fiscal year-end date t as $WACC_{i,t} = [Ke_{i,t} \times (csho_{i,t} * prcc\_f_{i,t}) + Kd_{i,t} \times (1 - \text{top statutory tax rate}_{i,t}) \times (dltt_{i,t} + dlc_{i,t})]/[(csho_{i,t} * prcc\_f_{i,t}) + dltt_{i,t} + dlc_{i,t}]$, with $Ke_{i,t} = rf_t + \beta_{i,t} \times ERP_t$ and $Kd_{i,t} = rf_t + \text{Corporate Spread}_t$. rf_t is the yield of the 10-year US Treasury bill at t (from FRED St Louis website). Corporate Spread$_t$ is the average spread on BB corporate bonds at t (from FRED St Louis website). $\beta_{i,t}$ is the company 3-year weekly equity beta obtained by regressing weekly excess stock returns (from CRSP) on excess market returns (from CRSP) over the last 3 years. We drop negative betas and betas below 0.1, as well as the same number of observations on the right-hand side of the distribution. ERP_t is the equity risk premium from Martin (2016) at t. All Compustat items are from the last available financial statements.
WACC (Campbell and Thompson (2008) - In)	Same as WACC (Martin (2016)) except that the source for the equity risk premium (ERP_t) is the in-sample predicted excess market return based on the predictors of Campbell and Thompson (2008).
WACC (Campbell and Thompson (2008) - Out)	Same as WACC (Martin (2016)) except that the source for the equity risk premium (ERP_t) is the out-of-sample predicted excess market return based on the predictors of Campbell and Thompson (2008).
WACC (Damodaran (2022))	Same as WACC (Martin (2016)) except that the source for the equity risk premium (ERP_t) is the implied equity risk premium from Damodaran website (https://pages.stern.nyu.edu/ adamodar/)

B – Division-level variables

Variable	Definition
Main variables	
Division Capex	$capxs/dps$ aggregated by 2-digit SIC division (from last available financial statements in Compustat Segments).
Project Horizon	Project Horizon for the corresponding 2-digit SIC division. Average horizon of projects by the division which we proxy by the average horizon of the business plan that firms use in the industry operated by the division. Data on firm business plan horizon are collected from SEC filings and averaged by 2-digit SIC industry. Project Horizon is time-invariant by SIC2-industry.
Other variables used as controls	
Division Assets	ias aggregated by 2-digit SIC division (from last available financial statements in Compustat Segments).
Division Cash flow	ops/ias aggregated by 2-digit SIC division (from last available financial statements in Compustat Segments). ias is measured at the end of the previous fiscal year ($fyear$)
Division Q	Industry Q for the corresponding 2-digit SIC division. Industry Q is the average Q (defined as $(at - ceq + csho * prcc_f)/at$ from last available financial statements in Compustat) across all firms from the same 2-digit SIC industry.
Division Size	Log of Assets.

Appendix II – Derivations in the Model

Proof of Lemma 1.

The equilibrium stock price. We first show that the equilibrium stock price is given by eq.(9) when the informed' trading strategy is given by eq.(8). In equilibrium, the dealer's price must satisfy (see eq.(5)):

$$p_1^*(O; I_b^*, h) = \mathrm{E}(V(I_b^*, h)\,|O = z + x^*(s_{st}, s_{lt}))\,. \tag{24}$$

As $x^*(s_{st}, s_{lt}) = \beta_{st}(s_{st} - \kappa I_b) + \beta_{lt}(s_{st} - I_b)$, we deduce that O is normally distributed with mean $E(O) = 0$ from the viewpoint of the dealer (since the dealer expects the signal s_{st} to be normally distributed with mean κI_b and the signal s_{lt} to be normally distributed with mean I_b). Therefore

$$p_1^*(O; I_b^*, h) = \mathrm{E}(V(I_b^*, h)) + \lambda O, \tag{25}$$

with $\lambda = \frac{Cov(V(I_b^*,h),O)}{Var(O)}$. From eq.(3), we deduce that $\mathrm{E}(V(I_b^*, h)) = \Delta(h, r, \kappa)I_b$. Moreover, using this equation and the fact that $E(O) = 0$, we obtain

$$Cov(V(I_b^*, h), O) = E(V(I_b^*, h)O) = \frac{(1-h)}{1+r}E(\theta_{st}(I_b^*)O) + \frac{h}{(1+r)^2}E(\theta_{lt}(I_b^*)O). \tag{26}$$

Thus, as $\theta_{st}(I_b^*) = \kappa I_b^* + \eta_{st}$ and $\theta_{lt}(I_b^*) = I_b^* + \eta_{st}$, we have (observe that I_b^* is a constant):

$$Cov(V(I_b^*, h), O) = \frac{(1-h)}{1+r}\beta_{st}\sigma^2_{\eta st} + \frac{h}{(1+r)^2}\beta_{lt}\sigma^2_{\eta lt}. \tag{27}$$

Moreover

$$Var(O) = Var(x^*(s_{st}, s_{lt}) + z) = \sigma_z^2 + \beta_{st}^2 Var(s_{st}) + \beta_{lt}^2 Var(s_{lt}), \tag{28}$$

where the second equality comes from (i) the fact that $x^*(s_{st}, s_{lt}) = \beta_{st}(s_{st}-\kappa I_b)+\beta_{lt}(s_{st}-I_b)$, (ii) the independence of z and the informed investors' signals, and (iii) the independence of the informed investors' short-term and long-term signals. Using the expressions for β_j and observing that $Var(s_j) = \frac{\sigma^2_{\eta_j}}{R_j^2}$ for $j \in \{st, lt\}$, we obtain:

$$Var(O) = \sigma_z^2 + (\frac{(1-h)}{1+r})^2\frac{R_{st}^2}{4\lambda^2}\sigma^2_{\eta^2_{st}} + (\frac{h}{(1+r)^2})^2\frac{R_{lt}^2}{4\lambda^2}\sigma^2_{\eta^2_{lt}} \tag{29}$$

Thus, we deduce that:

$$\lambda = \frac{Cov(V(I_b^*, h), O)}{Var(O)} = \frac{\frac{(1-h)}{1+r}\beta_{st}\sigma^2_{\eta st} + \frac{h}{(1+r)^2}\beta_{lt}\sigma^2_{\eta lt}}{\sigma_z^2 + (\frac{(1-h)}{1+r})^2\frac{R_{st}^2}{4\lambda^2}\sigma^2_{\eta^2_{st}} + (\frac{h}{(1+r)^2})^2\frac{R_{lt}^2}{4\lambda^2}\sigma^2_{\eta^2_{lt}}} \tag{30}$$

Substituting β_{st} and β_{lt} by their expressions in the numerator and solving the previous equation for λ, we obtain the expression for λ in Lemma 1.

The informed investor's optimal trading strategy. We now show that if the stock price is given by eq.(9) then it is optimal for the informed investor to use the trading strategy given by eq.(8). The informed investor's optimal order solves:

$$x^* \in Argmax_x E(x(V(I_b, h) - p_1^*(x+z; I_b, h)) \mid s_{st}, s_{lt}). \tag{31}$$

Using the expression for the equilibrium price given in eq.(9) and writing the FOC of this optimization problem, we deduce that:

$$x^*(s_{st}, s_{lt}) = \frac{E(V(I_b^*, h) \mid s_{st}, s_{lt}) - E(V(I_b^*, h))}{2\lambda}, \tag{32}$$

where $E(V(I_b^*, h)) = \Delta(h, r, \kappa)I_b^*$. Moreover, using eq.(3), we obtain:

$$E(V(I_b^*, h) \mid s_{st}, s_{lt}) = \frac{1-h}{1+r}E(\theta_{st} \mid s_{st}) + \frac{h}{(1+r)^2}E(\theta_{lt} \mid s_{lt}). \tag{33}$$

As all variables are normally distributed, standard calculations yield:

$$E(\theta_j \mid s_j) = E(\theta_j) + R_j^2(s_j - E(\theta_j)), \quad for \quad j \in \{st, lt\}. \tag{34}$$

We deduce from eq.(33) that

$$E(V(I_b^*, h) \mid s_{st}, s_{lt}) = E(V(I_b^*, h)) + \frac{(1-h)R_{st}^2}{(1+r)}(s_{st} - E(\theta_{st})) + \frac{hR_{lt}^2}{(1+r)^2}(s_{lt} - E(\theta_{lt})). \tag{35}$$

Hence, substituting this expression for $E(V(I_b^*, h) \mid s_{st}, s_{lt})$ in eq.(32) and observing that $E(\theta_{st}) = \kappa I_b$ and $E(\theta_{lt}) = I_b$, we deduce that:

$$x^*(s_{st}, s_{lt}) = \beta_{st}(s_{st} - \kappa I_b) + \beta_{lt}(s_{st} - I_b), \tag{36}$$

where β_j is as given in the lemma.

Proof of Proposition 1. Eq.(14) follows directly from Eq.(13) by replacing $\gamma(R_{st}^2, R_{lt}^2, h)$ by its expression in eq.(12) and using the fact that $C'(I_m^*) = I_m^*$. The rest of the proposition follows directly from inspection of eq.(14).

Proof of Proposition 2. Following steps that are very similar to those followed to derive Lemma 1, one can show that the expected equilibrium stock price when the firm has two projects is:

$$\mathrm{E}(p_1^*(O, I_{bst}, I_{blt}) = \Delta(I_{bst}, I_{blt}) + \frac{\kappa}{2(1+r)} R_{st}^2 (I_{st} - I_{bst}) + \frac{1}{2(1+r)^2} R_{lt}^2 (I_{lt} - I_{blt}), \quad (37)$$

with $\Delta(I_{bst}, I_{blt}) = \frac{\kappa I_{bst}}{1+r} + \frac{I_{blt}}{(1+r)^2}$ (I_{bh} is the market maker and the informed investor's conjecture about the firm's investment in the short-term and the long-term projects, respectively). We deduce that the first-order condition for the manager's investment problem (eq.(17)) is:

$$I_{st}^* = I^e(\bar{I}) + \frac{\omega}{2}(\frac{\kappa}{1+r}(\frac{R_{st}^2}{2} - 1) - \frac{1}{(1+r)^2}(1 - \frac{R_{lt}^2}{2}), \quad (38)$$

where $I^e(\bar{I}) = \frac{\bar{I}}{2} + \frac{\kappa}{1+r} - \frac{1}{(1+r)^2}$. Thus, $I^e(\bar{I})$ is the efficient level of investment in the short-term project (the one obtained when $\omega = 0$ so that the manager only cares about the long-run value of the firm). The rest of the proposition is immediate.

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