How Financial Markets Create Superstars*

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Abstract

Price discovery in financial markets guides the efficient allocation of resources. Yet we argue that speculators uninformed about firms' fundamentals can profit from distorting the allocative function of prices by inflating stock prices. Such speculation can be profitable because high valuations attract employees, business partners, and investors who create value at targeted firms at the cost of diverting resources away from better firms. The resulting resource misallocation is worst in "normal" (neither hot nor cold) markets and when firms offer stakeholders performance compensation or equity. Investors, such as VCs, can also profit from inflating firm valuations in private markets.

Keywords: Speculation, manipulation, superstar firms, unicorns, market efficiency, stakeholders, high-skilled employees, misallocation of resources.

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1 Introduction

A fundamental function of financial markets is to aggregate information about firms' growth prospects into stock prices. This information is valuable for economic agents (henceforth, "stakeholders"), such as employees, business partners, and investors, as it can guide their decisions of whether to join, do business with, or invest in a firm. In turn, these decisions affect the firm's prospects and its stock price. This feedback channel from prices to real decisions is well understood and empirically relevant, and it constitutes one of the main channels through which financial markets promote economic growth (Subrahmanyam and Titman, 2001; Bond et al., 2012).[1]

Since firms benefit when a high stock price helps them attract key stakeholders, it is not surprising that many firms have tried to influence this feedback channel by projecting an exaggerated image, trying to "fake it till they make it." Examples from VC-backed firms, such as WeWork, abound, but this phenomenon is also common in public markets. Tesla, labeled by Forbes "$1 Trillion of Speculation" (Trainer, 2021), is a case in point. Despite years of fundamental production difficulties, Tesla had become a magnet for speculators who drove its stock price to stratospheric levels, arguably helping the firm attract the financial and human capital that transformed the firm into a superstar. Other pretenders, such as Nikola, have been much less successful, but even pure fraud cases sometimes manage to maintain the pretense for years. For example, buoyed by a steadily increasing stock price, Wirecard doubled its employee count between 2016 and 2019, secured a €150 million loan from Deutsche Bank, and raised €900 million in equity from SoftBank. Wirecard managed to pull this off despite a series of articles in the Financial Times as early as 2015 exposing its fraudulent accounting practices.[2]

In this paper, we argue that, although financial markets eventually separate the wheat from the chaff, the conjecture that market participants always have incentives to eradicate firms trying to "fake it till they make it" is wrong. In fact, we show that an inherent feature of financial markets is that they will also promote such behavior. Specifically, the fact that informed speculators impound information into prices that can guide the decisions of stakeholders makes it profitable also for uninformed speculators — i.e., speculators without any private information about a firm's fundamentals — to trade as if they were positively informed about the firm's prospects. Such trading erodes both information and real efficiency, as uninformed speculators effectively endorse firms trying to "fake it till they make it." This

[1] For evidence that information and prices in financial markets are of first-order importance for prospective stakeholders, see Turban and Greening (1997), Bergman and Jenter (2007), Agrawal and Matsa (2013), Brown and Matsa (2016), and Liang, Williams, and Xiao (2021).

[2] See "The House of Wirecard," April 27, 2015, *Financial Times*.

trading strategy by uninformed speculators can be very profitable, even when everyone is rational and anticipates it in equilibrium. Uninformed speculators profit from inflating prices for the same reason that firms that try to "fake it till they make it" do — because high valuations help these firms attract third-party capital, business, and employees that make the firms better. The profits of speculators come at the expense of the truly good firms in the economy that, as a result, cannot attract or have to overpay to attract stakeholders.

We develop a model in which a firm releases non-verifiable news about its prospects, which triggers trading in its stock. A market maker sets prices, anticipating that the order flows may come from noise traders or speculators. We use the term "speculators" to refer to strategic, profit-motivated players whose entry is endogenous. Notably, these traders have a long-term focus and, thus, include not only hedge funds but also buy-and-hold traders. These speculators may or may not be able to infer the firm's true prospects from the released news, giving rise to either informed or uninformed strategic trading. The firm's prospects depend on whether it can attract crucial stakeholders who have outside opportunities. Being outsiders, these prospective stakeholders make rational inferences about the firm's prospects from its stock price.

In this setting, we first show that uninformed speculators can profit from buying and inflating the firm's stock as if they had positive information about its prospects, thereby effectively endorsing firms trying to "fake it till they make it." What is important is that stakeholders are rational and break even in expectation. However, since they cannot distinguish between firms with better prospects and firms with inflated stock prices but poorer prospects, stakeholders require the same payments from both types of firms. These "average" payments benefit firms with inflated valuations, which can now attract stakeholders (at a lower cost) at the expense of good firms. The key insight is that this cross-subsidization from good firms to firms with inflated valuations can make uninformed speculation profitable. It does so by limiting the uninformed speculators' downside risk of inflating the price of the wrong firms (i.e., firms trying to "fake it till they make it") since cross-subsidization also allows such firms to make a profit from attracting stakeholders.

Our model generates clear predictions for when uninformed speculation is likely to promote firms trying to "fake it till they make it." In particular, a key necessary condition for uninformed speculators to profit from inflating a firm's stock price is that the firm offers stakeholders contracts linked to firm value, such as equity, that facilitate cross-subsidization. Otherwise, with contracts offering fixed payments that do not depend on the firm's true prospects, stock prices are irrelevant to stakeholders; there is no cross-subsidization from good firms to firms with inflated stock prices; and uninformed speculators cannot profit from inflating prices above their fundamental value. Notably, this insight explains why prior work studying how stock prices affect internally funded investment decisions — i.e., when there are no third parties and no cross-subsidization — has argued that uninformed speculation triggering feedback effects by inflating prices is never profitable (Goldstein and Guembel, 2008). Hence, a key takeaway of our model is that shifting attention to third parties — as when firms try to attract employees or external financing to fund investments — reverses this central prediction from prior work. In line with the cited anecdotal evidence, our model predicts that potential targets of speculative trading will be firms that offer employees significant performance or equity-based pay or firms that seek external financing (especially equity) to fund investments.

Firms with more-dispersed cash flows will be more affected, as then the impact of information asymmetry is harder to tackle through optimally designing the contracts offered to stakeholders, and the scope for cross-subsidization is larger. The resulting misallocation of resources harms real efficiency by diverting resources away from their most efficient use. Since this harms firms from an ex ante perspective before the shock is realized, firms may end up undertaking projects with suboptimally low cash-flow dispersion, which adds another layer through which uninformed speculation distorts real efficiency. These effects are likely to be magnified in winner-takes-all industries.

We also study the market conditions under which uninformed speculation, accommodating "fake-it-till-you-make-it" strategies, can arise. For uninformed speculators to profit when an inflated stock price triggers feedback effects, market conditions need to be "normal" (i.e., neither hot nor cold), as captured, among others, by the stakeholders' prior beliefs about the firm's prospects. To see this, recall that uninformed speculators can profit from inflating the firm's stock price only if that facilitates sufficiently large cross-subsidization across firms. However, the scope for such cross-subsidization is limited if the stakeholders' prior beliefs are already very positive, such as in hot markets. In particular, prices in hot markets are too high for rational uninformed speculators to profit from inflating prices. Stakeholders' prior beliefs cannot be very negative either, as it is then very hard to inflate stock prices to a sufficiently high level to attract stakeholders.

Extending our model to evaluate the impact of the regulatory and market environments on uninformed speculation, we show that uninformed speculation is particularly likely for intermediate firm-level transparency: for low levels of transparency, stock prices are not informative to trigger positive feedback effects; and for high levels of firm-level transparency, prices will increase steeply following buy orders, making it impossible for uninformed speculators to profit. We also touch upon the role of post-trade transparency, trading fees, and margin requirements and show that, contrary to firm-level transparency, intermediate levels of such policies undermine the profitability of uninformed speculation. Notably, relaxing short-selling restrictions to stimulate corrective trading is unlikely to have a major impact. We show that, once triggered by speculative buying, positive feedback effects are hard to reverse, even in the absence of short-sale restrictions.

High valuations can attract stakeholders not only in secondary markets, but also when firms raise capital.[3] The key difference in this case is that investors buy securities directly from the firm instead of gradually from an uninformed market maker. Thus, in stark contrast to speculation in secondary markets, inflating a firm's valuation can be profitable for investors only if there is a separate way to compensate them for agreeing to a valuation above the firm's fundamental value. In particular, the firm and investors may agree on contract provisions offering investors additional cash flow rights unobservable to stakeholders. This prediction is in line with standard practices in venture capital, where it is estimated that most unicorns will lose their coveted unicorn status once accounting for such contract arrangements (Gornall and Strebulaev, 2020). Once again, such strategies erode real efficiency, and their cost is borne by the truly good firms that end up cross-subsidizing bad firms. However, while regulation exclusively targeting speculative trading in secondary markets seems hard, the policy implications for private markets seem clear-cut. Regulation mandating that firms better inform stakeholders about how the firm's financing arrangements affect the value of contingent contracts could lower the incentives of investors to inflate firm valuations. Together with our baseline model, our results help explain why unicorns can be created despite an apparent discrepancy with fundamentals in private markets and why the "buzz" can persist and have a positive real effect on firm value in secondary markets.

Related Literature. Our paper's main contribution is to show that financial markets may not only fail in their basic function of exposing firms trying to "fake it till they make it" but may even incentivize firms to pursue such strategies. Our predictions also illuminate both the market conditions under which uninformed speculation will proliferate and the type of firms pursuing "fake-it-till-you-make-it" strategies that uninformed speculators are likely to promote. These predictions add to the fast-growing literature studying feedback effects from secondary markets on firm value (Dow and Gorton, 1997; Bond, Edmans, and Goldstein, 2012; Lin, Liu, and Sun, 2019; Goldstein, 2022) and, in particular, to the work exploring the feedback effect between a firm's stock price and the firm's ability to attract key employees, business partners, and investors (Subrahmanyam and Titman, 2001).

[3] Gompers et al. (2020) report that over 90% of VCs consider most unicorns to be overvalued. Silicon Valley offers numerous examples: Theranos' high valuation helped it attract over 800 highly skilled employees and raise additional capital in multiple investment rounds. Similarly, WeWork's high initial valuation led to a large inflow of employees who believed that "it was going to be a rocket ship." Notably, Theranos and WeWork attracted capital and employees, despite widespread concerns about their *true* prospects (Ioannidis, 2015; Frank, 2017).

Our result that uninformed speculators can profit from inflating stock prices is, perhaps, surprising, given that prior work has argued that such speculation cannot be profitable (Goldstein and Guembel, 2008; Edmans, Goldstein, and Jiang, 2015). The difference derives from the fact that in these papers, financial markets mislead internally-funded investment decisions, which always destroys shareholder value. Hence, uninformed speculators cannot profit from inflating prices but only from short selling undermining prices (Goldstein and Guembel, 2008). On the contrary, we show that uninformed speculative buying can be profitable, as high prices affect the decisions of outside third parties, such as investors or employees. Notably, the effect of prices on such third parties is also prominent in Goldstein, Ozdenoren, and Yuan's (2013) model of market frenzies. In their model, small traders with correlated information about firm fundamentals put more weight on such information in their trading since that affects the decisions of capital providers. However, there is no uninformed speculation and, thus, "fake-it-till-you-make-it" strategies and trading promoting such strategies do not arise. By contrast, all of these aspects are central to our model. Moreover, we provide clear predictions about the type of firms that will be affected and the market conditions and regulatory environments that are likely to be conducive to uninformed speculation inflating prices.[4]

Endogenizing feedback effects not only leads to additional predictions but also reverses central predictions of models based on exogenous feedback effects, where firm value is mechanically tied to price. In particular, we show that speculators with no pre-existing position in the firm can initiate profitable speculative trading. Thus, the scope for such trading is very large, as it is potentially open to anyone. By contrast, when feedback effects are exogenous, the scope for uninformed speculation is limited, as trading that inflates a firm's stock price is never beneficial to speculators unless they are already large shareholders in the firm (Khanna and Sonti, 2004). This fundamental difference in predictions shows that the failure to endogenize feedback effects diverts attention away from the vast majority of speculators who can benefit from such strategies. By endogenizing these effects, we can also study the economic forces and market conditions that make uninformed speculation more attractive. More broadly, the feedback mechanism we describe contributes to work in which speculators pump up a firm's stock price (or engage in spoofing), hoping to sell at a higher price (Allen and Gorton, 1992; Chakraborty and Yilmaz, 2004; Skrzypacz and Williams, 2022). The main difference from such schemes is that speculative trading in our setting affects the fundamental value of a targeted firm. Furthermore, speculation is by buy-and-hold rather

[4] Our result that reversing positive feedback effects is hard even when short sellers have negative information *reinforces* the profitability of inflating prices. What further strengthens this prediction is that, in practice, large blockholders can trade against short sellers, and managers can engage in stock repurchases (Campello, Matta, and Safi, 2020).

than pump-and-dump investors. Related to our work, Cetemen et al. (2023) consider how an informed investor's trading can encourage the entry of wolf-pack activists; however, the key difference is that our model focuses on manipulative trading by uninformed investors effectively endorsing firms trying to "fake it till they make it."[5] The insights that uninformed investors can knowingly endorse such firms, which results in misallocation of resources in both public and private markets, are the key differences from prior work also exploiting that high valuations help attract stakeholders (Subrahmanyam and Titman, 2001; Khanna and Mathews, 2016). Finally, our result that uninformed speculation is more likely to occur when firms' transparency is intermediate complements work on how transparency affects feedback effects of financial markets, which has focused mainly on how disclosure may crowd in or crowd out information production by traders (Gao and Liang, 2013; Goldstein and Yang, 2017, 2019).[6]

2 Model

We consider a penniless firm that tries to attract stakeholders to realize a growth opportunity. Stakeholders can be interpreted as high-quality employees or business partners, or, alternatively, as capital providers. The firm's stock is traded, and its price is set by a market maker depending on the trading orders. Prospective stakeholders infer the firm's prospects from its stock price, which guides their decision of whether to accept the contract offered by the firm. All players are risk-neutral and maximize their profits, and there is no time discounting. In what follows, we add more structure to this framework.

Timeline. There are four dates, $t \in \{0, 1, 2, 3\}$. At date $t = 0$, a firm-specific shock $\omega \in \{G, B\}$ realizes that affects the probability of success of the investment opportunity. The firm observes a perfect but non-verifiable signal about ω. News about the shock — i.e., the information that ω has realized but not the value of ω — becomes publicly known at date $t = 1$, which triggers trading at dates $t = 1$ and $t = 2$. There are two agents in the financial market: a trader ("she") and a market maker ("he"). The market maker does not

[5] Our focus on how stock prices attract stakeholders also differentiates our paper from prior work that studies how feedback effects impact asset sales (Frenkel, 2020). Interestingly, Matta, Rocha, and Vaz (2020) show that speculators can benefit from shorting a firm's stock while buying its competitor's stock, and Ahnert, Machado, and Perreira (2022) argue that trading can affect the probability of a government bailout.

[6] More broadly, our result that uninformed trading affects the firm's fundamental value by attracting stakeholders adds to other mechanisms through which trading affects shareholder value, such as by affecting shareholders' incentives to intervene to discipline management (Maug, 1998), to vote (Levit, Malenko, and Maug, 2020), to exert pressure through the threat of exit (Edmans and Manso, 2011), and to use short-term debt (Voss, 2022).

have the specialized knowledge to interpret the news and infer ω. Furthermore, he cannot distinguish whether he is facing a noise trader or a strategic trader. The ex ante probability of facing a noise trader who does not trade strategically is β. The probability of facing a strategic trader is $1-\beta$.[7] It is common knowledge that the trader and her type are the same in both periods.

Strategic traders, henceforth "speculators," observe a signal s about the firm-specific shock ω. The informativeness of the signal depends on the information available about the firm. Intuitively, if there is more information about the firm, it is easier for the speculator to infer the firm-specific shock from the news.[8] Specifically, with probability α, the speculator's knowledge about the firm is sufficient, and her signal perfectly reveals ω. With probability $1-\alpha$, the speculator's signal is pure noise (i.e., $s=\varnothing$). Note that unlike the bulk of the literature (see Bond et al., (2012) for an overview), our model does not assume that financial markets are better informed than the firm's management about the firm's prospects; what matters for our mechanism is that a speculator can be more informed than prospective stakeholders.

At date $t=3$, the firm offers a contract to prospective stakeholders who need to be compensated for forgoing $\overline{w}$. If we interpret stakeholders as employees or business partners, $\overline{w}$ can be interpreted as their outside option; and if we interpret stakeholders as capital providers, $\overline{w}$ can be interpreted as the amount they invest directly in the firm. Prospective stakeholders observe the firm's stock price, form their beliefs about the firm-specific shock and their expected compensation given the contract offered by the firm, and decide whether to accept it.

In Section 4, we extend this baseline model by introducing an additional period during which the firm raises start-up capital. We relegate the details of this extension to Section 4.

Projects and Contracting. If the firm attracts stakeholders, it has a probability λ_ω of becoming a "star" and generating $x>0$. This probability is higher if the shock is good, i.e., $\lambda_G-\lambda_B=:\Delta\lambda>0$. If the firm does not attract stakeholders, it generates low cash flow $y\geq 0$, where $x-y:=\Delta y>0$. It is common knowledge that the ex ante probability that the shock is good ($\omega=G$) is q_0, and the probability that the shock is bad ($\omega=B$) is $1-q_0$. We assume that the present value of attracting stakeholders is greater than stakeholders' outside option if $\omega=G$ and that $\overline{w}>y$, so that any contract the firm offers to stakeholders will contain a positive output-dependent component.

[7] Initially, we take β as given but later endogenize it (Section B.1 in the Appendix).

[8] To give an example, suppose that there is news that the firm's CFO resigns. Noise traders and the market maker do not know how to interpret this news, but strategic traders, who closely follow the firm, might be able to infer the news's true information content.

Contracting with prospective stakeholders involves offering a payment of R that the firm pays to stakeholders regardless of the cash flow realized at $t = 3$, and a payment ΔR that the firm pays in addition to R in the high-cash-flow state. The firm chooses the contract to maximize its expected payoff

$$\max_{R,\, \Delta R} \; y - R + \lambda_\omega \left(\Delta y - \Delta R\right).$$

subject to the prospective stakeholders' participation constraint

$$R + \left(\lambda_B + q_{D_1 D_2} \Delta\lambda\right) \Delta R \geq \overline{w}, \tag{1}$$

where $q_{D_1 D_2} := \Pr(\omega = G | p_{D_1}, p_{D_1 D_2})$ denotes the stakeholders' posterior beliefs that the firm-specific shock is $\omega = G$. This shorthand notation makes it explicit that the beliefs depend on the prices, which depend on the order flows (D_1 and D_2) observed by the market maker in the financial market. As is standard, we assume that all parties are protected by limited liability and that contracts are monotone, i.e., $0 \leq R \leq y$ and $0 \leq \Delta R \leq \Delta y$.[9] The latter monotonicity assumptions ensure that no party has incentives to sabotage the firm (Innes, 1990). Once the firm attracts stakeholders, its project is implemented, and all cash flows are realized. In Section 3.5, we extend this baseline model to consider stakeholders leaving the firm after they have accepted its offer in a preceding period.

Trading in the Financial Market. Following Glosten and Milgrom (1985), we assume that the market maker sets a bid and an ask price at which he is willing to sell or buy one unit of the stock.[10] The price is equal to the firm's expected value, conditional on the information revealed by the order flow, D_t. Price p_{D_1} at $t = 1$ is conditional on the order flow, D_1, at $t = 1$, and price $p_{D_1 D_2}$ at $t = 2$ is conditional on the order flows at $t = 1$ and $t = 2$. The market maker absorbs the trading flow from his inventory.

We assume that before trading starts at $t = 1$, the speculator has neither long nor short positions in the firm, and after observing signal s, she submits her trading orders to maximize her expected final-period payoff, defined below. We restrict attention to market orders of the form $D_t \in \{-1, 0, 1\}$, i.e., in each period, the trader can buy, (short) sell one unit, or do

[9] We can further relax the assumptions that the firm is penniless and that the project's cash flows are binary. Ultimately, all that will matter for our analysis is that the firm offers state-contingent contracts (see Proposition 2).

[10] In a previous working paper version, we show that our main findings also persist in a setting based on Kyle (1985), in which there are two traders — one noise trader and one speculator who is informed with probability α and uninformed with probability $(1 - a)$.

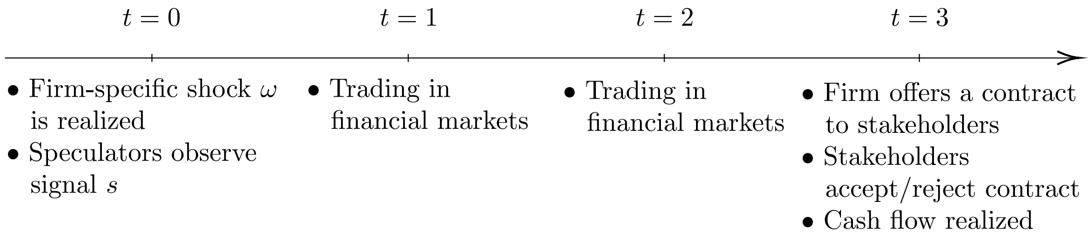

Figure 1: Timeline.

nothing. The speculator's problem boils down to

$$\max_{D_{1,2} \in \{-1,0,1\}} \mathrm{E}\Big[\left(y + \varphi\left(-R + \left(\lambda_B + q(s)\Delta\lambda\right)\left(\Delta y - \Delta R\right)\right) - p_{D_1}\right) D_1 + \left(y + \varphi\left(-R + \left(\lambda_B + q(s)\Delta\lambda\right)\left(\Delta y - \Delta R\right)\right) - p_{D_1 D_2}\right) D_2 \Big], \tag{2}$$

where her beliefs $q(s) := \Pr(\omega = G|s)$ at the time of placing the trading orders are $q(B) = 0$, $q(\varnothing) = q_0$, and $q(G) = 1$; E is the speculator's expectation over the probability φ that stakeholders accept the contract $\{R, \Delta R\}$ offered by the firm at $t = 3$. Note that in equilibrium, the speculator correctly anticipates $\{R, \Delta R\}$, p_{D_1}, and $p_{D_1 D_2}$, implying that φ will be either zero or one. We assume that noise traders are non-strategic and submit a trading order equal to -1, 0, or 1 with equal probability.

Equilibrium Concept. The equilibrium concept is Perfect Bayesian Equilibrium in pure strategies, in which (i) the firm offers the contract maximizing its profits; (ii) prospective stakeholders accept the firm's offer if their participation constraint is satisfied; (iii) the speculator submits her trading orders to maximize her expected final-period payoff; (iv) the market maker chooses the price-setting rule that allows him to break even in expectation; (v) all players use Bayes' rule to update their equilibrium beliefs; and (vi) all players are rational, and their beliefs about the other players' strategies are correct in equilibrium. Figure 1 summarizes the model.

Alternative Interpretations. Typical examples of non-financial stakeholders that we have in mind are employees or business partners. However, our model also applies to financial stakeholders, such as capital providers. In particular, institutional investors, endowments, banks, and family offices that invest in myriad firms, are likely to pay attention to prices to inform their investment decisions.[11] Furthermore, note that our insights are not restricted

[11] Prices could also play a role for target firms in M&A transactions, whose owners demand at least $\overline{w}$ to sell out.

to a firm attracting new stakeholders. An alternative interpretation of the model is as a principal-agent problem, in which a principal offers a contract to the agent to incentivize her to take an action that increases the firm's value at a private cost of $\overline{w}$ to the agent. Another interpretation is that agents/stakeholders need to be persuaded not to leave for an outside option paying $\overline{w}$.

3 Why and When Inflating Prices Is Profitable

We solve the model backward by first characterizing the stakeholders' decision of whether or not to accept the contract offered by the firm at $t = 3$. Then, we analyze the trading game at $t = 2$ and $t = 1$.

The firm attracts the stakeholders at date $t = 3$ if their posterior beliefs indicate that the contract offered by the firm is at least as valuable as their outside option $\overline{w}$. A necessary condition for such a contract to be feasible is that stakeholders' participation constraint can be satisfied for the highest feasible payment $(R, \Delta R) = (y, \Delta y)$ that the firm can offer, i.e.,

$$y + (\lambda_B + q_{D_1D_2}\Delta\lambda)\,\Delta y \geq \overline{w},$$

which is equivalent to

$$q_{D_1D_2} \geq q^* := \frac{\overline{w} - y - \lambda_B\Delta y}{\Delta\lambda\Delta y}. \tag{3}$$

At the core of our model is that the market maker learns about ω from the trader's trading patterns, and stakeholders learn about ω from the resulting stock prices. Such learning is valuable because the firm has no incentives to truthfully report ω: since the firm is cashless and protected by limited liability, it always finds it profitable to try to attract stakeholders, regardless of the shock realization ω. In particular, a firm observing $\omega = B$ will always pretend that it has observed $\omega = G$ since attracting stakeholders gives it a chance of generating positive cash flows, which are strictly higher than the firm's outside option of generating zero. We refer to this well-known strategy by its colloquial label "fake it till you make it," which, in practice, can range from merely exaggerating the firm's prospects to window dressing or outright fraud.[12] The key novelty of our paper lies in studying the role of financial markets in promoting this strategy. Initially, we simplify the exposition by normalizing the firm's cash flows in the low-cash-flow state to zero, i.e., $y = 0$, as this allows us to abstract from issues related to contracting. We study the importance of contracts by allowing for $y > 0$ in Section 3.3.

[12] We do not model this difference, but, naturally, the threat of a criminal prosecution can be modeled as a cost that will ultimately reduce the firm's incentives to engage in fraud.

3.1 Benchmark: Stakeholders Do Not Learn From Prices

To establish a benchmark, we start by exploring the case in which stakeholders do not use the information revealed by prices to update their beliefs about the firm. In this case, trading and prices have no real feedback effects. Furthermore, in our model, an uninformed trader cannot make a profit because when she buys, she buys at a higher price, and when she sells, she sells at a price that is lower than what she believes the firm's true value to be. These unfavorable price adjustments occur because the market maker accounts for the probability that the trades might be coming from an informed trader. Thus, buy orders lead to a price increase and sell orders to a price decrease. Relegating all formal proofs to the Appendix, we can summarize this benchmark case as:

Lemma 1 *If stakeholders do not consider stock prices when deciding whether to accept the contract offered by the firm, trading does not trigger feedback effects, and the speculator does not trade if she is uninformed.*

As Lemma 1 makes clear, our setting is stacked against uninformed traders. The purpose is to isolate the benefit for uninformed traders from triggering feedback effects by inflating stock prices when stakeholders learn from prices.[13]

3.2 How Uninformed Speculation Creates Stars

Our first main result is that uninformed speculation can be profitable if stakeholders use stock prices to inform their decision about whether to accept a contract offered by the firm.

Proposition 1 *If stakeholders learn from prices, an uninformed speculator ($s = \varnothing$) can profit from mimicking the trading strategy of a positively-informed speculator ($s = G$). In these equilibria, uninformed speculation helps a bad firm ($\omega = B$) "fake it till it makes it" by attracting stakeholders at the same cost as good firms ($\omega = G$).*

The uninformed speculator's profit is derived from the fact that she is better informed about the direction of her follow-up trades. In particular, she is better informed about how these trades are likely to affect the stakeholders' beliefs and, as a result, the firm's fundamental value by triggering a positive feedback effect. We define as a "positive feedback effect" the case in which a high stock price leads stakeholders to rationally infer that the

[13] An uninformed speculator could make a trading profit (though not from triggering feedback effects) in a modification of our model with two traders — a noise trader and a speculator, similar to Kyle (1985). In this modification, if the noise trader buys in the first period (moving prices up), the uninformed speculator can profit from short selling in the second period, as she knows there is no informed trader around. Such profit opportunities do not exist in our model, as all trades come from the same trader.

firm's prospects are better than indicated by their prior beliefs, leading them to accept the contract offered by the firm. In turn, the anticipation of this effect increases the firm's fundamental value and, therefore, its stock price. In what follows, we make this intuition more precise by showing why the uninformed speculator's trading strategy can be profitable even though the market maker and prospective stakeholders are rational, anticipate the speculator's strategy, and break even in expectation.

Consider the following candidate equilibrium in which the uninformed speculator trades as if she had positive information about the firm: the speculator buys in both periods if her signal is good or uninformative, $s \in \{G, \varnothing\}$, and sells if the signal is bad, $s = B$. Hence, in this equilibrium, buy orders reveal potentially positive information about the firm's prospects, whereas sell orders indicate negative information. The firm can attract stakeholders if their expectation (given the stock price) about the compensation offered by the firm is higher than their outside option $\overline{w}$. By standard arguments, the firm optimally sets the stakeholders' compensation such that they break even given their beliefs — i.e., condition (1) holds with equality (for details, see Lemma C.2 in the Appendix). Since $y = 0$, the only feasible value for R is zero, and it follows that $\Delta R = \frac{\overline{w}}{\left(\lambda_B + q_{D_1 D_2} \Delta\lambda\right)}$.

Next, consider the pricing of the firm's equity. For illustrative purposes, we discuss the case in which the speculator buys in both periods. Since the market maker must account for the probability that buy orders might also be coming from uninformed or noise traders, the price does not fully adjust to the firm's true value, even after two buy orders ($D_1 = D_2 = 1$). As a result, the price p_{11} at $t = 2$ after a buy order in each trading period and the price p_1 at $t = 1$ after a buy order in the first trading period, respectively, are

$$p_{11} = (\lambda_B + q_{11}\Delta\lambda)\left(x - \frac{\overline{w}}{\lambda_B + q_{11}\Delta\lambda}\right), \tag{4}$$

$$p_1 = \pi_{11} p_{11} + (1 - \pi_{11})(\lambda_B + q_0\Delta\lambda)\left(x - \frac{\overline{w}}{\lambda_B + q_0\Delta\lambda}\right)\mathbf{1}_{q_0 \geq q^*}, \tag{5}$$

where π_{11} is the (endogenous) probability that the market maker assigns to observing a buy order at $t = 2$ after observing a buy order at $t = 1$; $1_{q_0 \geq q^*}$ is an indicator function that takes the value of one if $q_0 \geq q^*$ and zero otherwise. Recall that if $q_0 \geq q^*$, the firm is able to attract stakeholders even if prices do not convey any new (positive) information; in that case, the firm attracts stakeholders at a compensation of $\Delta R = \frac{\overline{w}}{\lambda_B + q_0\Delta\lambda}$. Note that in this equilibrium, if a buy order at $t = 1$ is not followed by a buy order at $t = 2$, the market maker is certain that he is facing a noise trader. Then, the price does not generate any new information, and the market maker's and stakeholders' posterior belief is $q_{1,D_2 \neq 1} = q_0$.

Since it is a standard result that an informed trader can profit from her information advantage by trading with her information, we focus on the case in which the speculator is uninformed. The uninformed speculator's valuation of the firm if the stakeholders accept a contract promising them $\Delta R = \frac{\overline{w}}{\lambda_B + q_{11}\Delta\lambda}$ is

$$(\lambda_B + q_0\Delta\lambda)\left(x - \frac{\overline{w}}{\lambda_B + q_{11}\Delta\lambda}\right). \tag{6}$$

Notably, the price p_{11} (given by (4)) at which the uninformed speculator buys at $t = 2$ is higher than her expectation about the firm's value, given by (6), as $q_{11} > q_0$. Intuitively, the price cannot be lower, as it must reflect a higher probability that the firm-specific shock is good compared to uninformed players' prior beliefs, i.e., $q_{11} > q_0$. Thus, an uninformed speculator cannot make a profit in a one-period trading game despite triggering positive feedback effects at the firm.

However, an uninformed speculator can profit from multi-period trading, as she may be able to execute her initial trade at a lower price because the market maker is still uncertain whether the buy pressure will continue and the firm will be able to attract stakeholders at a lower cost. Specifically, if the price p_1 (given by (5)) at which she buys at $t = 1$ is lower than her valuation of the firm, the trading profit from the first trading period could more than offset the loss from the second.[14] Note that despite the second-period trading loss, there is no time inconsistency in the uninformed speculator's trading strategy, as, without her second trade, the firm will not be able to attract stakeholders at a lower cost.

In a nutshell, uninformed speculation can be profitable because the speculator is better informed (compared to the market maker) about whether she will continue buying at $t = 2$, with the resulting higher price triggering positive feedback effects at the firm. That is, the speculator's private information that she intends to continue to inflate the price, which will allow the firm to attract stakeholders (at a lower cost), gives rise to an endogenous information rent. This rent arises despite the fact that the speculator has no private information about the firm-specific shock ω. The reason that the price p_1 at $t = 1$ may react only slowly, allowing the uninformed speculator to make a profit on her first-period trade, is that the market maker must take into account that the order flow could be coming from noise traders. This intuition also extends to alternative equilibria with uninformed trading, such as those in which the speculator buys only in $t = 1$ and does not trade in $t = 2$ if $s \in \{G, \varnothing\}$. Such equilibria are even more profitable for an uninformed speculator because, then, she does not

[14] For comparison, note that a positively-informed speculator (observing $s = G$) makes a profit on both trades, as her valuation, $\lambda_G (x - w)$, is higher than both p_1 and p_{11}.

incur trading losses from buying in the second period.[15]

Other Equilibria. So far, we have presented the case in which uninformed speculators find it profitable to inflate stock prices. It is conceivable that an uninformed speculator might also pursue the opposite strategy – mimicking the trading strategy of a negatively-informed speculator by, for example, short selling in both periods. We discuss short selling in detail in Section 3.5. For completeness, we should note that there can also be equilibria without uninformed speculation. Since these equilibria are well understood, we describe them in the Online Appendix (Proposition B.2).[16]

3.3 When Does Uninformed Speculation Occur?

In what follows, we develop the intuition behind the necessary and sufficient conditions for uninformed speculation to be profitable.

3.3.1 The Importance of Contract Design

A central insight from our paper is that an uninformed speculator can profit from inflating a firm's stock price only if the firm compensates stakeholders with state-contingent contracts. Explaining why this is the case requires investigating at whose expense the speculator makes a profit.

Stakeholders and the market maker in our model are rational and break even — thus, they do not lose out, in expectation, from the fact that speculators might be trading with no information about the firm-specific shock. In particular, they anticipate that buy orders might be coming from an uninformed speculator and that the firm's stock price might be higher than warranted. As a result, stakeholders' posterior beliefs do not improve as much as they would in equilibria without uninformed speculation, forcing firms with good prospects to offer more favorable terms to attract stakeholders. However, these "average terms" benefit firms with inflated valuations by allowing them to attract stakeholders (at a lower cost). Hence, truly good firms with stock prices below fundamental value end up cross-subsidizing worse firms that can pool with them because their stock prices are inflated by uninformed speculators. Therefore, the key implication is that the profits of the uninformed speculator

[15] In such equilibria, the lack of short selling that reverses the price increase in $t = 1$ implies that stakeholders' posterior beliefs about the firm continue improving in $t = 2$.

[16] We do not discuss equilibrium selection, as it goes beyond the scope of our paper. In practice, it is conceivable that when equilibria with and without uninformed speculation coexist, uninformed speculative trading could be triggered by news releases, possibly overhyped by (social) media. Goldman, Martel, and Schneemeier (2021) have recently analyzed the importance of media for stock prices.

come at the expense of the truly good firms.[17] Intuitively, cross-subsidization limits the downside risk for uninformed speculators of inflating the price of the wrong firms (i.e., firms trying to "fake it till they make it") since cross-subsidization also allows such firms to make a profit from attracting stakeholders.

To formalize the intuition, we consider the case in which the firm generates a positive cash flow also in the low-cash-flow state, i.e., $y > 0$. Under the optimal contract, stakeholders' participation constraint (1) binds. Therefore, for any given output-independent compensation, R, we can express the output-dependent compensation offered to stakeholders as $\Delta R = \frac{\overline{w}-R}{\lambda_B + q_{D_1 D_2}\Delta\lambda}$. In what follows, we show that the speculator's expected payoff increases in the degree of cross-subsidization, which will be captured by the size of ΔR. This claim follows from two observations.

First, note that the prices set by the market maker do not depend on the contract the firm offers to stakeholders. This is because the market maker has the same information as stakeholders. Thus, from the perspective of both the market maker and stakeholders, the expected value of the contract offered to stakeholders is just equal to the stakeholders' outside option $\overline{w}$. This can be easily illustrated in the case in which the speculator buys the firm's stock in both trading dates if $s \in \{G, \varnothing\}$. The prices at $t = 1$ and $t = 2$ are then

$$p_{11} = y - R + (\lambda_B + q_{11}\Delta\lambda)\left(\Delta y - \frac{\overline{w} - R}{(\lambda_B + q_{11}\Delta\lambda)}\right), \tag{7}$$

$$p_1 = \pi_{11}p_{11} + (1 - \pi_{11})\left(y + \mathbf{1}_{q_0 \geq q^*}\left(-R + (\lambda_B + q_0\Delta\lambda)\left(\Delta y - \frac{\overline{w} - R}{(\lambda_B + q_0\Delta\lambda)}\right)\right)\right), \tag{8}$$

where we use that, for any given R, $\Delta R = \frac{\overline{w}-R}{\lambda_B + q_{D_1 D_2}\Delta\lambda}$. As expressions (7) and (8) confirm, the prices p_1 and p_{11} do not depend on whether the firm offers stakeholders a contract with a high or low output-independent component, R.

Second, note that in stark contrast to the first observation, the speculator's valuation of the firm depends on the contract offered to stakeholders. Intuitively, by becoming a shareholder, the speculator's payoff is directly affected by whether the firm can attract stakeholders at a lower cost. Since the uninformed speculator's beliefs about the firm's success probability $(\lambda_B + q_0\Delta\lambda)$ are lower than the beliefs of stakeholders $(\lambda_B + q_{11}\Delta\lambda)$, the uninformed speculator's payoff increases if the firm pays stakeholders with a higher proportion of output-dependent compensation, ΔR, since stakeholders value that component more than the uninformed speculator. In analogy to models of financial contracting (e.g., Nachman and Noe, 1994), a higher output-dependent component, ΔR, increases the cross-subsidy that firms with inflated valuations receive from good firms. Thus, the uninformed

[17] We will show that uninformed speculation harms the firm also in ex ante terms before ω is realized (Proposition 4). As is standard, noise traders also lose out.

speculator's profit increases in ΔR, which comes at the expense of the good firms, whose profits decrease in ΔR.[18] More formally, in the case in which the speculator buys in both periods if $s \in \{G, \varnothing\}$, the speculator's valuation of the firm upon observing signal s is

$$y - R + (\lambda_B + q(s)\Delta\lambda)\left(\Delta y - \frac{\overline{w} - R}{\lambda_B + q_{11}\Delta\lambda}\right). \quad (9)$$

As (9) shows, this valuation decreases in the output-independent component, R, and increases in the output-dependent component, $\Delta R = \frac{\overline{w}-R}{\lambda_B+q_{11}\Delta\lambda}$, offered to stakeholders if and only if $q(s) < q_{11}$. In the limit, as $R \to \overline{w}$ and, thus, $\Delta R \to 0$, there is no cross-subsidization from G-firms to B-firms, and the uninformed speculator's profit is always negative.[19] Since uninformed speculation raises stakeholders' beliefs about the firm-specific shock above q_0, i.e., $q_0 < q_{11}$, the uninformed speculator's profit is increasing in ΔR. Combining this insight with the fact that prices do not depend on the proportion of output-dependent to output-independent compensation, it follows:

Proposition 2 *For any contract $\{R, \Delta R\}$ for which stakeholders' participation constraint binds, the uninformed speculator's profit increases in the output-dependent component, ΔR, of stakeholders' compensation. There is no equilibrium with uninformed speculation if $\Delta R \to 0$.*

3.3.2 Uninformed Speculation Needs "Normal" Market Conditions

Another central insight from our model is that equilibria with uninformed speculation do not arise in hot or cold markets but, rather, when market conditions are "normal." In what follows, we define this notion of "normal" along several dimensions. In particular, we have two necessary conditions that, together, are sufficient for the existence of speculation equilibria.

First, a necessary condition for equilibria with uninformed speculation to exist is that the stakeholders' outside options, $\overline{w}$, or their prior beliefs, q_0, are neither too high nor too low. On the one hand, if $\overline{w}$ is very high, the stakeholders' posterior beliefs need to improve significantly for the firm to be able to attract stakeholders. However, this is unlikely if they expect that the stock price could have been driven by uninformed speculators. On the other

[18] We have taken the output-independent component R as given. Endogenizing contract design follows standard arguments. Since the firm is better informed than stakeholders about its project, the choice of $\{R, \Delta R\}$ will play a signaling role. As is standard, the unique contract surviving standard equilibrium refinements stipulates $R = y$, as this minimizes the cross-subsidization of B-firms by G-firms.

[19] This case essentially corresponds to that analyzed in Goldstein and Guembel (2008), who consider a setting in which a manager learns from stock prices whether to undertake an investment using the firm's internal resources. Since, in their setting, there is no external financing, there is no cross-subsidization.

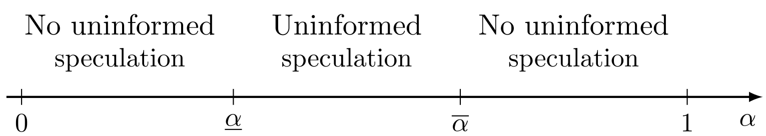

Figure 2: Profitability of uninformed speculation. The figure shows that uninformed speculation is profitable if the probability of informed trading is intermediate. Similarly, uninformed speculation is profitable only if stakeholders' outside options and prior beliefs are intermediate.

hand, if $\overline{w}$ is very low, cross-subsidization in stakeholders' compensation has little effect on the firm's value and, thus, its stock price, which makes it impossible for an uninformed speculator to make an overall trading profit. We can alternatively express these normality requirements in terms of the stakeholders' prior beliefs for a given level of the outside option $\overline{w}$. In particular, if q_0 is very low, stakeholders' posterior beliefs about the firm cannot improve sufficiently to convince stakeholders to forgo their outside options. And if q_0 is very high, there is little scope for further improvement in beliefs, implying that cross-subsidization in stakeholders' compensation matters little for stock prices, again making it impossible for an uninformed speculator to make an overall trading profit.

The second necessary condition is that the probability of informed trading, captured by α, should be intermediate, as buy orders should have an intermediate impact on the posterior beliefs of the market maker and the resulting prices (Figure 2). On the one hand, if the probability of informed trading is high, prices will increase steeply following buy orders. This will make it hard for the uninformed speculator to profit from buying, as she is, after all, unsure about the true nature of the firm-specific shock. On the other hand, if the probability of informed trading is very low, prices will have little impact on the stakeholders' beliefs. Hence, prices will have little effect on the firm's ability to attract stakeholders or the contracts it needs to offer them, thus muting the feedback effects of financial markets. Moreover, if the probability of informed trading is low, it could also become optimal for a negatively-informed speculator to buy in both periods. Such deviations would undermine the proposed uninformed speculation equilibrium.

Proposition 3 *An equilibrium in which an uninformed speculator ($s = \varnothing$) mimics the trading strategy of a positively-informed speculator ($s = G$) — thereby potentially endorsing firms trying to "fake it till they make it" — exists if and only if the probability that the speculator is informed is intermediate, $\alpha \in [\underline{\alpha}, \overline{\alpha}]$ and the outside option, $\overline{w}$, for a given level of prior beliefs q_0, is intermediate, i.e., $\overline{w} \in [\overline{w}_a, \overline{w}_b]$, where thresholds $\overline{w}_a, \overline{w}_b$ are defined in the Appendix. The latter condition can be equivalently restated as a condition that the prior beliefs, q_0, for a given level of the outside option, $\overline{w}$, must be intermediate, i.e., $q_0 \in [\underline{q}_0, \overline{q}_0]$,* *where thresholds $\underline{q}_0, \overline{q}_0$ are defined in the Appendix.*

3.4 Uninformed Speculation and Real Efficiency

Uninformed Speculation and Aggregate Surplus. Informed speculation in our model increases aggregate surplus by facilitating a better value-creating match between stakeholders and firms. By contrast, uninformed speculation potentially worsens that match. Whether aggregate efficiency is affected depends on whether the firm would have been able to attract stakeholders even if financial markets did not generate any new information about the firm's prospects. In particular, if stakeholders would accept an offer by the firm even if prices were uninformative, i.e., $q_0 \geq q^*$, uninformed speculation would lead to a zero-sum redistribution of surplus. However, uninformed speculation erodes real efficiency if $q_0 < q^*$, as uninformed speculation attracts stakeholders to firms stakeholders would have avoided otherwise. Since all other players at least break even, this efficiency loss harms the firm not only ex post if $\omega = G$, in which case it cross-subsidizes "fake-it-till-you-make-it" firms, but also ex ante before the firm observes the shock realization ω.

Proposition 4 *If $q_0 < q^*$, uninformed speculation decreases aggregate surplus, with the surplus loss borne by the firm. If $q_0 \geq q^*$, uninformed speculation does not affect aggregate surplus but leads to a zero-sum redistribution of profits. Thus, uninformed speculation harms the firm and erodes real efficiency if and only if the firm's prospects are ex ante poorer (i.e., $q_0 < q^*$).*

Uninformed Speculation, Project Choice, and Cash-Flow Dispersion. Uninformed speculation can further distort efficiency by distorting the types of projects the firm pursues. To make this statement more precise, suppose (for this discussion only) that the firm can choose to lower or increase the cash-flow dispersion of its project before observing the shock realization ω. This sequence of events appears natural if one interprets the choice of cash-flow dispersion as the choice of the nature of the project (e.g., safe or risky) and ω as a project-specific shock that is realized only after the project is selected. An increase in cash-flow dispersion corresponds to a project with $\Delta\widetilde{y} > \Delta y$ but $\widetilde{y} < y$. These inequalities are reversed for a project with a lower cash-flow dispersion. Suppose that the cash-flow dispersion from the baseline model is optimal in terms of project NPV, implying that a change in either direction lowers the NPV, i.e., $y + (\lambda_B + q_0\Delta\lambda)\,\Delta y > \widetilde{y} + (\lambda_B + q_0\Delta\lambda)\,\Delta\widetilde{y}$ for $(\widetilde{y}, \Delta\widetilde{y}) \neq (y, \Delta y)$.

Observe, now, that since higher cash-flow dispersion lowers the output-independent component R that the firm can promise to stakeholders and forces the firm to offer stakeholders contracts with a higher output-dependent component ΔR, it increases the scope for uninformed speculation (Proposition 2). Hence, if $q_0 < q^*$ and the firm is at or just above the threshold at which uninformed speculation is attractive (see Proposition 3), it can benefit from inefficiently lowering cash-flow dispersion to avoid becoming a target of uninformed speculation, as such speculation is more likely to harm it than benefit it.[20] Thus, real efficiency is further eroded.

Proposition 5 *(i) Higher cash-flow dispersion increases the scope for uninformed speculation. (ii) Suppose that the firm can distort its project's cash-flow dispersion at the expense of the project's NPV. If $q_0 < q^*$, the firm can benefit from selecting projects that have inefficiently low cash-flow dispersion and, thus, discourage uninformed speculation. Distorting cash-flow dispersion is not optimal if $q_0 \geq q^*$.*

Broader Industry Effects. To simplify the model, we took the stakeholders' outside option, $\overline{w}$, as given, and we assumed that firms can make a take-it-or-leave-it offer to stakeholders. Alternatively, we could modify our baseline model to assume that the firm competes against another firm to attract stakeholders, where $\overline{w}$ is the value-added that stakeholders generate at the firm's competitor. Thus, $\overline{w}$ corresponds to the highest price that this competitor will offer to attract stakeholders. With such competition for stakeholders, an additional source of inefficiency arises if $q_0 < q^*$, as, then, uninformed speculation attracts stakeholders away from a competitor at which stakeholders create strictly higher value.

As another related extension, suppose that at $t = 1$ and $t = 2$, the speculator can choose to trade in either of two ex ante identical firms that compete in the same winner-takes-all market. The firm that manages to attract stakeholders first has a probability λ_w of becoming the main player, in which case the other firm makes zero profits. In this context, uninformed speculation can change the entire industry equilibrium. Furthermore, becoming the main player can lead to positive externalities whereby attracting stakeholders at $t = 3$ subsequently attracts more stakeholders, even though all these stakeholders would create more value elsewhere. That is, uninformed speculation can have large multiplier effects.[21]

[20] Choosing higher cash-flow dispersion might be beneficial after the firm observes $\omega = B$, in which case it can benefit from trying to "fake it till it makes it." However, this is not optimal before the firm observes ω.

[21] Our model can be extended to a setting in which a firm attracts multiple stakeholders, where there are strategic complementarities across stakeholders. State-contingent contracts of the type we consider play a key role in affecting these strategic complementarities, where attracting or retaining key stakeholders also drives others to join or stay (Hoffmann and Vladimirov, 2022).

3.5 Short Selling

Short Selling Before the Firm Attracts Stakeholders. Thus far, we have discussed equilibria in which the uninformed speculator mimics a positively-informed speculator, raising the question of whether mimicking the strategy of a negatively-informed speculator could also be profitable. The answer to this question depends on the stakeholders' prior beliefs. If $q_0 < q^*$, uninformed short selling is never profitable. Recall that when $q_0 < q^*$, it is impossible for the firm to attract stakeholders without a positive feedback effect from the market. In this case, there is no equilibrium in which the uninformed speculator can profit from short selling, as selling has no real feedback effects: with or without short selling, the firm cannot attract stakeholders. Hence, an intuition similar to that of Lemma 1 applies again.

Instead, if $q_0 \geq q^*$, stakeholders' prior beliefs are sufficiently high that they would accept the contract offered by the firm even without positive information from the financial market. In this case, uninformed short selling (similar to uninformed buying) can have real effects. The main difference is that instead of mimicking a positively-informed speculator, the uninformed speculator mimics a negatively-informed speculator. In particular, short selling will worsen the terms at which the firm can attract stakeholders, as this strategy is correctly associated with a negatively-informed speculator. Short selling can even make attracting stakeholders impossible if stakeholders' posterior beliefs q_{-1-1} drop below q^*. In the presence of such real effects, uninformed short selling can become profitable.[22] Noting that we can equivalently express these conditions in terms of the stakeholders' outside options rather than their prior beliefs, we obtain:

Lemma 2 *While only uninformed speculative buying can be profitable if $q_0 < q^*$ (equivalently, $\overline{w} > (\lambda_B + q_0 \Delta\lambda)\, x$), both uninformed speculative buying and short selling can be profitable if $q_0 \geq q^*$ (i.e., $\overline{w} \leq (\lambda_B + q_0 \Delta\lambda)\, x$).*

Short Selling After the Firm Attracts Stakeholders. Another question that arises naturally in our setting is whether informed speculators can potentially reverse the positive feedback effects of uninformed buying. Our analysis shows that a distinctive feature of positive feedback effects is that, once triggered, they are hard to reverse. This is easy to see if we interpret stakeholders as capital providers. Then, negatively-informed speculators can profit from impounding their negative information into prices, but reversing feedback effects is not possible if the investment outlay $\overline{w}$ that the firm raises from external financiers

[22] We do not present the details of equilibria with uninformed short selling, as the underlying mechanism is analogous to the equilibria with uninformed buying. See, also, Goldstein and Guembel (2008).

is already sunk. Any new information from declining stock prices effectively comes too late for capital providers, as all they can do is wait for their contractual payments in $t = 3$.

Interestingly, reversals of positive feedback effects are hard even if we interpret the stakeholders as employees. The reason is that, in practice, when employees leave the firm, they typically forgo bonuses and non-vested equity, which mitigates the loss for the firm, especially if the value that employees have created does not fully dissipate with their departure. In fact, firms trying to "fake it till they make it" might even be better off when some employees leave prematurely. In Section B.3 in the Appendix, we extend our model and formalize this discussion and derive concrete conditions under which short selling partially reversing positive feedback effects will or will not be profitable (Proposition B.3).[23]

4 Inflating Valuation When Firms Raise Capital

Our baseline model analyzed the role of uninformed speculators in secondary markets in promoting firms trying to "fake it till they make it." We now extend our model to consider the viability of such uninformed speculation when firms raise capital. A key difference in this case is that investors invest directly into the firm rather than buying shares from an uninformed market maker over an extended period. Thus, in stark contrast to speculation in secondary markets, inflating a firm's valuation can be profitable for investors only if there is a separate way to compensate them for agreeing to a valuation above the firm's fundamental value. In particular, the firm may compensate uninformed investors for inflating the firm's valuation through side payments unobservable to stakeholders.[24] Conditional on such agreements, uninformed speculation when firms raise capital can arise under conditions similar to those facilitating speculation in secondary markets.

Extension: Raising Start-Up Capital. Consider an extension of the baseline model with two additional dates, $t = -2$ and $t = -1$, in which the firm needs to raise outside capital. Though our reasoning applies to raising capital in both public and private markets, we illustrate the mechanics by adopting language from venture capital financing. Specifically, at $t = -2$, a penniless entrepreneur seeks financing K from a venture capitalist (VC) to start the firm. Apart from this start-up capital, the firm also needs to attract stakeholders —

[23] There are other reasons that reversing positive feedback effects is difficult. The positive externalities of being on a star team are likely to keep stakeholders, even if they observe less positive information. Leaving is also made difficult by contractual and non-compete agreements (Marx, Strumsky, and Flemming, 2009). Furthermore, employees are typically reluctant to leave after less than a year, as recruiters consider such short-tenured job-hopping a major red flag (Bullhorn, 2012; Fan and DeVaro, 2020).

[24] An alternative we do not model is that the firm and investors engage in separate business relation at terms that are more favorable to investors.

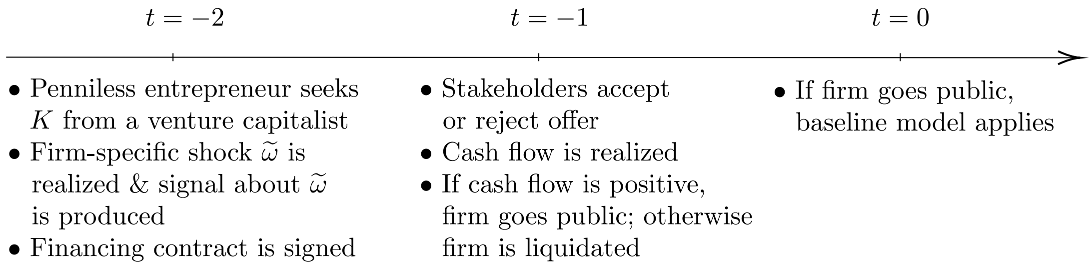

Figure 3: Timeline — Raising Start-Up Capital.

i.e., employees or business partners with an outside option of $\overline{w}$; alternatively, the firm may need to raise follow-up financing $\overline{w}$ provided by uninformed investors. Before the financing contract with a VC is signed, both the entrepreneur and the VC, but not the stakeholders, observe a signal $\widetilde{s} \in \{G, B, \varnothing\}$, which may reveal the firm-specific shock $\widetilde{\omega}$ that determines the firm's likelihood of generating high cash flows at $t = -1$. The firm-specific shock $\widetilde{\omega}$ and cash flows at $t = -1$ may, but need not, be correlated with the firm-specific shock ω at $t = 0$ and the cash flows at $t = 3$. Similar to the baseline model, the signal $\widetilde{s}$ is fully informative with probability α and pure noise, i.e., $\widetilde{s} = \varnothing$, otherwise. The prior probability that the firm-specific shock is good is $\widetilde{q}$. If the firm-specific shock is good, the firm has a probability λ_G of generating high cash flows, x, at date $t = -1$ if it attracts stakeholders. If the shock is bad, this probability is λ_B. If the firm is unsuccessful, it generates zero.

To keep the analysis simple, we assume that the firm is liquidated if its cash flow at $t = -1$ is zero (i.e., if the firm is unsuccessful). If the firm is successful (i.e., generates x), it goes public, and the VC sells out.[25] The game continues then with the baseline model starting at date $t = 0$. We denote the price of equity at $t = 0$ in anticipation of this game with p_0. To stack the game against uninformed speculation, we assume that competition in capital markets reduces the profits of investors observing $s = G$ to zero. Figure 3 summarizes the model extension.

Contracting With Side Payments. Consider date $t = -2$ at which an entrepreneur seeks capital K to start the firm. As in the baseline model, since the firm generates zero in the low-cash-flow state, it can offer a payment only in the high-cash-flow state.

Consider the following candidate equilibrium in which uninformed investors inflate the firm's valuation: (i) If the firm and the VC observe $\widetilde{s} = B$, the firm does not raise capital. (ii) If $\widetilde{s} = G$, the firm offers the VC an equity stake γ such that her participation constraint

[25] If the states in $t = -2$ and $t = 0$ are correlated, the venture capitalist's decision to stay invested could act as a signal about the firm's type. We do not pursue this extension, as it does not add qualitatively to our results. Venture capitalists, indeed, typically exit their investments at the time of a firm's initial public offering (Gompers, 1996).

binds[26]

$$\lambda_G \left(\gamma \left(x - \Delta R_0\right) + \gamma p_0\right) = K. \tag{10}$$

In expression (10), $\lambda_G \left(x - \Delta R_0\right)$ is the firm's expected cash flow at $t = -1$ net of the compensation ΔR_0 promised to stakeholders (defined in expression (12) below). (iii) If the firm and the VC are uninformed ($\widetilde{s} = \varnothing$), they agree on an additional payment, which increases the overall payment to the VC at $t = -1$ to $S \geq \gamma \left(x - \Delta R_0\right)$, where S is chosen such that the VC's participation constraint, given $\widetilde{s} = \varnothing$, binds

$$\left(\lambda_B + \widetilde{q}\Delta\lambda\right)\left(S + \gamma p_0\right) = K. \tag{11}$$

We can equivalently interpret this contract as a convertible contract that converts into an equity stake γ upon an initial public offering, with only this equity stake being publicly announced to outsiders. Such convertible contracts and the practice of announcing firm valuations based only on VCs' equity stake rather than all cash flow rights they obtain are common in venture capital financing (Gornall and Strebulaev, 2020).[27] (iv) Finally, the firm offers stakeholders a payment ΔR_0 if the cash flow is high, such that their participation constraint binds. Given that stakeholders cannot distinguish between the cases in which $\widetilde{s} = G$ and $\widetilde{s} = \varnothing$, we obtain that

$$\Delta R_0 = \frac{\overline{w}}{\frac{\alpha\widetilde{q}}{\alpha\widetilde{q}+1-\alpha}\lambda_G + \frac{1-\alpha}{\alpha\widetilde{q}+1-\alpha}\left(\lambda_B + \widetilde{q}\Delta\lambda\right)}. \tag{12}$$

As in the benchmark model, in this extension of our model, stakeholders are rational and demand to be compensated for the probability that they might be dealing with a firm about which investors are uninformed. In particular, expression (12) corresponds to the stakeholder's binding participation constraint, in which $\frac{\alpha\widetilde{q}}{\alpha\widetilde{q}+1-\alpha}$ is the probability that stakeholders attribute to the VC being positively-informed, and $\frac{1-\alpha}{\alpha\widetilde{q}+1-\alpha}$ is the probability that the VC is uninformed, with these probabilities formed using Bayes' rule. Our equilibrium concept is, again, Perfect Bayesian Equilibrium. We refine out-of-equilibrium beliefs by assuming that stakeholders place probability one on $s = B$ if they observe an offer different from ΔR_0.

To show that the proposed equilibrium exists, it suffices to show that it is feasible to construct contracts that satisfy the participation constraints (10)–(12) and the incentive constraint guaranteeing that when the firm and the VC observe $s = B$, they do not pretend to be positively-informed. That is, even if the firm offers the VC all cash flows net of the

[26] Since cash flows are either zero or positive, the assumption of equity financing is without loss of generality.

[27] We implicitly assume that stakeholders' contracts cannot condition on the ex post payment to the venture capitalist. This assumption is realistic, and relaxing it is possible.

payment to stakeholders in $t = -1$ (i.e., it offers the VC a payment $S = x - \Delta R_0$ at $t = -1$) it will hold

$$\lambda_B (x - \Delta R_0 + p_0) \leq K. \tag{13}$$

Similar to Proposition 3, we obtain that inflating the firm's valuation (by concealing payments from the firm to the VC that go beyond the latter's equity stake) is feasible and can help attract stakeholders as long as the stakeholders' outside option $\overline{w}$ is intermediate. If $\overline{w}$ is too high, the stakeholders' posterior beliefs cannot improve sufficiently to convince them to accept the firm's contract offer, given that they anticipate that the firm's valuation might be inflated. And if $\overline{w}$ is very low, mimicking becomes very attractive. That is, the VC and the firm are willing to pretend that the firm is good even if $\widetilde{s} = B$, undermining the incentive compatibility constraint (13). Just as in our baseline analysis, we can equivalently restate the condition that $\overline{w}$ must be intermediate for a given q_0 and α, as a condition that the stakeholders' prior beliefs (or the probability of an informed investor, α) must be in some intermediate range.

Notably, whenever this equilibrium can be supported, an alternative equilibrium in which the firm raises financing at terms at which investors break even if $s = G$ but does not raise financing if $s = \varnothing$ cannot be supported. Intuitively, if such an equilibrium existed, the firm would be able to attract stakeholders at a lower cost compared to (12), which makes it even more attractive for the firm and the investor to deviate and agree on providing the investor with additional cash-flow rights if $s = \varnothing$.

Proposition 6 *There exist thresholds $\overline{w}_c, \overline{w}_d$ such that if $\overline{w} \in [\overline{w}_c, \overline{w}_d]$, any equilibrium in which the firm raises financing involves uninformed speculation. One such equilibrium is that the firm does not raise financing if $\widetilde{s} = B$, raises financing at the same publicly observable terms if $\widetilde{s} = G$ or $\widetilde{s} = \varnothing$, and offers investors additional cash-flow rights that are not observable to stakeholders if $\widetilde{s} = \varnothing$.*

5 Empirical and Policy Implications

5.1 Empirical Relevance and Implications

Our model's premise is that there is a feedback effect between stock prices and prospective stakeholders' decisions. There is extensive empirical evidence suggesting that a wide variety of stakeholders pay attention to prices and that elevated prices remain high long enough to allow firms to benefit from an improved image that can help them attract stakeholders.[28]

[28] It is common that speculative trading keeps prices elevated over many months (Aggarwal and Wu, 2006). The same is sometimes true even when prices increase following news releases that do not contain

For example, two of the most important factors for prospective employees before joining a firm are its profitability and stock market value (Dowling, 1986; Fombrun and Shanley, 1990; Turban and Greening, 1997; Bergman and Jenter, 2007; Brown and Matsa, 2016). The price of a firm's stock also matters to business partners and suppliers, deciding whether to expand their relationship with a firm by making firm-specific investments (Liang, Williams, and Xiao, 2021). Furthermore, there is evidence that capital providers also pay attention to stock prices (Baker, Stein, and Wurgler, 2003; Derrien and Kecskes, 2013; Grullon, Michenaud, and Weston, 2015). Our work generates clear predictions about the type of firms and economic conditions that would favor uninformed trading and promote firms trying to "fake it till they make it":

Implication 1 *(Speculation targets) Uninformed speculators are more likely to inflate the prices of firms that are potentially trying to "fake it till they make it" if: (i) the firms' prospects are promising but still uncertain; (ii) their cash flows are sufficiently dispersed; (iii) they rely extensively on performance pay or equity-like instruments to compensate stakeholders or raise external (in particular, equity) financing; and (iv) market conditions are normal — i.e., investors' beliefs and outside options are neither too high nor too low.*

Parts (i)–(iii) suggest that likely targets are human-capital-intensive growth firms, newly-public firms, or firms in transition, which is broadly in line with the anecdotal evidence cited in the introduction. Furthermore, there is also evidence that stock price manipulation taking place over extended periods is more likely in intermediately opaque markets.[29] Note that part (iv) differentiates our paper from irrational exuberance theories focusing on hot markets in which firms can free-ride on positive market sentiment, helping them cheaply attract financial and possibly non-financial capital (Baker and Wurgler, 2002; Baker, Stein, and Wurgler, 2003). Another stark contrast to such theories is that stakeholders in our model anticipate that valuations may be inflated and do not lose, on average, from their dealings with the firm. Uninformed speculators' profits are at the expense of the truly good firms that either overpay stakeholders or fail to attract stakeholders altogether. Notably, since speculators in our model can make a profit even without any prior inventory in the firm's stock, the scope for uninformed speculation is potentially very large and open to anyone.

fundamental information (Huberman and Regev, 2001; Cooper, Dimitrov, and Rau, 2001).

[29] Aggarwal and Wu (2006) find that, conditional on speculation taking place in such opaque markets, manipulation is more likely when such markets are less opaque.

5.2 Impact of Regulatory and Market Environment

Designing targeted regulation that can undermine the profitability of uninformed speculation is hard, as such regulation is likely to have a broader impact, also encumbering informed trading. Yet it is important to understand the impact of the regulatory and market environment on the opportunities for uninformed speculation. In the Appendix, we extend our model in several directions to address this question, and in what follows, we summarize the main takeaways.

Post-trade transparency requirements. Post-trade transparency requirements are a double-edged sword. On the one hand, when such requirements make it easier for market participants to infer the traders' identity, they lower speculators' profits, possibly lowering real efficiency if that prevents informed traders from trading. On the other hand, full anonymity, as in our baseline model, is also undesirable, as it promotes uninformed speculation, lowering real efficiency.

Cost of acquiring information and endogenous entry. In Appendix B.1, we study the case with endogenous costly entry of speculators, where the entry cost captures the cost of identifying potential targets for speculation, which may require following the news and analyst reports and forecasts. We show that uninformed speculation continues to arise if the cost of entry is intermediate (Proposition B.1).[30] This implies that policy measures, such as more stringent reporting requirements at the firm level,[31] or advances in information technology that have made it moderately costly to acquire information about firms might have also increased the probability of uninformed speculation.[32]

Margin trading and trading fees. Speculators in our model have deep pockets, which allows them to trade the desired amount at all dates. If traders are cash-constrained and seek external financing to buy shares, their private information about whether or not they have observed an informative signal adds a (standard) layer of cross-subsidization: informed speculators cross-subsidize uninformed speculators, which decreases the latter's cost of external financing and makes uninformed speculation even more attractive. Regulation requiring traders to use more of their own cash for trading (higher margin requirements) lowers the amount of such cross-subsidization. It is, therefore, desirable as long as it does not make it too hard for informed traders to participate. Relatedly, regulation affecting

[30] If this cost is too high, the equilibrium fraction of speculators and the probability of informed trading will be too low for prices to meaningfully affect the decisions of prospective stakeholders. Instead, if the entry cost is too low, more speculators will be attracted to enter, making prices very sensitive to new trades.

[31] One example is the implementation of the EDGAR system in the nineties (Goldstein et al., 2022).

[32] Note that more transparency does not necessarily make prices more informative or increase firm value, as it can attract uninformed speculators. This insight is related to prior work showing that more transparency can undermine price efficiency (Banerjee, Davis, and Gondhi, 2018, 2022).

margin rates or, more generally, trading fees, is also a double-edged sword. While lowering fees increases real efficiency by making trading profitable for informed speculators, if fees are lowered too much, trading can also become profitable for uninformed speculators. Thus, real efficiency may be higher if margin rates and trading fees are strictly positive.

Short-selling restrictions. Given that uninformed speculative buying distorts real efficiency, one may argue that relaxing short-selling restrictions may help, as informed short sellers will stand to benefit from correcting inflated prices. As we discuss in Section 3.5, an implication of our model is that relaxing short-selling restrictions may not achieve the desired goal of improving real efficiency for two main reasons: first, it may facilitate uninformed speculative short-selling (Lemma 2). Second, relaxing short-selling restrictions to stipulate corrective trading is unlikely to have a major impact, as once triggered, positive feedback effects are hard to reverse, even without such restrictions (Proposition B.3). Thus, even if the prices of firms targeted by uninformed speculators reverse, these reversals are likely to be only partial. Implication 2 summarizes the discussion from this section (the detailed proof is in the Appendix).

Implication 2 *Consider an extension of our model that allows for trading fees, external financing for cash-constrained traders, and a probability that the trader's identity is revealed. The scope for uninformed speculation is lower (and real efficiency higher) if: (i) trading anonymity is at an intermediate level; (ii) firm-level transparency is either low or high, but not intermediate* $\alpha \notin [\underline{\alpha}, \overline{\alpha}]$*; (iii) trading fees are intermediate; (iv) margin requirements and margin rates are intermediately high; (v) the cost of acquiring information about firms is either low or high but not intermediate. (vi) Relaxing short-selling restrictions is unlikely to reverse positive feedback effects triggered by uninformed speculation and might promote uninformed short selling.*

Uninformed speculation can also arise when firms raise capital. In particular, venture capitalists are often accused of promoting firms trying to "fake it till they make it" (Braithwaite, 2018; Owen, 2020; Taparia, 2020). We show that this can be achieved by concealing side payments between the firm and VCs, which is in line with Gornall and Strebulaev (2020), who show that close to half of unicorns would lose their unicorn status once properly accounting for all cash-flow rights of VC investors stipulated in the actual contracts. Further in line with our model, Gahng (2023) shows that firms try to strategically manipulate their valuations to achieve unicorn status as a means of attracting employees at a lower cost. Yet, unlike regulation that primarily affects uninformed speculation in secondary markets trading, regulation tackling the inflation of valuations in private markets can be targeted more precisely. In particular:

Implication 3 *Mandating that firms offering stakeholders state-contingent claims provide stakeholders with more information about how the firm's other financing arrangements affect the value of these claims can lower the incentive of uninformed investors to inflate the valuations of firms raising capital.*

6 Conclusion

In this paper, we show that an inherent feature of financial markets is that they may not only fail to root out firms that overstate their prospects but may even promote such firms. The reason is that speculators without fundamental information about a firm can profit from inflating its stock price and help it "fake it till it makes it," even though everyone is rational and anticipates such strategies. The underlying mechanism is that high prices attract stakeholders, such as key employees, business partners, or investors, who rationally infer that there is a chance that high prices reflect stellar prospects. Since stakeholders are rational and anticipate that prices might also be inflated, they do not lose out, on average, as they demand higher payments. Instead, the speculators' profits come at the expense of the good firms in the economy, which end up cross-subsidizing worse ones with inflated prices or end up losing access to talent and funding altogether. To avoid this cost, firms may choose suboptimal projects that make them less attractive to speculators, which further erodes real efficiency.

A necessary condition that uninformed speculators can make a profit from inflating prices is that firms attract stakeholders with information sensitive contracts, such as equity performance-based pay compensation, which facilitate cross-subsidization from good to bad firms. This cross-subsidization protects uninformed speculators against the risk of inflating the price of the wrong firm and is the reason that uninformed speculation can be profitable. Higher cash-flow dispersion magnifies these effects. Thus, speculators are likely to target cash-constrained or human-capital-intensive firms with high potential but uncertain growth prospects that resort to equity financing or pay employees with equity. Newly-listed firms or firms in transition that have high growth potential but highly uncertain prospects are also likely targets.

Uninformed speculation is most likely to occur in "normal," as opposed to hot, markets. In particular, uninformed speculation inflating prices is most profitable when stakeholders' outside options and the cost of acquiring information about targeted firms are neither too low nor too high. Furthermore, stakeholders' prior beliefs about the firm cannot be too positive (as in hot markets) or too negative (as in cold markets), as in these cases, uninformed speculation has too little impact to pay off. It is also notable that once speculation triggers positive feedback effects, such effects are hard to reverse, even when there are informed traders with negative information about a firm. That is, price reversals following such speculation are likely to be partial, especially when firms use the elevated stock price to build up their stakeholder base.

Investors can profit from inflating valuations that help firms "fake it till they make it," not only in secondary markets but also when firms raise capital. Again, the investor's profit comes from the fact that attracting high-quality stakeholders through inflated valuations creates firm value at the expense of the good firms in the economy. This can be facilitated by promising investors cash-flow rights unobservable to stakeholders, as is often the case in VC financing. Overall, our model rationalizes why venture capitalists and entrepreneurs might knowingly agree on unrealistically high valuations that elevate firms to unicorn status and why such an inflated image can persist after a firm goes public and subsequently become a reality.

References

[1] Aggarwal, Rajush, and Guojun Wu, 2006, Stock market manipulations, *Journal of Business*, 79(4), 1915–1953.

[2] Agrawal, Ashwini K., and David A. Matsa, 2013, Labor unemployment risk and corporate financing decisions, *Journal of Financial Economics*, 108(2), 449–470.

[3] Ahnert, Toni, Caio Machado, and Anna Pereira, 2022, Trading for bailouts, Working Paper.

[4] Allen, Franklin, and Garry Gorton, 1992, Stock price manipulation, market microstructure and asymmetric information, *European Economic Review* 36(2–3), 624–630.

[5] Baker, Malcolm, and Jeffrey Wurgler, 2002, Market timing and capital structure, *Journal of Finance* 57(1), 1–32.

[6] Baker, Malcolm, Jeremy Stein, and Jeffrey Wurgler, 2003, When does the market matter? Stock prices and the investment of equity-dependent firms, *Quarterly Journal of Economics* 118(3), 969– 1006.

[7] Banerjee, Snehal, Jesse Davis, and Naveen Gondhi, 2018, When transparency improves, must prices reflect fundamentals better?, *Review of Financial Studies* 3(6), 2377–2414.

[8] Banerjee, Snehal, Jesse Davis, and Naveen Gondhi, 2022, Incentivizing effort and informing investment: the dual role of stock prices, Working Paper.

[9] Bergman, Nittai K., and Dirk Jenter, 2007, Employee sentiment and stock option compensation, *Journal of Financial Economics* 84(3), 667–712.

[10] Bond, Philip, Alex Edmans, and Itay Goldstein, 2012, The real effects of financial markets, *Annual Review of Financial Economics* 4, 39–60.

[11] Braithwaite, Tom, 2018, "Fake it till you make it" – but know when to stop, Retrieved from https://www.ft.com/content/d7a06eb6-d18b-11e5-92a1-c5e23ef99c77.

[12] Brown, Jennifer, and David A. Matsa, 2016. Boarding a Sinking Ship? An Investigation of Job Applications to Distressed Firms, *Journal of Finance*, 701(2): 507-550.

[13] Campello, Murillo, Rafael Matta, and Pedro A. C. Saffi, Does stock manipulation distort corporate investment? The role of short selling costs and share repurchases, 2020, Working Paper.

[14] Cetemen, Doruk, Gonzalo Cisternas, Aaron Kolb, S. Viswanathan, 2023, Activist trading dynamics, Working Paper.

[15] Chakraborty, Archishman, and Bilge Yilmaz, 2004, Informed manipulation, *Journal of Economic Theory* 114(1), 132–152.

[16] Cooper, Michael J., Orlin Dimitrov, and P. Raghavendra Rau, 2001, A rose. com by any other name, *Journal of Finance* 56(6), 2371–2388.

[17] Derrien, Francois, and Ambrus Kecskes, 2013, The real effects of financial shocks: evidence from exogenous changes in analyst coverage, *Journal of Finance* 68(4), 1407–1440.

[18] Dow, James, and Gary Gorton, 1997, Stock market efficiency and economic efficiency: is there a connection?, *Journal of Finance* 52(3), 1087–1129.

[19] Dowling, Grahame R., 1986, Managing your corporate images, *Industrial Marketing Management* 15(2), 109–115.

[20] Edmans, Alex, and Gustavo Manso, 2011, Governance through trading and intervention: a theory of multiple blockholders, *Review of Financial Studies* 24(7), 2395–2428.

[21] Edmans, Alex, Itay Goldstein, and Wei Jiang, 2015, Feedback effects, asymmetric trading, and the limits to arbitrage, *American Economic Review* 105(12), 3766–3799.
[22] Fan, Xiaodong, and Jed DeVaro, 2020, Job hopping and adverse selection in the labor market, *Journal of Law, Economics, and Organization* 36(1), 84–138.
[23] Fombrun, Charles, and Mark Shanley, 1990, What's in a name? Reputation building and corporate strategy, *Academy of Management Journal* 33(2), 233–258.
[24] Frank, Jacqui, 2017, WeWork is arguably the most overvalued company in the world, Retrieved from https://www.businessinsider.com/scott-galloway-wework-overvalued-company-world-2017-5?international=true&r=US&IR=T
[25] Frenkel, Sivan, 2020, Dynamic asset sales with a feedback effect, *Review of Financial Studies* 33(2), 829–865.
[26] Gahng, Minmno, 2023, Create your own valuation, Working Paper.
[27] Gao, Pingyang, and Pierre Jinghong Liang, 2013, Informational feedback, adverse selection, and optimal disclosure policy, *Journal of Accounting Research* 51(5), 1133–1158.
[28] Goldman, Eitan, Jordan Martel, and Jan Schneemeier, 2021, A theory of financial media, *Journal of Financial Economics*, forthcoming.
[29] Goldstein, Itay, 2022, Information in financial markets and its real effects, Review of Finance, forthcoming.
[30] Goldstein, Itay, and Alexander Guembel, 2008, Manipulation and the allocational role of prices, *Review of Economic Studies* 75(1), 133–164.
[31] Goldstein, Itay, and Liyan Yang, 2017, Information disclosure in financial markets, *Annual Review of Financial Economics* 9, 101–125.
[32] Goldstein, Itay, and Liyan Yang, 2019, Good disclosure, bad disclosure, *Journal of Financial Economics* 131(1), 118–138.
[33] Goldstein, Itay, Emre Ozdenoren, and Kathy Yuan, 2013, Trading frenzies and their impact on real investment, *Journal of Financial Economics* 109(2), 566–582.
[34] Gompers, Paul A., 1996, Grandstanding in the venture capital industry, *Journal of Financial Economics* 42(1), 133–156.
[35] Gompers, Paul A., Will Gornall, Steven Kaplan, and Ilya A. Strebulaev, 2020, How do venture capitalists make decisions?, *Journal of Financial Economics* 135(1), 169–190.
[36] Glosten, Lawrence R., and Paul R. Milgrom, 1985, Bid, ask and transaction prices in a specialist market with heterogeneously informed traders, *Journal of Financial Economics* 14(1), 71–100.
[37] Gornall, Will, and Ilya Strebulaev, 2020, Squaring venture capital valuations with reality, *Journal of Financial Economics* 135(1), 120–143.
[38] Grullon, Gustavo, Sebastien Michenaud, and James P. Weston, 2015, The real effects of short-selling constraints, *Review of Financial Studies* 28(6), 1737–1767.
[39] Hoffmann, Florian, and Vladimir Vladimirov, 2022, Worker runs, Working Paper.
[40] Huberman, Gur, and Tomer Regev, 2001, Contagious speculation and a cure for cancer: a nonevent that made stock prices soar, *Journal of Finance* 56(1), 387–396.
[41] Inderst, Roman, and Vladimir Vladimirov, 2019, Growth firms and relationship finance: a capital structure perspective, *Management Science* 65(11), 5411–5426.
[42] Innes, Robert D., 1990, Limited liability and incentive contracting with ex-ante action choices, *Journal of Economic Theory* 52(1), 45–67.

[43] Ioannidis, John PA, 2015, Stealth research: is biomedical innovation happening outside the peer-reviewed literature?, *JAMA* 313(7), 663–664.
[44] Khanna, Naveen, and Ramana Sonti, 2004, Value creating stock manipulation: feedback effect of stock prices on firm value, *Journal of Financial Markets* 7(3), 237–270.
[45] Khanna, Naveen, and Richmond D. Mathews, 2016, Posturing and holdup in innovation, *Review of Financial Studies* 29(9), 2419–2454.
[46] Kyle, Albert S, 1985, Continuous auctions and insider trading, *Econometrica* 53(6), 1315–1335.
[47] Levit, Doron, Nadya Malenko, and Ernst Maug, 2020, Trading and shareholder democracy, Working Paper.
[48] Liang, Lantian, Ryan Williams, and Steven Chong Xiao, 2021, Stock market information and innovative investment in the supply chain, *Review of Corporate Finance Studies* 10(4), 856–894.
[49] Lin, Tse-Chun, Qi Liu, and Bo Sun, 2019, Contractual managerial incentives with stock price feedback, *American Economic Review* 109(7), 2446–2468.
[50] Marx, Matt, Deborah Strumsky, and Lee Fleming, 2009, Mobility, skills, and the Michigan non-compete experiment, *Management Science* 55(6), 875–879.
[51] Matta, Rafael, Sergio Rocha, and Paulo Vaz, 2020, Product market competition and predatory stock price manipulation, Working Paper.
[52] Maug, Ernst, 1998, Large shareholders as monitors: Is there a trade-off between liquidity and control?, *Journal of Finance* 53(1), 65–98.
[53] Nachman, David C., and Thomas H. Noe, 1994, Optimal design of securities under asymmetric information, *Review of Financial Studies* 7(1), 1–44.
[54] Owen, Thomas, 2020, Fake it until you make it: a Silicon Valley strategy that seems unstoppable, Retrieved from https://www.sfchronicle.com/business/article/Fake-it-until-you-make-it-a-Silicon-Valley-15012062.php.
[55] Skrzypacz, Andrzej, and Basil Williams, 2022, Spoofing in equilibrium, Working paper.
[56] Subrahmanyam, Avanidhar, and Sheridan Titman, 2001, Feedback from stock prices to cash flows, *Journal of Finance* 56(6), 2389-2413.
[57] Taparia, Neal, 2020, 5 reasons why founders fake it till they make it, Retrieved from https://www.forbes.com/sites/nealtaparia/2020/06/17/5-compelling-reasons-to-fake-it-till-you-make/?sh=7b4f703d526
[58] Trainer, David, 2021, Tesla: $1 trillion of speculation, Retrieved from https://www.forbes.com/sites/greatspeculations/2021/11/09/tesla-1-trillion-of-speculation/?sh=3184dec477eb
[59] Turban, Daniel B., and Daniel W. Greening, 1997, Corporate social performance and organizational attractiveness to prospective employees, *Academy of Management Journal* 40(3), 658–672.
[60] Voss, Paul, 2022, Short-term debt and corporate governance, Working Paper.

Appendix A Proofs

Proof of Lemma 1. We proceed backward. Suppose that prospective stakeholders observe the firm-specific shock. At $t = 3$, the firm can attract stakeholders if and only if the firm-specific shock is G. It is optimal for the firm to offer a compensation of $\Delta R = \frac{\overline{w}}{\lambda_G}$ for which the participation constraint of stakeholders binds. The argument is standard and, thus, relegated to Lemma C.2. Therefore, the expected payoff of the firm if the firm-specific shock is G is $\lambda_G x - \overline{w}$. In contrast, if the firm-specific shock is B, the firm cannot attract stakeholders (as $\lambda_B x < \overline{w}$), and the firm's value is zero. In what follows, we show that a speculator trades with her information in both periods, and that an uninformed speculator does not trade.

The expected trading profit of a positively-informed speculator is

$$(\lambda_G (x - \Delta R) - p_{D_1}) D_1 + (\lambda_G (x - \Delta R) - p_{D_1 D_2}) D_2.$$

where we account for the fact that the speculator's beliefs about the stakeholders' contract are correct in equilibrium. Clearly, the positively-informed speculator (i.e., a speculator who observes $s = G$) cannot make a strictly positive profit from not trading. She also cannot profit from selling in both periods or selling in one period and not trading in another, as the price set by the market maker will be at most $\lambda_G (x - \Delta R)$, resulting in an expected trading loss. In contrast, if the positively-informed speculator deviates to buying in both periods, the price set by the market maker is strictly less than $\lambda_G (x - \overline{w})$, since the market maker accounts for the probability that the trade comes from noise traders, resulting in a strictly positive profit.

Similarly, it also cannot be that the positively-informed speculator buys in the first period but does not trade or sells in the second period, as then her expected profit from the second trade is either zero or negative, while by deviating to buying she can make a strictly positive trading profit in that period, as the price at which she buys will be strictly less than $\lambda_G (x - \overline{w})$. Finally, it remains to be argued that the positively-informed trader will deviate from equilibrium candidates in which she does not trade or sells in the first period and buys in the second. Suppose to a contradiction that such equilibria existed and that the speculator deviates to buying in the first period. Since in equilibrium, this trade does not come from a positively-informed trader, the prices set by the market maker following buy orders in the first and second period are lower than after the equilibrium trades of a positively-informed trader on the equilibrium path. Hence, by deviating, the positively-informed speculator makes a strictly higher trading profit in both periods, completing the contradiction argument. Hence, the positively-informed speculator buys in both periods. By symmetric arguments, we can show that a negatively-informed speculator will sell in both periods.

It is now straightforward to show that the uninformed speculator will not trade. Her expected profit when she follows the same trading strategy as when she observes $s = G$ in which case stakeholders accept its offer with probability q_0 is

$$\left(q_0\left(\lambda_G x - \overline{w}\right) - p_{D_1}\right) + \left(q_0\left(\lambda_G x - \overline{w}\right) - p_{D_1 D_2}\right) < 0,$$

which is less than her expected payoff (of zero) when she abstains from trading in both periods. Furthermore, the uninformed trader cannot strictly benefit from trading as a positively-informed trader in $t = 1$ and as a noise trader in $t = 2$ since she will then make a trading loss on her first trade and no profit on her second trade. The argument that an uninformed speculator will not follow the trading strategy of a negatively-informed speculator is symmetric. **Q.E.D.**

Proof of Proposition 1. In what follows, we show the existence of an equilibrium in which the speculator buys in both periods if $s \in \{G, \varnothing\}$ and sells in both periods if $s = B$. We discuss the existence of other equilibria at the end of the proof. To show existence, we, first, derive the posterior beliefs and the prices in both trading dates $t = 1$ and $t = 2$ (Step 1). In Step 2, we derive the speculator's expected trading profit and derive the necessary and sufficient conditions for this profit to be positive. Subsequently, we verify that the trading strategies at $t = 1$ and $t = 2$ are optimal in that there are no profitable deviations from these strategies (Steps 3 and 4).

Step 1: Posterior beliefs, prices, and equilibrium payoffs. The posterior belief of the market maker that the firm-specific shock is $\omega = G$ is

$$q_{11} = \frac{\left((1-\beta) + \beta\frac{1}{9}\right) q_0}{(1-\beta)\,\alpha q_0 + (1-\beta)\,(1-\alpha) + \beta\frac{1}{9}} \quad \text{if } D_1 = D_2 = 1$$

$$q_{-1-1} = \frac{\beta\frac{1}{9} q_0}{(1-\beta)\,\alpha\,(1-q_0) + \beta\frac{1}{9}} \quad \text{if } D_1 = D_2 = -1$$

and $q_{D_1 D_2} = q_0$ for all other orders D_1 an D_2.[33] Since the firm can attract stakeholders only

[33] For details about how the posteriors and prices are formed, see Lemma C.1.

if $q_{11} \geq q^*$, there is a threshold

$$\alpha_{11}^* := \max\left\{0, \frac{\left(1-\frac{8}{9}\beta\right)\left(1-\frac{q_0}{q^*}\right)}{\left(1-\beta\right)\left(1-q_0\right)}\right\},$$

such that the firm can attract stakeholders after $D_1 = D_2 = 1$ only if $\alpha \geq \alpha_{11}^*$. Note that $\alpha_{11}^* = 0$ for the case where $q_0 > q^*$.

Furthermore, the market maker's beliefs that the trader chooses $D_2 = 1$ after she has chosen $D_1 = 1$ and, respectively, that she chooses $D_2 = -1$ after she has chosen $D_1 = -1$ are

$$\begin{aligned}
\pi_{11} &= \frac{\left(1-\beta\right)\alpha q_0 + \left(1-\beta\right)\left(1-\alpha\right) + \beta\frac{1}{9}}{\left(1-\beta\right)\alpha q_0 + \left(1-\beta\right)\left(1-\alpha\right) + \beta\frac{1}{3}} \\
\pi_{-1-1} &= \frac{\left(1-\beta\right)\alpha\left(1-q_0\right) + \beta\frac{1}{9}}{\left(1-\beta\right)\alpha\left(1-q_0\right) + \beta\frac{1}{3}}.
\end{aligned}$$

The prices at $t = 2$ and $t = 1$ are

$$\begin{aligned}
&p_{11} = \left(\lambda_B + q_{11}\Delta\lambda\right)\left(x - \tfrac{\overline{w}}{\lambda_B + q_{11}\Delta\lambda}\right) && \text{if } D_1 = D_2 = 1 \\
&p_1 = \pi_{11} p_{11} + \left(1-\pi_{11}\right)\left(\lambda_B + q_0\Delta\lambda\right)\left(x - \tfrac{\overline{w}}{\lambda_B + q_0\Delta\lambda}\right)\mathbf{1}_{q_0 \geq q^*} && \text{if } D_1 = 1 \\
&p_{-1-1} = \left(\lambda_B + q_{-1-1}\Delta\lambda\right)\left(x - \tfrac{\overline{w}}{\lambda_B + q_{-1-1}\Delta\lambda}\right)\mathbf{1}_{q_{-1-1} \geq q^*} && \text{if } D_1 = D_2 = -1 \\
&p_{-1} = \pi_{-1-1} p_{-1-1} && \text{if } D_1 = -1 \\
&\qquad + \left(1-\pi_{-1-1}\right)\left(\lambda_B + q_0\Delta\lambda\right)\left(x - \tfrac{\overline{w}}{\lambda_B + q_0\Delta\lambda}\right)\mathbf{1}_{q_0 \geq q^*} && \\
&p_{D_1 D_2} = p_0 := \left(\lambda_B + q_0\Delta\lambda\right)\left(x - \tfrac{\overline{w}}{\lambda_B + q_0\Delta\lambda}\right)\mathbf{1}_{q_0 \geq q^*} && \text{otherwise,}
\end{aligned}$$

where $1_{q_0 \geq q^*}$ and $1_{q_{-1-1} \geq q^*}$ are indicator functions equal to one if $q_0 \geq q^*$ and $q_{-1-1} \geq q^*$, respectively, and zero otherwise. Recall that the market maker's and speculator's beliefs about stakeholder's compensation are correct in equilibrium. The speculator's expected payoff from buying in both trading periods is

$$\Pi_{11}\left(s\right) = 2\left(\lambda_B + q\left(s\right)\Delta\lambda\right)\left(x - \frac{\overline{w}}{\lambda_B + q_{11}\Delta\lambda}\right) - p_{D_1} - p_{D_1 D_2},$$

which, after plugging in for p_{D_1} and $p_{D_1D_2}$, can be stated as

$$\Pi_{11}(s) = \begin{cases} 2q(s)\Delta\lambda\left(x - \frac{\overline{w}}{\lambda_B + q_{11}\Delta\lambda}\right) & \\ +\left((1-\pi_{11})\lambda_B - (1+\pi_{11})q_{11}\Delta\lambda\right)\left(x - \frac{\overline{w}}{\lambda_B + q_{11}\Delta\lambda}\right) & \text{if } q_0 < q^* \\ 2q(s)\Delta\lambda\left(x - \frac{\overline{w}}{\lambda_B + \Delta\lambda q_{11}}\right) & \\ +\Delta\lambda\left((1-\pi_{11})(q_{11}-q_0)x - 2q_{11}\left(x - \frac{\overline{w}}{\lambda_B + \Delta\lambda q_{11}}\right)\right) & \text{if } q_0 \geq q^*. \end{cases} \tag{A.1}$$

Furthermore, we obtain that the speculator's expected payoff from selling in both trading periods is

$$\Pi_{-1-1}(s) = \begin{cases} 0 & \text{if } q_0 < q^* \\ (1-\pi_{-1-1})(\lambda_B + q_0\Delta\lambda)\left(x - \frac{\overline{w}}{\lambda_B + q_0\Delta\lambda}\right) & \text{if } q_0 \geq q^* > q_{-1-1} \\ (1-\pi_{-1-1})(q_0 - q_{-1-1})\Delta\lambda x & \\ -2(q(s) - q_{-1-1})\Delta\lambda\left(x - \frac{\overline{w}}{\lambda_B + q_{-1-1}\Delta\lambda}\right) & \text{if } q_{-1-1} \geq q^*. \end{cases} \tag{A.2}$$

Step 2: Necessary and sufficient conditions for $\Pi_{11}(\varnothing) > 0$. First, consider the case in which $q_0 < q^*$ (i.e., $\overline{w} > (\lambda_B + q_0\Delta\lambda)x$). In this case, $1_{q_0 \geq q^*} = 0$, and a sufficient condition for the profit of the uninformed speculator to be positive, that is $\Pi_{11}(\varnothing) > 0$, is that $\alpha \leq \frac{1-\frac{2}{3}\beta-\sqrt{\left(1-\frac{2}{3}\beta\right)^2-\frac{4}{9}\beta\left(1-\frac{8}{9}\beta\right)}}{2(1-\beta)(1-q_0)}$. In this case, the sum of all terms multiplied by $\Delta\lambda$ in the first clause of (A.1) is positive. Next, we derive the necessary and sufficient conditions for $\Pi_{11}(\varnothing) > 0$ for the case in which $\alpha > \frac{1-\frac{2}{3}\beta-\sqrt{\left(1-\frac{2}{3}\beta\right)^2-\frac{4}{9}\beta\left(1-\frac{8}{9}\beta\right)}}{2(1-\beta)(1-q_0)} > 0$. In Lemma C.3 in Appendix C, we show that if $\Pi_{11}(\varnothing)$ crosses zero for $\alpha \leq 1$, then it does so from above. Hence, there is a cutoff value $\overline{\alpha}_{11}$ at which $\Pi_{11}(\varnothing) = 0$, and it holds that $\Pi_{11}(\varnothing) > 0$ for $\alpha \leq \overline{\alpha}_{11}$.

It remains to show that the condition that $\alpha \leq \overline{\alpha}_{11}$ does not contradict the requirement that $\alpha \geq \alpha^*_{11}$. Clearly, this is never the case if $\overline{w} \to (\lambda_B + q_0\Delta\lambda)x$, as then $\alpha^*_{11} \to 0$. More generally, there is an upper threshold for $\overline{w}$ such that $\Pi_{11}(\varnothing) > 0$ if $\overline{w}$ is between $(\lambda_B + q_0\Delta\lambda)x$ and this upper threshold. To find this threshold, observe that α^*_{11} increases in $\overline{w}$ (as q^* is increasing in $\overline{w}$). By contrast, $\overline{\alpha}_{11}$ does not depend on $\overline{w}$. Hence, there is a unique cutoff for $\overline{w}$, implicitly defined by the value of $\overline{w}$ for which $\alpha^*_{11} = \min\{\overline{\alpha}_{11}, 1\}$, such that $\alpha^*_{11} < \overline{\alpha}_{11}$ if $\overline{w}$ is below this cutoff.

Second, consider the case in which $q_0 \geq q^*$ (i.e., $\overline{w} \leq (\lambda_B + q_0\Delta\lambda)x$). Since, in this case, $\alpha^*_{11} = 0$, the condition that $\alpha \geq \alpha^*_{11}$ is never binding. In Lemma C.3, we show that also for this case, if $\Pi_{11}(\varnothing) = 0$, then this is for at most one value $\overline{\alpha}_{11} \in [0, 1]$. A necessary and sufficient condition for $\overline{\alpha}_{11} > 0$ is $\overline{w} > \frac{1+\pi_{11}}{2}(\lambda_B + q_{11}\Delta\lambda)x$.

Note that in both cases (i.e., both when $q_0 < q^*$ and $q_0 \geq q^*$), the intermediate region $[\alpha_{11}^*, \overline{\alpha}_{11}]$ is not empty if stakeholders' outside options, $\overline{w}$, are in an intermediate range. Furthermore, note that these conditions on $\overline{w}$ can alternatively be stated as conditions on stakeholders' prior, q_0.

Step 3: Ruling Out Deviations at $t = 2$. Denote

$$v\left(s, q_{D_1 D_2}\right) = \left(\lambda_B + q\left(s\right)\Delta\lambda\right)\left(x - \frac{\overline{w}}{\lambda_B + q_{D_1 D_2}\Delta\lambda}\right)\mathbf{1}_{q_0 \geq q^*}$$

and observe that if the market maker observes trading orders that are inconsistent with the equilibrium strategies associated with $s = G$ (i.e., $D_1 = D_2 = 1$) or $s = B$ (i.e., $D_1 = D_2 = -1$), he will set the price equal to p_0, and the firm will be able to attract stakeholders only if $q_0 \geq q^*$.

We start by verifying that after the speculator who has observed $s \in \{G, \varnothing\}$ has played $D_1 = 1$ at $t = 1$, she will not deviate to choosing $D_2 \in \{-1, 0\}$, which is only consistent with the trading strategy of a noise trader on the equilibrium path. The speculator's expected payoff is then

$$\left(v\left(s, q_{D_1 D_2}\right) - p_1\right) + \left(v\left(s, q_{D_1 D_2}\right) - p_{1D_2}\right)D_2. \tag{A.3}$$

If $D_2 = -1$ and $s \in \{G, \varnothing\}$, the deviation payoff in (A.3) is $-p_1 + p_0 < 0$. Hence, such a deviation is not profitable. If $D_2 = 0$ and $s = \varnothing$, the deviation payoff is again weakly negative if $s = \varnothing$. Specifically, that payoff boils down to $-q_{11}\Delta\lambda x < 0$ if $q_0 < q^*$ and $-\left(q_{11} - q_0\right)\Delta\lambda x < 0$ if $q_0 \geq q^*$. Finally, if $D_2 = 0$ and $s = G$, the deviation payoff is again less than the equilibrium payoff of the speculator since the firm needs to pay stakeholders more (so the first-period trading profit is lower — it is $-p_1$ if $q_0 < q^*$ and $-p_1 + \lambda_G\left(x - \frac{\overline{w}}{\lambda_B + q_0\Delta\lambda}\right)$ if $q_0 \geq q^*$— while the second-period trading profit is zero (while it is positive on the equilibrium path).

Similarly, a negatively-informed speculator ($s = B$) will also not deviate after playing $D_1 = -1$ at $t = 1$. If she buys, i.e., $D_2 = 1$, then the price in the second trading period will be p_0, resulting in a weakly negative profit of $p_{-1} - p_0$ (strictly negative if $q_0 > q^*$ and zero otherwise). If the speculator does not trade, $D_2 = 0$, the deviation payoff is also weakly less than the equilibrium payoff of the speculator. In particular, if $q_0 < q^*$, the deviation profit is zero, which is the same as on the equilibrium path. And if $q_0 \geq q^*$, the firm needs to pay stakeholders less, leading to a lower first period period trading profit of $p_{-1} - \lambda_B\left(x - \frac{\overline{w}}{\lambda_B + q_0\Delta\lambda}\right)$ instead of $p_{-1} - \lambda_B\left(x - \frac{\overline{w}}{\lambda_B + q_{-1-1}\Delta\lambda}\right)1_{q_{-1-1} \geq q^*}$, while the second-period trading profit is zero (while, on the equilibrium path, it is strictly positive).

Step 4: Ruling Out Deviations at $t = 1$. We continue by verifying that the speculator will not deviate at $t = 1$. In what follows, we present the proof for the case in which $q_0 < q^*$, which is sufficient to show the existence we claim in Proposition 1. For completeness, we also analyze the case in which $q_0 \geq q^*$ in Appendix C, which follows the same steps but is algebraically more tedious (see Lemma C.4).

Suppose that the speculator has observed $s \in \{G, \varnothing\}$. Regardless of how the speculator trades at $t = 2$, deviating to $D_1 \in \{-1, 0\}$ and, thus, trading as a negatively-informed or noise trader at $t = 1$, results in the firm not being able to attract stakeholders, in which case its value is equal to the price set by the market maker at both trading dates: $p_{D_1} = p_{D_1 D_2} = p_0 = 0$. The speculator's expected payoff is then $(p_0 - p_{D_1}) D_1 + (p_0 - p_{D_1 D_2}) D_2 = 0$, which is less than what she obtains on the equilibrium path. The same argument applies if $s = B$, but the speculator deviates to $D_1 = 0$ or $D_1 = 1$ followed by $D_2 \in \{-1, 0\}$. Then, the speculator's deviation profit would be zero if $D_1 = 0$, $D_2 \in \{-1, 0\}$ and negative if $D_1 = 1$, $D_2 \in \{-1, 0\}$.

It remains to consider the case in which the speculator observes $s = B$ but mimics the strategy of a positively-informed speculator and buys in both periods, i.e., $D_1 = D_2 = 1$. If the speculator's expected payoff, given by expression (A.1), is positive for some α, then it always crosses zero in $\alpha \in [0, 1]$ for a unique cutoff, which we denote with α_{11}^B. Note that since $\Pi_{11}(s)$ increases in $q(s)$ and $q(G) = 1 \geq q_0 \geq q(B) = 0$, it always holds that $\alpha_{11}^B < \overline{\alpha}_{11}$.

Defining $\underline{\alpha}_{11} := \max\left\{\alpha_{11}^B, \alpha_{11}^*\right\}$, we can summarize all conditions on α from Steps 2 - 4 as: there are thresholds $\underline{\alpha}_{11}$ and $\overline{\alpha}_{11}$, with $\underline{\alpha}_{11} < \overline{\alpha}_{11}$, such that an equilibrium (as stipulated at the beginning of the proof) exists if $\alpha \in [\underline{\alpha}_{11}, \overline{\alpha}_{11}]$.[34] This step concludes our existence proof.

It is straightforward to modify the above proof to show that there are equilibria in which the speculator buys in both periods if $s \in \{G, \varnothing\}$ and does not trade if $s = B$ or sells only in one of these periods. The only difference is the posterior belief that the speculator has observed a bad signal. However, since the price set by the market maker for any posterior belief $q_{D_1 D_2} \leq q_0$ is the same as above (i.e., zero), all arguments apply without any further changes. In Lemma C.5, we show that there are equilibria with uninformed speculation in which the speculator buys in $t = 1$ and does not trade in $t = 2$ if $s \in \{G, \varnothing\}$. Note that the expected payoff for an uninformed speculator in such equilibria is higher than when she

[34] The subscript 11 in $\underline{\alpha}_{11}$ and $\overline{\alpha}_{11}$ refers to the speculator's trading strategy if $s \in \{G, \varnothing\}$. We use $[\underline{\alpha}, \overline{\alpha}]$ in the statement of the Proposition, as for other speculation equilibria, such as those discussed below, the thresholds might be different.

buys in both periods since the price at which she buys in the first period is the same, but she does not incur a loss from trading at $t = 2$. **Q.E.D.**

Proof of Proposition 2. First, we show that, holding the expected compensation of stakeholders fixed and equal to $\overline{w}$, the uninformed speculator's expected payoff is decreasing in R. Plugging in for p_{11} and p_1 from the expressions from (7) and (8), the speculator's expected payoff becomes

$$\Pi_{11}(s) = (2(\lambda_B + q(s)\Delta\lambda) - (1+\pi_{11})(\lambda_B + q_{11}\Delta\lambda))\left(\Delta y - \frac{\overline{w} - R}{\lambda_B + q_{11}\Delta\lambda}\right) \quad \text{(A.4)}$$
$$- (1-\pi_{11})\left(R + \mathbf{1}_{q_0 \geq q^*}\left(-R + (\lambda_B + q_0\Delta\lambda)\left(\Delta y - \frac{\overline{w} - R}{(\lambda_B + q_0\Delta\lambda)}\right)\right)\right).$$

Taking the derivative with respect to R and simplifying, we obtain that:

$$\frac{\partial}{\partial R}\Pi_{11}(s) = 2\frac{q_0 - q_{11}}{\lambda_B + q_{11}\Delta\lambda}\Delta\lambda < 0.$$

Next, we show that the uninformed speculator's trading profit payoff is negative if $R \to \overline{w}$ and, thus, $\Delta R \to 0$. To see this, observe that in this limit, the uninformed speculator's trading profit becomes

$$\begin{aligned}
\Pi_{11}(\varnothing) &= (2(\lambda_B + q_0\Delta\lambda) - (1+\pi_{11})(\lambda_B + q_{11}\Delta\lambda))\Delta y \\
&\quad - (1-\pi_{11})(\overline{w} + \mathbf{1}_{q_0 \geq q^*}(-\overline{w} + (\lambda_B + q_0\Delta\lambda)\Delta y)) \\
&< (2(\lambda_B + q(s)\Delta\lambda) - (1+\pi_{11})(\lambda_B + q_{11}\Delta\lambda) \\
&\qquad - (1-\pi_{11})(\lambda_B + q_0\Delta\lambda))\Delta y \\
&= (1+\pi_{11})(q_0 - q_{11})\Delta\lambda\Delta y < 0.
\end{aligned}$$

Finally, observe that if $y = 0$ (and, thus, $R = 0$), expression (A.4) is the same as (A.1) with the only difference that we need to replace x by Δy. Thus, Proposition 1 applies nearly unchanged. **Q.E.D.**

Proof of Proposition 3. The proof follows from the proofs of Propositions 1 and 2. **Q.E.D.**

Proof of Proposition 4. We compare the firm's expected payoff between the equilibria with and without uninformed speculation. We only show the proof for the case in which the positively-informed speculator buys in both periods.

Case $q_0 < q^*$**:** In the equilibrium without uninformed speculation, the firm's expected profit given a shock ω is

$$U^{ns}(\omega) = \left(\frac{\beta}{9} + \mathbf{1}_{\omega=G}\left((1-\beta)\,\alpha\right)\right)\left(y - R + \lambda_\omega\left(\Delta y - \frac{\overline{w}-R}{\lambda_B + q_{11}^{ns}\Delta\lambda}\right)\right),$$

where $q_{11}^{ns} = \frac{\left((1-\beta)\alpha+\beta\frac{1}{9}\right)q_0}{(1-\beta)\alpha q_0+\beta\frac{1}{9}}$.[35] Thus, the firm's ex ante expected payoff is

$$\begin{aligned}
\mathrm{E}U^{ns} &= \left(q_0\,(1-\beta)\,\alpha + \frac{\beta}{9}\right)(y-R) \\
&\quad + \left(\frac{\beta}{9}\lambda_B + q_0\left((1-\beta)\,\alpha\lambda_G + \frac{\beta}{9}\left(\lambda_G - \lambda_B\right)\right)\right)\left(\Delta y - \frac{\overline{w}-R}{\lambda_B + q_{11}^{ns}\Delta\lambda}\right).
\end{aligned}$$

In the equilibrium with uninformed speculation, the firm's expected profit, given the firm-specific shock ω is

$$U^{s}(\omega) = \left(\frac{\beta}{9} + (1-\beta)((1-\alpha) + \mathbf{1}_{\omega=G}\alpha)\right)\left(y - R + \lambda_\omega\left(\Delta y - \frac{\overline{w}-R}{\lambda_B + q_{11}^{s}\Delta\lambda}\right)\right),$$

where $q_{11}^{s} = \frac{\left((1-\beta)+\beta\frac{1}{9}\right)q_0}{(1-\beta)\alpha q_0+(1-\beta)(1-\alpha)+\beta\frac{1}{9}}$. Thus, the firm's ex ante expected payoff is

$$\begin{aligned}
\mathrm{E}U^{s} &= \left((1-\beta)\,(1-\alpha+\alpha q_0) + \frac{\beta}{9}\right)(y-R) \\
&+ \left(\left((1-\beta)\,(1-\alpha) + \frac{\beta}{9}\right)\lambda_B + q_0\left((1-\beta)\left(\lambda_G - (1-\alpha)\,\lambda_B\right) + \frac{\beta}{9}\Delta\lambda\right)\right) \\
&\quad \times \left(\Delta y - \frac{\overline{w}-R}{\lambda_B + q_{11}^{s}\Delta\lambda}\right).
\end{aligned}$$

Taking the difference $EU^{ns} - EU^{s}$ and using that $R = \min\{y, \overline{w}\} = y$ for $q_0 < q^*$, we obtain

$$\mathrm{E}U^{ns} - \mathrm{E}U^{s} = (1-\beta)\,(1-\alpha)\left(\overline{w} - y - (\lambda_B + q_0\Delta\lambda)\,\Delta y\right) > 0,$$

where the inequality follows from the fact that $q_0 < q^* \iff \overline{w} > y + (\lambda_B + q_0\Delta\lambda)\,\Delta y$.

Case $q_0 \geq q^*$ **:** In the equilibrium without uninformed speculation, the firm's expected

[35] Superscript ns (s) refers to the equilibrium without (with) uninformed speculation.

profit given a shock ω is

$$
\begin{aligned}
U^{ns}(\omega) &= \left(\frac{\beta}{9}+\mathbf{1}_{\omega=G}(1-\beta)\alpha\right)\left(y-R+\lambda_\omega\left(\Delta y-\frac{\overline{w}-R}{\lambda_B+q_{11}^{ns}\Delta\lambda}\right)\right)\\
&+ \left(1-\frac{2\beta}{9}-(1-\beta)\alpha\right)\left(y-R+\lambda_\omega\left(\Delta y-\frac{\overline{w}-R}{\lambda_B+q_0\Delta\lambda}\right)\right),
\end{aligned}
$$

and the firm's ex ante expected profit is

$$
\begin{aligned}
\mathrm{E}U^{ns} &= -\Delta y\frac{1}{9}((9+9\alpha(-1+\beta)-\beta)\lambda_B(-1+q_0)+(-9+\beta)\lambda_G q_0))\\
&- \Delta y\frac{1}{9}((-9+\beta+9\alpha(-1+\beta)(-1+q_0))(\overline{w}-y)).
\end{aligned}
$$

In the equilibrium with uninformed speculation, the firm's expected profit, given the firm-specific shock ω is

$$
\begin{aligned}
U^{s}(\omega) &= \left(\frac{\beta}{9}+(1-\beta)((1-\alpha)+\mathbf{1}_{\omega=G}\alpha)\right)\left(x-R+\lambda_\omega\left(\Delta y-\frac{\overline{w}-R}{\lambda_B+q_{11}^{s}\Delta\lambda}\right)\right)\\
&+ \left(1-\frac{2\beta}{9}-(1-\beta)\right)\left(x-R+\lambda_\omega\left(\Delta y-\frac{\overline{w}-R}{\lambda_B+q_0\Delta\lambda}\right)\right),
\end{aligned}
$$

and the ex ante expected profit is

$$
\begin{aligned}
\mathrm{E}U^{s} &= -\Delta y\frac{1}{9}((9+9\alpha(-1+\beta)-\beta)\lambda_B(-1+q_0)+(-9+\beta)\lambda_G q_0))\\
&- \Delta y\frac{1}{9}((-9+\beta+9\alpha(-1+\beta)(-1+q_0))(\overline{w}-y)) = \mathrm{E}U^{ns}.
\end{aligned}
$$

Finally, we can show that for both $q_0 \geq q^*$ and $q_0 < q^*$, it holds that $U^{ns}(G) > U^{s}(G)$ and $U^{ns}(B) < U^{s}(B)$, which implies that uninformed speculation transfers surplus from firms with good firm-specific shocks to firms with bad firm-specific shocks. **Q.E.D.**

Proof of Proposition 5. (i) Recall that we assume (without loss of generality) that $R = \min\{\overline{w}, y\}$. We have shown that if $R = \overline{w}$, there is no scope for uninformed speculation. Consider, therefore, the case in which $R = y$ and $\Delta R = \frac{\overline{w}-y}{\lambda_B+q_{11}\Delta\lambda}$. Since $dy+(\lambda_B+q_0\Delta\lambda)\,d\Delta y < 0$, we further have that $\frac{d\Delta y}{dy} < -\frac{1}{(\lambda_B+q_0\Delta\lambda)}$. Using this and differentiating the speculator's expected payoff (A.4) with respect to y, we obtain:

$$
\begin{aligned}
\frac{\partial}{\partial y}\Pi_{11}(\varnothing) &= \frac{\partial \Pi_{11}(s)}{\partial R}\frac{dR}{dy}+\frac{\partial \Pi_{11}(s)}{\partial R}\frac{dy}{d\Delta y}\\
&< \begin{cases} 2\frac{q_0-q_{11}}{\lambda_B+q_{11}\Delta\lambda}\Delta\lambda-\frac{(2(\lambda_B+q_0\Delta\lambda)-(1+\pi_{11})(\lambda_B+q_{11}\Delta\lambda))}{(\lambda_B+q_0\Delta\lambda)} & \text{if } q_0 < q^* \\ (q_0-q_{11})\,\Delta\lambda\frac{(2(\lambda_B+q_0\Delta\lambda)-(1+\pi_{11})(\lambda_B+q_{11}\Delta\lambda))}{(\lambda_B+q_{11}\Delta\lambda)(\lambda_B+q_0\Delta\lambda)} & \text{if } q_0 \geq q^* \end{cases}.
\end{aligned}
$$

Observe that a necessary condition that $\Pi_{11}(\varnothing) \geq 0$ is that

$$(2(\lambda_B + q_0 \Delta\lambda) - (1 + \pi_{11})(\lambda_B + q_{11}\Delta\lambda)) \geq 0 \, .$$

Hence, we obtain that whenever $\Pi_{11}(\varnothing) \geq 0$, it holds that $\frac{\partial}{\partial y}\Pi_{11}(\varnothing) < 0$, implying that lower cash-flow dispersion (higher y) reduces the scope for uninformed speculation.

(ii) Suppose that $\alpha = \underline{\alpha}$, such that uninformed speculation is just profitable. Making explicit the dependence of the firm's expected payoff on the project's cash flows $(y, \Delta y)$, recall that $EU^s < EU^{ns}$ if $q_0 < q^*$ (Proposition 4). It follows that the firm can strictly increase its expected profit if it can avoid becoming a target of uninformed speculation. Thus, reducing the firm's cash-flow dispersion to $(\widetilde{y}, \Delta\widetilde{y})$ can make the firm strictly better off, even though this lowers the project's NPV, as long as the loss of transitioning to an equilibrium with uninformed speculation is larger than the loss from distorting the cash flow, i.e., if:

$$\begin{aligned} & EU^{ns}(y, \Delta y) - EU^s(y, \Delta y) > EU^{ns}(y, \Delta y) - EU^{ns}(\widetilde{y}, \Delta\widetilde{y}) \, , \\ \iff \; & EU^{ns}(\widetilde{y}, \Delta\widetilde{y}) > EU^s(y, \Delta y) \, . \end{aligned} \tag{A.5}$$

By continuity of the speculator's expected payoffs in α , if condition (A.5) is satisfied, it will hold not only at $\underline{\alpha}$ but also for somewhat higher α. **Q.E.D.**

Proof of Lemma 2. We have shown the existence of equilibria with uninformed buying in Proposition 1. If $q_0 \geq q^*$, so that firms are able to attract stakeholders even without positive feedback from the market, showing the existence of equilibria with uninformed selling follows similar steps to the construction of speculation equilibria in Proposition 1. The key difference is that there is no equilibrium in which an uninformed speculator makes a strictly positive profit from short selling if $q_0 < q^*$. In what follows, we show why this is the case.

If $q_0 < q^*$, the stakeholders' prior beliefs are not sufficiently positive, making it impossible for the firm to attract stakeholders without a positive feedback effect from the market, in which case the firm's value drops to zero. Hence, in any equilibrium, in which a positively-informed and a negatively-informed speculator pursue different strategies in at least one trading date (which is necessary for trading to affect stakeholders' beliefs), the uninformed speculator's profit from mimicking the trading strategy of a negatively-informed speculator will be either zero or negative. To see this, note that the speculator's expected trading profit is

$$((\lambda_B + q(s)\Delta\lambda)(x - \Delta R) - p_{D_1}) D_1 + ((\lambda_B + q(s)\Delta\lambda)(x - \Delta R) - p_{D_1 D_2}) D_2.$$

This payoff is zero if the uninformed speculator's trading strategy differs from that of a positively-informed speculator in the first period, as then the firm's expected value and the prices at which the stock trades will be zero in both periods.

If, instead, the speculator's trading strategy does not depend on her signal in the first period, the uninformed speculator's trading profit will be negative or zero. To see this, observe that there can be no equilibrium in which a positively-informed trader short-sells in one or both periods, as this would lead to a negative expected trading profit, which is less than the zero-payoff from not trading in both periods. Thus, if the speculator's first-period trading strategy is the same, regardless of her signal, she must be either buying or not trading in the first period. However, then the speculator's expected payoff will be negative if $s = \varnothing$, as she would be buying at a positive price, while expecting that her trading strategy in the second period (which mimics being negatively informed) will lead the price and firm value to drop to zero. And if a negatively-informed (mimicked by uninformed) speculator does not trade in the first period, the price and firm value again drop to zero in the second period, leading to a payoff of zero. Hence, there is no equilibrium in which the uninformed speculator can make a strictly positive profit from mimicking a negatively-informed trader if $q_0 < q^*$. **Q.E.D.**

Proof of Proposition 6. We start by proving the existence of the proposed equilibrium. From the break-even condition (10) of a VC who has observed $\widetilde{s} = G$, we obtain

$$\gamma = \frac{K}{\lambda_G \left(x - \Delta R_0 + p_0 \right)}. \tag{A.6}$$

If the VC has observed $\widetilde{s} = \varnothing$, from the break-even condition (11), we can derive

$$S = \frac{K}{\left(\lambda_B + \widetilde{q} \Delta\lambda \right)} - \gamma p_0. \tag{A.7}$$

The latter expression is strictly positive since $\lambda_G > (\lambda_B + \widetilde{q}\Delta\lambda)$ (see expressions (10) and (11)).

We, now, check when these contracts satisfy the feasibility restrictions $\gamma \in [0, 1]$ and $0 \leq S + \gamma p_0 + \Delta R_0 \leq x + p_0$. The last inequality requires that the sum of payment promised to the financier and the stakeholders cannot exceed the firm's cash flow and the price that the firm can obtain by selling its equity stake at $t = -1$ when the firm goes public. It holds

$$\begin{aligned} & S + \gamma p_0 + \Delta R \leq x + p_0 \\ & \Longleftrightarrow \Delta R_0 \leq x + p_0 - \frac{K}{\left(\lambda_B + \widetilde{q} \Delta\lambda \right)}. \end{aligned} \tag{A.8}$$

To show that $\gamma \in [0,1]$, we need to show that

$$\gamma = \frac{K}{\lambda_G (x - \Delta R_0 + p_0)} \leq 1,$$

which can be restated as

$$\Delta R_0 \leq x + p_0 - \frac{K}{\lambda_G}. \tag{A.9}$$

Observe that condition (A.9) is satisfied if condition (A.8) is satisfied.

We need to verify, now, that the incentive constraint (13) is satisfied:

$$\lambda_B (x - \Delta R_0 + p_0) \leq K \Longleftrightarrow x + p_0 - \frac{K}{\lambda_B} \leq \Delta R_0.$$

Solving for the bounds of ΔR_0 for the latter condition is satisfied, and considering condition (A.8) and the stakeholders' break-even condition (12), we can state all conditions on ΔR_0 as

$$\max\left\{x + \frac{1}{2}p_0 - \frac{K}{2\lambda_B} - \frac{\sqrt{\lambda_G^2 (K + \lambda_B p_0)^2 - 4K\lambda_B^2 \lambda_G p_0}}{2\lambda_B \lambda_G}, x + p_0 - \frac{K}{\lambda_B}\right\} \tag{A.10}$$

$$\leq \Delta R_0 = \frac{\overline{w}}{\left(\frac{\alpha\widetilde{q}\lambda_G + (1-\alpha)(\lambda_B + \widetilde{q}\Delta\lambda)}{\alpha\widetilde{q} + (1-\alpha)}\right)}$$

$$\leq \min\left\{x + \frac{1}{2}p_0 - \frac{K}{2\lambda_B} + \frac{\sqrt{\lambda_G^2 (K + \lambda_B p_0)^2 - 4K\lambda_B^2 \lambda_G p_0}}{2\lambda_B \lambda_G}; x + p_0 - \frac{K}{(\lambda_B + \widetilde{q}\Delta\lambda)}\right\}. \tag{A.11}$$

Hence, we obtain that there are thresholds $\overline{w}_c$ and $\overline{w}_d$, defined by the (unique) values of $\overline{w}$ for which the weak inequalities (A.10) and (A.11) are satisfied with equality, such that all conditions (10)–(12) are satisfied if $\overline{w} \in [\overline{w}_c, \overline{w}_d]$. Note since ΔR_0 decreases monotonically in $\widetilde{q}$ and α, we can equivalently express the same conditions as thresholds on q_0 or α, for a given $\overline{w}$. To complete the existence proof, observe that the firm and the investor have no incentive to agree on a different publicly-observable contract γ, as then stakeholders believe that the firm is bad and reject its contract offer.

Finally, observe that there is no equilibrium in which the uninformed investor does not pretend to be positively-informed if $\overline{w} \in [\overline{w}_c, \overline{w}_d]$. Suppose to a contradiction that this were the case. For such an equilibrium to be supported, it needs to hold that there is no side payment increasing the payment to the investor to S such that (10) is satisfied. However, since for $\overline{w} \in [\overline{w}_c, \overline{w}_d]$ such a payment exists, it follows that this continues to be true in the equilibrium candidate under consideration since in that equilibrium, $\Delta R_0 = \frac{\overline{w}}{\lambda_G}$, which is strictly lower than (12), which makes offering a feasible S easier. This gives the desired contradiction. **Q.E.D.**

Proof of Implication 2. In what follows, we discuss the equilibrium in which the trader buys in both periods if $s \in \{G, \varnothing\}$ and (short) sells if $s = B$ (the argument for all speculation equilibria is analogous). Note that, conditional on being in this equilibrium, the prices p_1 and p_{11} are given by expressions (5) and (4), respectively.

(i) Post-trade transparency. Suppose that a publicly observable signal about the speculator's type is revealed between her first- and second-period trades. Suppose that this signal is perfectly informative with probability χ and uninformative otherwise (our baseline model corresponds to the case of $\chi = 0$). If the signal is informative, the price in the second period adjusts to $p_{11} = \lambda_G \Delta y - \overline{w}$ in the case of an informed trader. Otherwise, the price becomes $p_{11} = (\lambda_B + q_0 \Delta\lambda) \max\left\{0, \left(x - \frac{\overline{w}}{\lambda_B + q_0\Delta\lambda}\right)\right\}$. The speculator's expected profit from buying in both periods is

$$\begin{aligned}\Pi_{11}(s) \quad = \quad & (1-\chi)\left(2\left(\lambda_B + q(s)\Delta\lambda\right)\left(x - \frac{\overline{w}}{\lambda_B + q_{11}\Delta\lambda}\right) - p_1 - p_{11}\right) \\ & +\chi\left(\left(\lambda_B + q(s)\Delta\lambda\right)\max\left\{0, \left(x - \frac{\overline{w}}{\lambda_B + q(s)\Delta\lambda}\right)\right\} - p_1\right).\end{aligned}$$

Since this profit decreases monotonically in χ if $s = \varnothing$, it follows that there is a cutoff $\widehat{\chi}$, such that uninformed speculators do not trade if $\chi > \widehat{\chi}$.

(ii) Transparency requirements for firms. It follows directly from Proposition 3.

(iii) Trading fees. Suppose that the trader incurs a fee of ϕ whenever she trades (our baseline model corresponds to the case of $\phi = 0$). Since the market maker breaks even, the prices she demands to sell or buy the firm's shares remain unchanged. Consider an equilibrium in which the speculator buys in both periods if $s \in \{G, \varnothing\}$. The difference to the proof of Proposition 1 is that the condition for trading to be profitable is that $\Pi_{11}(s) > 2\phi$. In particular, there is a threshold $\widehat{\phi}(s) := \frac{\Pi_{11}(s)}{2}$, such that trading is profitable for signal s only if $\phi < \widehat{\phi}(s)$, with $\widehat{\phi}(\varnothing) < \widehat{\phi}(G)$. For the region $[\underline{\alpha}, \overline{\alpha}]$ in which uninformed trading is profitable, it follows that $\underline{\alpha}$ weakly increases in ϕ, and $\overline{\alpha}$ strictly decreases in ϕ, with $[\underline{\alpha}, \overline{\alpha}]$ being empty if ϕ is sufficiently high.

(iv) Margin trading. Suppose that trader has cash on hand c, which is insufficient to pay p_1 and p_{11}, forcing the trader to fund the gap from a risk-neutral external financier operating in a competitive capital market. Consider a pooling equilibrium, in which a trader with $s \in \{G, \varnothing\}$ makes a take-it-or-leave-it offer for debt financing $\{M, \Delta M\}$, paying $M = c$ to financiers in case of failure and ΔM in addition to M in case of success.[36] In equilibrium,

[36] It is straightforward to show that this contract will, indeed, arise in equilibrium (see, for example,

such financiers' participation constraint binds

$$c+\left(\lambda_B+\widetilde{q}^f\left(M,\Delta M\right)\Delta\lambda\right)\Delta M=\left(p_1+p_{11}\right)\left(1+\varepsilon\right),$$

where $\widetilde{q}^f\left(M,\Delta M\right)$ is the financiers' posterior belief about the trader's type, given offer $\{M,\Delta M\}$, and ε is a fee on margin trading that regulation could potentially affect. In analogy to (2), the trader's expected payoff, net of her investment c, is

$$2\left(\lambda_B+q(s)\Delta\lambda\right)\left(x-\frac{\overline{w}}{\lambda_B+q_{11}\Delta\lambda}\right)-c-\left(\lambda_B+q\left(s\right)\Delta\lambda\right)\frac{\left(p_1+p_{11}\right)\left(1+\varepsilon\right)-c}{\left(\lambda_B+\widetilde{q}^f\left(M,\Delta M\right)\Delta\lambda\right)}$$

which, for $\varepsilon=0$, is strictly larger than (A.1) if $s=\varnothing$ but lower if $s=G$, with these differences being decreasing in c. The proof follows from the observation that higher margin requirements can be interpreted as a minimum level of c that needs to be promised to investors. As with trading fees, increasing the fee on margin trading, ε, discourages both informed and uninformed trading.

(v) Cost of acquiring information. It follows directly from Proposition B.1 in Appendix B.1.

(vi) Short-selling restrictions. The proof follows directly from Lemma 2 and Proposition B.3. **Q.E.D.**

Nachman and Noe, 1994). Note that, equivalently, the trader may use c to co-finance her payment of p_1 and p_{11} in which case $M=0$.

Appendix B Online Appendix

B.1 Endogenous Entry of Speculators

To model the possibility of entry by speculators, we modify the baseline model (for this discussion only) such that there is a pool of traders, the size and the composition of which are endogenously determined. While the number of noise traders in that pool is fixed, the number of speculators is endogenous. The trader that the market maker faces in periods one and two is a random draw from that pool. That is, β is the endogenous probability that the market maker faces a noise trader. New entry by speculators leads to a decrease in β. We denote by κ the speculator's cost of entry, which we interpret as the cost of monitoring the news and identifying which firm can become the target of speculative trading. This decision takes place after the firm chooses its transparency level (captured by α) but before trading starts. We continue to assume that the news observed by such speculators is informative about the state ω with probability α.

Let Π^{inf} and Π^{uninf} denote the speculator's profits conditional on becoming informed or remaining uninformed after observing a signal about ω. In any equilibrium with endogenous entry, all positive profit opportunities will be exhausted. That is, it must hold that

$$\mathrm{E}\Pi\left(\beta\right) := \alpha\Pi^{inf}\left(\beta\right) + \left(1-\alpha\right)\Pi^{uninf}\left(\beta\right) = \kappa. \tag{B.1}$$

The intuition is straightforward. If the expected profit from entry were positive, it would attract more entry. If they were negative, speculators would not enter. Thus, for any given level of transparency α and entry cost κ, condition (B.1) defines the equilibrium shares of noise traders, β, and speculators, $1-\beta$.

There is a wide parameter range for κ for which the speculation equilibria described in Proposition 1 arise in a setting with endogenous entry. The notable feature of this range is that entry costs must be intermediate. If they are too high, the equilibrium fraction of speculators and the probability of informed trading (captured by $(1-\beta)\,\alpha$) will be too low for prices to meaningfully affect prospective stakeholders' decisions. Instead, if entry costs are very low, speculators will be attracted to enter, making prices very sensitive to new trades. This would make it impossible for uninformed traders to profit from inflating prices. Hence, the case with endogenous entry adds to the general insight of our paper that speculation equilibria that affect the decisions of prospective stakeholders arise when market conditions are "normal" as opposed to extreme.

Proposition B.1 *There are thresholds $\underline{\kappa}$ and $\overline{\kappa}$ such that for $\kappa \in [\underline{\kappa}, \overline{\kappa}]$, there are equilibria with uninformed speculation, where the equilibrium shares of speculators and noise traders* *are determined by condition (B.1).*

B.2 Other Equilibria

As discussed in the main text, our setting also allows for other non-speculative equilibria.

Proposition B.2 *There is a threshold α', such that for $\alpha > \alpha'$, there are equilibria without uninformed speculation.*

B.3 Short selling After the Firm Attracts Stakeholders

Next, we explore the question of when speculative trading can reverse stakeholders' decision to join the firm. Considering this question is important, as the stakeholders' prior beliefs could be the result of speculative trading preceding date $t = 0$. Moreover, the prospect of a reversal affects the incentives to inflate prices in the first place. To address this question, we extend our analysis to consider the case in which the stakeholders' high prior beliefs, $q_0 \geq q^*$, allow the firm to attract stakeholders already at $t = 0$ by offering $\Delta R = \frac{\overline{w}}{\lambda_B + q_0 \Delta\lambda}$.

The limits to reversing positive feedback effects (and, thus, possibly arbitraging away inefficiencies) are immediate when we interpret stakeholders as capital providers. Then, reversals are not possible if the investment $\overline{w}$ is sunk. The new information effectively comes too late for capital providers, and all they can do is wait for their contractual payments in $t = 3$.

Next, we consider the alternative interpretation of stakeholders as employees and show that reversals are often unlikely in this context as well. The difference between the interpretation of stakeholders as employees and as investors is that the employees' outside option $\overline{w}$ is not necessarily sunk. We consider the following scenario. If employees leave before $t = 3$: (i) they can still claim their outside option $\overline{w}$; (ii) they forgo their compensation; and (iii) the firm's project yields a (liquidation) payoff of L.

Assumption (ii) is arguably realistic in the context of employees paid with vesting equity and performance bonuses, which is the setting we are interested in (Proposition 2). Assumption (iii) applies to cases in which the value that employees have created in a firm does not fully dissipate with their departure. Arguably, most businesses geared toward producing physical or digital products fit this description. However, there are also other examples, such as when scientists and engineers generate patents for the firm. We assume that it is efficient for employees to leave and the project to be liquidated if $\omega = B$ but not if $\omega = G$:

$$\lambda_B \left(x - \frac{\overline{w}}{\lambda_B + q_0 \Delta\lambda} \right) \leq L \leq \lambda_G \left(x - \frac{\overline{w}}{\lambda_B + q_0 \Delta\lambda} \right).$$

The trade-off for speculators is now readily apparent. If the negative price pressure from short selling causes stakeholders to leave, the firm is relieved from its obligation to pay them. Thus, even though the departure of stakeholders reduces the expected size of the "pie" if $\omega = G$, there is a countervailing effect for equity holders, as they are left with a larger share of the remaining pie, L. This countervailing effect dominates if the liquidation value L that becomes available through the employees' involvement is sufficiently high (i.e., L is larger than some lower bound $\underline{L}$) or if the firm has promised a large fraction of its cash flows to employees to ensure it can attract them to realize the risky project. In these cases, the speculators' profit from short selling that scares stakeholders away and forces the firm to liquidate the risky project is limited. In the extreme, short selling can even end up increasing the firm's stock price, making short selling unattractive regardless of the firm's information. Related, L cannot be too high either (i.e., it cannot be that the firm benefits too much when stakeholders leave). This is because a negatively-informed speculator will be able to make a profit by buying in the first period and benefiting from the increase in value when her subsequent trades drive stakeholders to leave.[37]

Proposition B.3 *The opportunities for reversing positive feedback effects, possibly driven by inflated prior beliefs, are limited. There are thresholds $\underline{L}$ and $\overline{L}$, such that when the project's liquidation value is intermediate, $L \in [\underline{L}, \overline{L}]$, there is no equilibrium in which negative information impounded into prices by short-sellers triggers stakeholders to leave the firm before $t = 3$.*

Interestingly, although Edmans, Goldstein, and Jiang (2015) show that trading on negative information is less profitable than trading on positive information, which is related to Proposition B.3, they also show that uninformed speculation inflating prices is not profitable. By contrast, our predictions are fundamentally different. The main insight from our analysis in Propositions 1–3 and Proposition B.3 is that such speculation is not only profitable but also likely to persist, as positive feedback effects are hard to reverse.

B.4 Transparency and Speculation Opportunities

Firms often have wide latitude in how transparent they want to be about their business, raising the question of how the firm's choice of transparency affects the probability of uninformed speculation. Although we do not mean to suggest that transparency decisions are

[37]Note that a key difference between our setting and laying off staff to improve operational efficiency is that employees leave voluntarily. In particular, although equity holders might be better off liquidating the project, this does not imply that attracting employees in the first place is suboptimal, as employees are instrumental both for running the project and for its positive liquidation value. Indeed, the firm generates zero if it does not attract stakeholders.

based primarily on this calculation, we believe that considerations of how transparency will affect speculative trading in the firm's stock are economically significant enough to be contemplated when deciding on the firm's level of transparency. For example, an effect that a firm might consider is that, outside the intermediate region for L defined in Proposition B.3, informed and possibly uninformed speculative short selling can potentially reverse positive feedback effects. However, analogously to Proposition 3, there are no equilibria with speculative short selling if transparency is sufficiently low or sufficiently high.

More precisely, consider an extension of our model in which the firm chooses its transparency level α at $t = 0$ before the shock ω is realized. A firm that wishes to avoid becoming the target of speculative short selling that scares off stakeholders can benefit from being very transparent or very intransparent.[38] Specifically, if the transparency level α is very low, the probability of informed trading is low and, hence, prices have little impact on stakeholders' beliefs and no impact on their decisions to leave the firm. This is trivial to see if $\alpha = 0$. Alternatively, firms can reduce the likelihood that stakeholders leave by increasing transparency. Higher transparency makes prices more sensitive to trades. As a result, the parameter range $L \in \left[\underline{L}, \overline{L}\right]$ (defined in Proposition B.3) for which speculators cannot benefit from trading on negative information increases ($\overline{L}$ increases). This strategy is not as effective as setting $\alpha = 0$, but is possibly more realistic for public firms, which typically must comply with minimum disclosure requirements.[39]

Proposition B.4 *The firm can reduce the profitability of short selling that triggers stakeholders to leave by choosing the highest feasible transparency level α. Alternatively, the firm can prevent trading from having an impact on stakeholders' decision to leave by choosing a transparency level below a threshold $\underline{\alpha}''$ (defined in the Appendix).*

B.5 Omitted Proofs From Appendix B

Proof of Proposition B.1. We only show the argument for the case in which $q_0 < q^*$ and the equilibrium with uninformed speculation in which the uninformed speculator buys in both periods. The same intuition applies to all other equilibria with speculation. Following

[38] Examples of information that could help speculators infer ω include the firm's choice of auditor quality, the number of items it reports in its financial reports, the accuracy of such reports, and the intensity of discussion of items such as R&D expenses, capital expenditures, product and segment data, and major business partners. Furthermore, in its regulatory filings, earnings calls, and news releases, a firm can choose how transparent it wants to be about its strategy; organizational structure; the identity of major shareholders; the background, share ownership, and affiliations of board members; as well as non-executive officers and employees.

[39] Moreover, lowering transparency might be hard for firms that had previously chosen high transparency (outside of our model) since, once information is released, it cannot be taken back.

the same steps as in the proof of Proposition 1, we can express the existence condition in terms of $\beta \in [\underline{\beta}_{11}, \overline{\beta}_{11}]$. The lower bound $\underline{\beta}_{11}$ is implicitly defined by $\Pi(\varnothing) = 0$. For the upper bound, it holds that $\overline{\beta}_{11} = \min\{\beta_{11}, \beta^*_{11}\}$, where β_{11} is implicitly defined by $\Pi(B) = 0$ and β^*_{11} by condition (3).

Observe, now, that for any $\beta \in [\underline{\beta}_{11}, \overline{\beta}_{11}]$, we can define $\kappa^*(\beta)$ as the value of κ for which condition (B.1) holds. That is, $\kappa^*(\beta)$ is the level of monitoring cost for which the speculator's expected payoff from monitoring the news, given a fraction β of noise traders in the market, is zero. To find the domain of κ that supports equilibria with uninformed speculation and endogenous entry, we, therefore, need to find $\kappa^*(\beta)$ for all $\beta \in [\underline{\beta}_{11}, \overline{\beta}_{11}]$. Let $\underline{\kappa} = \min_{\beta \in [\underline{\beta}_{11}, \overline{\beta}_{11}]} E\Pi(\beta)$ and $\overline{\kappa} = \max_{\beta \in [\underline{\beta}_{11}, \overline{\beta}_{11}]} E\Pi(\beta)$. Using that $E\Pi(\beta)$ and, thus, $\kappa^*(\beta)$ are continuous in β, we obtain that equilibria with uninformed speculation and endogenous entry exist if $\kappa \in [\underline{\kappa}, \overline{\kappa}]$. **Q.E.D.**

Proof of Proposition B.2. Consider an equilibrium in which the speculator buys in both trading dates ($D_1 = D_2 = 1$) if she observes $s = G$, sells if $s = B$, and does not trade if $s = \varnothing$. The stakeholders' and market maker's posteriors are then given by $\widehat{q}_{11} = q_{01}$ (we use $\widehat{q}_{11}$ to make it clear that the posterior is different from q_{11} in part (i) of Proposition 1) and

$$\widehat{\pi}_{11} = \frac{(1-\beta)\,\alpha q_0 + \beta \frac{1}{9}}{(1-\beta)\,\alpha q_0 + \beta \frac{1}{3}},$$

and the stakeholders join only if $\alpha \geq \alpha^{**}$. The proof is almost the same as that of Proposition 1 with the exception that the uninformed speculator should not have an incentive to mimic the trading strategy $D_1 = D_2 = 1$. Similar to Proposition 1, the speculator's expected payoff is given by

$$\Pi(s) = ((2q(s) - (1 + \pi_{11})\,\widehat{q}_{11})\,\Delta\lambda + (1 - \widehat{\pi}_{11})\,\lambda_B)\,(x - w).$$

Since this expression is positive if $s = G$, the speculator has no incentives to trade as a negatively-informed or noise trader, as that would lead to a deviation payoff of zero.

Similar to Proposition 1, for $\alpha > \alpha^{**}$, it holds that $\frac{\partial}{\partial \alpha}\Pi(\varnothing) < 0$ at $\Pi(\varnothing) = 0$, implying that there is a cutoff α_b, defined by $\Pi(\varnothing) = 0$, such that the speculator does not mimic the trading strategy $D_1 = D_2 = 1$ when she is uninformed if and only if $\alpha \geq \alpha_b$. Note that if the speculator does not mimic if $s = \varnothing$, she has even less of an incentive to do so if $s = B$. Defining $\underline{\underline{\alpha}}_{11} \equiv \max\{\alpha^{**}, \alpha_b\}$, the claim of the Proposition follows. **Q.E.D.**

Proof of Proposition B.3. We argue to a contradiction. Suppose that there is an equilibrium in which the stakeholders leave the firm at $t = 2$ when they observe stock prices consistent with the equilibrium trading strategy of a negatively but not a positively-informed speculator. We proceed in two steps. In Step 1, we define the equilibrium prices and expected payoffs. In Step 2, we argue to a contradiction by showing that the speculator cannot make a profit when her trading leads stakeholders to leave, provided that $L \in \left[\underline{L}, \overline{L}\right]$ (which we define below).

Step 1: Payoffs and prices. The speculator's expected payoff from when her trading leads stakeholders to leave is

$$\left(L - p_{D_1}\right) D_1 + \left(L - p_{D_1 D_2}\right) D_2. \tag{B.2}$$

Instead, the speculator's expected payoff when stakeholders do not leave the firm is

$$\left(\left(\lambda_G + q\left(s\right) \Delta\lambda\right)\left(x - \Delta R\right) - p_{D_1}\right) D_1 + \left(\left(\lambda_G + q\left(s\right) \Delta\lambda\right)\left(x - \Delta R\right) - p_{D_1 D_2}\right) D_2. \tag{B.3}$$

Note that in this section, ΔR is set before the trading game starts and is not affected by it.

Let $\pi_{D_1 D_s}$ denote the probability that the market maker assigns that the trade in the second period comes from a speculator with signal s, after observing her order flow, D_1, in the first period. Analogously, let $p_{D_1 D_s}$ be the price that would result in period two if the market maker observes trading consistent with the equilibrium strategy of a speculator with signal s. The price at $t = 1$ can be stated as

$$p_{D_1} = \pi_{D_1 D_B} p_{D_1 D_B} + \pi_{D_1 D_G} p_{D_1 D_G} + \left(1 - \pi_{D_1 D_B} - \pi_{D_1 D_G}\right)\left(\lambda_B + q_0 \Delta\lambda\right)\left(x - \Delta R\right). \tag{B.4}$$

If the market maker observes an order flow at $t = 1$ that is consistent with the strategy of a negatively but not a positively-informed speculator, we have that $p_{D_1 D_B} = L$ and $\pi_{D_1 D_G} = 0$. If D_1 is the same for $s = B$ and $s = G$, but D_2 differs depending on the signal, we have that

$$p_{D_1 D_G} = \left(\lambda_B + q_{D_1 D_G} \Delta\lambda\right)\left(x - \Delta R\right).$$

Step 2. Trading strategies and deviations. Observe that there is no equilibrium in which the speculator does not buy in both periods if $s = G$. To see this, suppose to a contradiction that the speculator either does not trade or sells at $t = 1$ if $s = G$. By deviating and buying in both periods, the speculator will have to pay p_1 and p_{11} where both are weakly smaller than $\left(\lambda_B + q_0 \Delta\lambda\right)\left(x - \Delta R\right)$ since the market maker associates this strategy with a noise trader or possibly even with a negatively-informed trader (at least at $t = 1$). Hence, the speculator's deviation trading profit is at least $2\left(\lambda_G - \left(\lambda_B + q_0 \Delta\lambda\right)\right)\left(x - \Delta R\right)$, which is higher than her equilibrium profit of (B.3). The latter is true because the speculator makes a loss from short selling, zero profit from not trading, and a smaller profit from buying since she buys at a price higher than $\left(\lambda_B + q_0 \Delta\lambda\right)\left(x - \Delta R\right)$. Using similar arguments, it is easy to see that there is no equilibrium in which a positively-informed speculator buys in the first but not in the second period. In particular, deviating to buying in both periods makes the speculator strictly better off, as the price in the first period is the same, while that in the second period is lower than the firm's fundamental value. Hence, the positively-informed speculator's trading strategy is $\{D_1, D_2\} = \{1, 1\}$, and in any equilibrium in which stakeholders leave, the negatively-informed strategy must differ from $\{D_1, D_2\} = \{1, 1\}$.

Next, we consider the speculator's strategies when she is negatively informed ($s = B$) or uninformed ($s = \varnothing$). First, we argue to a contradiction that there is no equilibrium in which a negatively-informed speculator makes a profit from selling or not trading in period one, $D_1 \in \{0, -1\}$ if $L > \underline{L} := (\lambda_B + q_0 \Delta\lambda)(x - \Delta R)$. Recall that the speculator buys in the first period ($D_1 = 1$) if $s = G$. Hence, if the speculator chooses, instead, $D_1 \in \{0, -1\}$, it becomes known that she has not observed $s = G$. Hence, it holds that $\pi_{D_1 D_G} = 0$. Since by contradiction assumption, stakeholders leave after the second period if $s = B$, we also have $p_{D_1 D_B} = L$. Plugging into expressions (B.2) and (B.4), we obtain that the speculator obtains a negative expected payoff from her first-period trade $D_1 \in \{0, -1\}$ if $L > (\lambda_B + q_0 \Delta\lambda)(x - \Delta R)$. Since $p_{D_1 D_B} = L$, we further have that the speculator's second-period trading profit is zero. Hence, the speculator's overall equilibrium expected trading profit is negative. This gives a contradiction since her expected payoff from deviating to not trading in both periods is zero.[40]

It remains to show that there is no equilibrium in which a speculator observing $s = B$ buys in $t = 1$ if $L < \overline{L} := \left(\lambda_B + \frac{(1-\beta)\alpha + \frac{2}{9}\beta}{(1-\beta)\alpha q_0 + \frac{2}{9}\beta} q_0 \Delta\lambda\right)(x - \Delta R)$. Suppose to a contradiction that such an equilibrium existed. In any equilibrium in which a negatively-informed speculator makes a profit from trading, a speculator observing $s = \varnothing$ will choose the same strategy, as the expected payoff from doing so is independent of the signal s (see expression (9)), while the profit from not trading is zero. Combined with the fact that the second-period trading profit is zero if the stakeholders leave, we can restrict attention to the case in which the speculator does not trade in the second period, i.e., $\{D_1, D_2\} = \{1, 0\}$, if $s = \{B, \varnothing\}$ since the case with $\{D_1, D_2\} = \{1, -1\}$ if $s = \{B, \varnothing\}$ is payoff-equivalent. It holds that:

$$\pi_{10} = \frac{(1-\beta)(\alpha(1-q_0) + (1-\alpha)) + \frac{1}{9}\beta}{1 - \frac{2}{3}\beta}$$

$$\pi_{11} = \frac{(1-\beta)\alpha q_0 + \frac{1}{9}\beta}{1 - \frac{2}{3}\beta}$$

$$p_{11} = \left(\lambda_B + \frac{\left((1-\beta)\alpha + \frac{1}{9}\beta\right) q_0}{(1-\beta)\alpha q_0 + \frac{1}{9}\beta}\Delta\lambda\right)(x - \Delta R).$$

[40] Recall that we assume that if the speculator's expected trading profit is zero, she does not trade.

Plugging π_{10}, π_{11}, p_{11} and p_1 into (B.4), we derive that a negatively-informed speculator's expected profit from buying at $t = 1$, which is equal to $L - p_1$, is negative as long as $L < \left(\lambda_B + \frac{(1-\beta)\alpha + \frac{2}{9}\beta}{(1-\beta)\alpha q_0 + \frac{2}{9}\beta} q_0 \Delta\lambda\right)(x - \Delta R)$. **Q.E.D.**

Proof of Proposition B.4. First, we argue that the firm can prevent the existence of equilibria in which changes in the firm's stock price cause stakeholders to leave by choosing α sufficiently low. To see this, observe that stakeholders leave the firm if and only if their expected compensation at the firm is lower than their outside option $\overline{w}$. Hence, there is a threshold $\widehat{q} := \frac{\overline{w} - \lambda_B \Delta R}{\Delta\lambda \Delta R}$, such that stakeholders leave if and only if their posterior beliefs are lower than $\widehat{q}$. Consider, now, any candidate equilibrium in which the speculator plays strategy $\{\widehat{D}_1, \widehat{D}_2\}$ when observing $s = B$. For any such strategy, it holds that the stakeholders' posterior beliefs following price movements, consistent with $\{\widehat{D}_1, \widehat{D}_2\}$, decrease in α, i.e., $\partial q_{\widehat{D}_1 \widehat{D}_2} / \partial\alpha < 0$. Hence, there is a unique threshold $\underline{\alpha}''$, defined by the value of α for which $q_{\widehat{D}_1 \widehat{D}_2} = \widehat{q}$, such that there is no equilibrium in which the stakeholders leave the firm if the firm chooses a transparency level $\alpha < \underline{\alpha}''$. Trivially, if $\alpha = 0$, the probability of informed trading is zero, trades do not affect prices, and stakeholders' decision to stay is never affected.

Next, we show that the firm can reduce the parameter range for which there are equilibria in which stock price changes lead stakeholders to leave the firm by choosing a transparency level as high as possible. This follows from the fact that such equilibria do not exist if $L \in [\underline{L}, \overline{L}]$ (Proposition B.3) and the fact that $\underline{L}$ does not depend on α, while $\overline{L}$ increases in α. **Q.E.D.**

Appendix C Proofs of Auxiliary Lemmas

Lemma C.1 *Let $id \in \{in, un, no\}$ denote the identity of the speculator, depending on whether she is informed (in), uninformed (un), or a noise trader (no). Let $\Omega_t \subseteq \{-1, 0, 1\}$ be the set of equilibrium actions that can be taken by the informed speculator at date t. Following trades D_1 and D_2, the market maker's and the stakeholders' posterior belief that the firm-specific shock is $\omega = G$ is*

$$q_{D_1 D_2} = \frac{\sum_{id=\{in,un,no\}} \Pr(id) \Pr(D_1, D_2 | id, G) \Pr(G)}{\sum_{id=\{in,un,no\}} \Pr(id) \sum_{\omega=\{G,B\}} \Pr(D_1, D_2 | id, \omega) \Pr(\omega)} \text{ if } D_1 \in \Omega_1, D_2 \in \Omega_2, \tag{C.1}$$

and $q_{D_1 D_2} = q_0$ if $D_1 \notin \Omega_1$ or $D_2 \notin \Omega_2$. Furthermore, after observing a trade D_1 at $t = 1$, the market maker assigns the following probability that the trader will play D_2 at $t = 2$:

$$\pi_{D_1 D_2} = \frac{\sum_{id=\{in,un,no\}} \Pr(id) \sum_{\omega=\{G,B\}} \Pr(D_1, D_2 | id, \omega) \Pr(\omega)}{\sum_{id=\{in,un,no\}} \Pr(id) \sum_{\omega=\{G,B\}} \Pr(D_1 | id, \omega) \Pr(\omega)}. \tag{C.2}$$

The stock price at date $t = 2$ is given by

$$p_{D_1 D_2} = \begin{cases} (\lambda_B + q_{D_1 D_2} \Delta\lambda) \left(x - \frac{\overline{w}}{\lambda_B + q_{D_1 D_2} \Delta\lambda} \right) \mathbf{1}_{q_{D_1 D_2} \geq q^*} & \text{if } D_1 \in \Omega_1, D_2 \in \Omega_2 \\ (\lambda_B + q_0 \Delta\lambda) \left(x - \frac{\overline{w}}{\lambda_B + q_0 \Delta\lambda} \right) \mathbf{1}_{q_0 \geq q^*} & \text{otherwise,} \end{cases} \tag{C.3}$$

where $1_{q_{D_1 D_2} \geq q^*} = 1$ if $q_{D_1 D_2} \geq q^*$ and zero otherwise. The price at date $t = 1$ is

$$p_{D_1} = \begin{cases} \sum_{D_2=\{-1,0,1\}} \pi_{D_1 D_2} p_{D_1 D_2} & \text{if } D_1 \in \Omega_1 \\ (\lambda_B + q_0 \Delta\lambda) \left(x - \frac{\overline{w}}{\lambda_B + q_0 \Delta\lambda} \right) \mathbf{1}_{q_0 \geq q^*} & \text{otherwise.} \end{cases} \tag{C.4}$$

The speculator's expected profit from both trades is

$$\Pi(s) = (v(s, q_{D_1 D_2}) - p_{D_1}) D_1 + (v(s, q_{D_1 D_2}) - p_{D_1 D_2}) D_2, \tag{C.5}$$

where

$$v(s, q_{D_1 D_2}) = (\lambda_B + q(s) \Delta\lambda) \left(x - \frac{\overline{w}}{\lambda_B + q_{D_1 D_2} \Delta\lambda} \right) \mathbf{1}_{q_{D_1 D_2} \geq q^*}.$$

Proof of Lemma C.1. Expressions (C.1) and (C.2) follow from a simple application of Bayes' rule. The prices reflect the market maker's rational expectation about the firm's fundamental value given the trades D_1 and D_2 and the trader's equilibrium trading strategies. **Q.E.D.**

Lemma C.2 *The contract $\{R, \Delta R\}$ offered by the firm to stakeholders satisfies their par-*

ticipation constraint (1) with equality. If the stakeholders observe the firm-specific shock ω, the firm can attract them if and only if $\omega = G$ in which case $q_{D_1 D_2}$ is replaced by one in expression (1).

Proof of Lemma C.2. If the firm and the stakeholders have the same information, which they infer from the firm's stock price, it is optimal for the firm to satisfy the worker's participation constraint with equality by offering (for $y = R = 0$)

$$\Delta R = \frac{\overline{w}}{\lambda_B + q_{D_1 D_2} \Delta\lambda}. \tag{C.6}$$

Offering more is strictly suboptimal as it does not affect whether or not the firm can attract stakeholders, while it increases the cost of doing so.

Offering contract (C.6) is optimal also in the case in which the firm observes the firm-specific shock ω, while the stakeholders form their beliefs based on the firm's stock price. The argument is standard. In the resulting signaling game, the unique equilibrium contract is pooling and must satisfy condition (C.6).[41] Since the contract offered by the firm is uninformative about the true firm-specific shock, the stakeholders' posterior beliefs are formed once again from the firm's stock price. Finally, for use in Lemma 1, if the stakeholders observe the firm-specific shock (regardless of whether the firm observes it), it is optimal for the firm to offer a contract for which (1) is satisfied for $q_{D_1 D_2} = 1$. Then, the stakeholders will join if and only if they observe that $\omega = G$. **Q.E.D.**

Lemma C.3 *For any feasible (β, q_0), if there is a value for α, denoted by $\overline{\alpha}_{11}$, for which $\Pi(\varnothing) = 0$, then $\frac{\partial}{\partial \alpha}\Pi(\varnothing) < 0$ at $\overline{\alpha}_{11}$.*

Proof of Lemma C.3. We have two cases depending on whether $\overline{w}$ is larger or smaller than $(\lambda_B + q_0 \Delta\lambda)\, x$.

Case: $q_0 < q^*$ (equivalently, $\overline{w} > (\lambda_B + q_0 \Delta\lambda)\, x$). From expression (A.1), the uninformed speculator's profit is

$$\Pi_{11}(\varnothing) = ((2q_0 - (1 + \pi_{11})\, q_{11})\, \Delta\lambda + (1 - \pi_{11})\, \lambda_B) \left(x - \frac{\overline{w}}{\lambda_B + q_{11} \Delta\lambda} \right). \tag{C.7}$$

Since by construction $x \geq \frac{\overline{w}}{\lambda_B + q_{11}\Delta\lambda}$ for $\alpha > \alpha^*_{11}$, it suffices to analyze the first term in

[41] If the firm generates positive cash flows, $y > 0$, also in the low cash flow state, the proof is slightly more tedious but standard. In particular, the firm will offer $R = y$ and $\Delta R = \frac{\overline{w} - y}{\lambda_B + q_{D_1 D_2} \Delta\lambda}$. We omit the full proof, as it is standard. See Nachman and Noe (1994) and Inderst and Vladimirov (2019) for detailed proofs.

brackets in expression (C.7), $C_1 := ((2q_0 - (1+\pi_{11})\,q_{11})\,\Delta\lambda + (1-\pi_{11})\,\lambda_B)$. A sufficient condition that this term is always positive is that $2q_0 \geq (1+\pi_{11})\,q_{11}$. Plugging in for π_{11} and q_{11}, this is the case if $\alpha \leq \frac{1-\frac{2}{3}\beta-\sqrt{\left(1-\frac{2}{3}\beta\right)^2-\frac{4}{9}\beta\left(1-\frac{8}{9}\beta\right)}}{2(1-\beta)(1-q_0)}$.

We show, now, that if $\alpha > \frac{1-\frac{2}{3}\beta-\sqrt{\left(1-\frac{2}{3}\beta\right)^2-\frac{4}{9}\beta\left(1-\frac{8}{9}\beta\right)}}{2(1-\beta)(1-q_0)}$, C_1 crosses zero at most once from above. Taking the derivative of C_1 with respect to α, we have

$$
\begin{aligned}
&-\frac{\partial}{\partial\alpha}\left(q_{11}+\pi_{11}q_{11}\right)\Delta\lambda - \frac{\partial}{\partial\alpha}\pi_{11}\lambda_B \\
&= -\left(\frac{q_0\,(1-\beta)\,(1-q_0)\left(1-\frac{8}{9}\beta\right)}{\left((1-\beta)\,\alpha q_0+(1-\beta)\,(1-\alpha)+\beta\frac{1}{9}\right)^2}\right. \\
&\qquad \left. + \frac{q_0\,(1-\beta)\,(1-q_0)\left(1-\frac{8}{9}\beta\right)}{\left((1-\beta)\,\alpha q_0+(1-\beta)\,(1-\alpha)+\beta\frac{1}{3}\right)^2}\right)\Delta\lambda \qquad \text{(C.8)} \\
&+ \frac{\frac{2}{9}\beta\,(1-\beta)\,(1-q_0)}{\left((1-\beta)\,\alpha q_0+(1-\beta)\,(1-\alpha)+\beta\frac{1}{3}\right)^2}\lambda_B. \qquad \text{(C.9)}
\end{aligned}
$$

Suppose, now, that the speculator's profit is zero at some $\alpha > \alpha_{11}^*$. From expression (C.7), we can then express $\lambda_B = \frac{-(2q_0-(1+\pi_{11})q_{11})\Delta\lambda}{(1-\pi_{11})}$. Plugging in for λ_B, expression (C.9) can be simplified to

$$
\begin{aligned}
&6q_0\,(1-\beta)\,(1-q_0) \qquad \text{(C.10)} \\
&\times\frac{((1-\beta)\,81\alpha\,(1-q_0)-144\,(1-\beta)-18)\,(1-\beta)\,\alpha\,(1-q_0)+(9-8\beta)\,(9-7\beta)}{(3\,(1-\beta)\,\alpha\,(1-q_0)+2\beta-3)\,(9\alpha\,(1-\beta)\,(1-q_0)+8\beta-9)^2}\Delta\lambda.
\end{aligned}
$$

Observe now that the numerator in expression

$$
(9-8\beta)^2+(9-8\beta)\,\beta-(9-8\beta)\,(9-7\beta)
$$

(C.10) is positive for any (α, q_0). To see this, denote $A := \alpha\,(1-q_0)$, and observe that the numerator of (C.10) is convex in A, obtaining a minimum value at $A = \frac{8\beta-9}{9\beta-9} > 1$ for any $\beta \in [0,1]$. Since $\alpha \in [0,1]$ and $q_0 \in [0,1]$, the minimum value of the numerator is achieved at $A = 1$, for which the numerator becomes equal to $\beta\,(9-7\beta) > 0$. Furthermore, observe that expression $(3\,(1-\beta)\,\alpha\,(1-q_0)+2\beta-3)$ in the denominator is negative for any (α, q_0) , since $3\,(1-\beta)\,A+2\beta-3 \leq -\beta < 0$. Hence, we obtain that $\frac{\partial}{\partial\alpha}\Pi_{11}(\varnothing) < 0$ for any α for which $\frac{\partial}{\partial\alpha}\Pi_{11}(\varnothing) = 0$, as was to be shown. ■

Case: $q_0 \geq q^*$ **(equivalently,** $\overline{w} \leq (\lambda_B + q_0\Delta\lambda)\,x$**).** From expression (A.1), the uninformed speculator's profit simplifies to

$$\Pi_{11}(\varnothing) = \frac{(q_{11} - q_0)\,\Delta\lambda}{\lambda_B + q_{11}\Delta\lambda}\left(2\overline{w} - (\lambda_B + q_{11}\Delta\lambda)(1 + \pi_{11})\,x\right).$$

After plugging in for q_{11} and π_{11}, the term after the fraction can be rewritten as

$$\begin{aligned} C_2 := 2\overline{w} - &\left(\lambda_B + \frac{\left(1 - \frac{8}{9}\beta\right) q_0}{(1-\beta)(1 - \alpha(1 - q_0)) + \beta\frac{1}{9}}\Delta\lambda\right) \\ &\times \left(2 - \frac{\beta\frac{2}{9}}{(1-\beta)(1 - \alpha(1 - q_0)) + \beta\frac{1}{3}}\right) x. \end{aligned}$$

Observe that C_2 increases in β. Furthermore, we can restate C_2 as

$$\begin{aligned} &\frac{2}{\left((1-\beta)(1-\alpha(1-q_0)) + \beta\frac{1}{9}\right)\left((1-\beta)(1-\alpha(1-q_0)) + \beta\frac{1}{3}\right)} \\ &\times \left(\overline{w}\left((1-\beta)(1-\alpha(1-q_0)) + \beta\frac{1}{9}\right)\left((1-\beta)(1-\alpha(1-q_0)) + \beta\frac{1}{3}\right)\right. \\ &- \left(\left((1-\beta)(1-\alpha(1-q_0)) + \beta\frac{1}{9}\right)\lambda_B + \left(1 - \frac{8}{9}\beta\right) q_0\Delta\lambda\right) \\ &\quad \left.\times \left((1-\beta)(1-\alpha(1-q_0)) + \beta\frac{2}{9}\right) x\right). \end{aligned}$$

Denoting $A := (1 - \alpha(1 - q_0))$, the numerator in the above expression can be restated as

$$\begin{aligned} &\overline{w}\left((1-\beta)A + \beta\frac{1}{9}\right)\left((1-\beta)A + \beta\frac{1}{3}\right) \\ &- \left(\left((1-\beta)A + \beta\frac{1}{9}\right)\lambda_B + \left(1 - \frac{8}{9}\beta\right) q_0\Delta\lambda\right)\left((1-\beta)A + \beta\frac{2}{9}\right) x. \end{aligned} \tag{C.11}$$

Furthermore, for any (α, q_0), expression (C.11) evaluated at $\beta = 1$ becomes

$$\frac{1}{27}\left(w - \frac{2}{3}x(\lambda_B + q_0\Delta\lambda)\right).$$

Hence, a necessary condition for the speculator's profit to be positive is that $\overline{w} \geq \frac{2}{3}x(\lambda_B + q_0\Delta\lambda)$. We will use this property in what follows to show that expression (C.11) increases in A when (C.11) is zero. Since $\frac{\partial A}{\partial \alpha} < 0$, this will imply that if $\Pi_{11}(\varnothing) = 0$ for some α, then $\frac{\partial \Pi_{11}(\varnothing)}{\partial \alpha} < 0$ at that α.

The derivative of expression (C.11) with respect to A is

$$\overline{w}\frac{2}{9}(1-\beta)(9A(1-\beta)+2\beta)$$
$$-\left(\frac{1}{9}(1-\beta)(18A\lambda_B+3\beta\lambda_B+9\Delta_\lambda q_0-18A\beta\lambda_B-8\beta\Delta_\lambda q_0)\right)x,$$

where, by using that $\overline{w}\geq\frac{2}{3}x(\lambda_B+\Delta_\lambda q_0)$, this derivative is larger than

$$\frac{2}{3}x(\lambda_B+\Delta_\lambda q_0)\frac{2}{9}(1-\beta)(9A(1-\beta)+2\beta)$$
$$-\left(\frac{1}{9}(1-\beta)(18A\lambda_B+3\beta\lambda_B+9\Delta_\lambda q_0-18A\beta\lambda_B-8\beta\Delta_\lambda q_0)\right)x$$
$$=\frac{1}{27}(\beta-1)((18A(1-\beta)+\beta)\lambda_B+(27-32\beta-36A(1-\beta))\Delta_\lambda q_0)x. \tag{C.12}$$

Consider, now, a value of α, which we denote as $\overline{\alpha}_{11}$, for which expression (C.11) is zero (and so $C_2=\Pi_{11}(\varnothing)=0$). Using again that $\overline{w}\geq\frac{2}{3}x(\lambda_B+\Delta_\lambda q_0)$, it holds

$$0=\overline{w}\left((1-\beta)A+\beta\frac{1}{9}\right)\left((1-\beta)A+\beta\frac{1}{3}\right)$$
$$-\left(\left((1-\beta)A+\beta\frac{1}{9}\right)\lambda_B+\left(1-\frac{8}{9}\beta\right)q_0\Delta_\lambda\right)\left((1-\beta)A+\beta\frac{2}{9}\right)x$$
$$>\frac{2}{3}(\lambda_B+\Delta_\lambda q_0)\left((1-\beta)A+\beta\frac{1}{9}\right)\left((1-\beta)A+\beta\frac{1}{3}\right)x$$
$$-\left(\left((1-\beta)A+\beta\frac{1}{9}\right)\lambda_B+\left(1-\frac{8}{9}\beta\right)q_0\Delta_\lambda\right)\left((1-\beta)A+\beta\frac{2}{9}\right)x$$
$$=\frac{1}{27}(\beta-1)\left(A(9A(1-\beta)+\beta)\lambda_B+\left(27A+6\beta-18A^2(1-\beta)-32A\beta\right)\Delta_\lambda q_0\right)x,$$

which implies that $(\beta-1)\lambda_B<-(\beta-1)\frac{\left(27A+6\beta-18A^2(1-\beta)-32A\beta\right)}{A(9A(1-\beta)+\beta)}\Delta_\lambda q_0$. Hence, expression (C.12) at $\overline{\alpha}_{11}$ is larger than

$$\frac{1}{27}(\beta-1)\Bigg(-(18A(1-\beta)+\beta)\frac{27A+6\beta-18A^2+18A^2\beta-32A\beta}{(9A^2+A\beta-9A^2\beta)}$$
$$+27-32\beta-36A(1-\beta)\Bigg)\Delta_\lambda q_0 x$$
$$=\frac{\frac{1}{9}(1-\beta)}{A(9A+\beta-9A\beta)}\left(90A^2\beta^2-171A^2\beta+81A^2-36A\beta^2+36A\beta+2\beta^2\right)\Delta_\lambda q_0 x.$$

Since $A\in[0,1]$, the term in brackets has a minimum at $A=2\frac{\beta}{10\beta-9}$, but since $A\leq 1$, the minimum of the above expression as obtained at $A = 1$ as

$$\frac{\frac{1}{9}(1-\beta)}{A(9A+\beta-9A\beta)}\left(56\beta^2-135\beta+81\right)\Delta_\lambda q_0 x > 0 \text{ for any } \beta \in [0,1].$$

Hence, the derivative of expression (C.11) at any α for which the speculator's profit is zero is positive with respect to A. Since $\frac{\partial A}{\partial \alpha} < 0$, the claim follows. ■

The proofs of the two cases complete the proof. **Q.E.D.**

Lemma C.4 *There is an equilibrium in which an uninformed speculator buys in both periods if $q_0 \geq q^*$.*

Proof of Lemma C.4. It only remains to prove Step 4 from Proposition 1 for the case where $q_0 \geq q^*$. In particular, we continue by verifying that the speculator will not deviate at $t = 1$. Clearly, deviating to $\{D_1, D_2\} = \{0, 0\}$ is never strictly optimal, as the speculator's deviation payoff is zero. In what follows, we provide sufficient conditions for which deviations do not occur, followed by concrete parametric examples that satisfy all these conditions.

Ruling Out Deviations to $\{D_1, D_2\} = \{0, -1\}$ and $\{D_1, D_2\} = \{1, -1\}$. If the speculator deviates to $\{D_1, D_2\} = \{0, -1\}$ or $\{D_1, D_2\} = \{1, -1\}$, which are trades that can only come from a noise trader on the equilibrium path, her expected payoff is

$$\left((\lambda_B + q(s)\Delta\lambda)\left(x - \frac{\overline{w}}{(\lambda_B + q_0\Delta\lambda)}\right) - p_1\right) D_1 \qquad \text{(C.13)}$$
$$- \left((\lambda_B + q(s)\Delta\lambda)\left(x - \frac{\overline{w}}{(\lambda_B + q_0\Delta\lambda)}\right) - p_0\right).$$

Case $q_0 \geq q^* \geq q_{-1-1}$: In this case, expression (C.13) reduces to $p_0 - p_1 < 0$ if $D_1 = 1$ and $(q_0 - q(s))\Delta\lambda\left(x - \frac{\overline{w}}{(\lambda_B+q_0\Delta\lambda)}\right)$ if $D_1 = 0$. The latter is (weakly) negative for signals $s = \{G, \varnothing\}$. For signal $s = B$, we need to compare (C.13) to the negatively-informed speculator's expected payoff from selling twice. If $q_0 \geq q^* \geq q_{-1-1}$, the difference is

$$((1-\pi_{-1-1})(\lambda_B + q_0\Delta\lambda) - q_0\Delta\lambda)\left(x - \frac{\overline{w}}{(\lambda_B + q_0\Delta\lambda)}\right),$$

which is positive (i.e., deviating is unprofitable) if and only if $\lambda_B > \frac{\pi_{-1-1}}{(1-\pi_{-1-1})} q_0\Delta\lambda$ and negative otherwise. Since π_{-1-1} is increasing in α, we obtain that if $\lambda_B > \frac{9\alpha(\beta-1)(q_0-1)+\beta}{2\beta} q_0\Delta\lambda$, there is no deviation. Instead, if it holds that $\lambda_B \in \left[\frac{1}{3}q_0\Delta\lambda, \frac{9\alpha(\beta-1)(q_0-1)+\beta}{2\beta} q_0\Delta\lambda\right]$, there is a threshold $\alpha_{u1} \in [0,1]$, such that a deviation by the negatively-informed speculator can be prevented if $\alpha \leq \alpha_{u1}$. For $\lambda_B < \frac{1}{3}q_0\Delta\lambda$, the speculator always deviates.

Case $q_{-1-1} \geq q^*$: Similarly to the previous case, the difference between the negatively-informed speculator's expected payoff and her payoff (C.13) from deviating to $\{0, -1\}$ is

$$2q_{-1-1}\Delta\lambda\left(x - \frac{\overline{w}}{\lambda_B + q_{-1-1}\Delta\lambda}\right) + \left(1 - \pi_{-1-1}\right)\left(q_0 - q_{-1-1}\right)\Delta\lambda x - q_0\Delta\lambda\left(x - \frac{\overline{w}}{\left(\lambda_B + q_0\Delta\lambda\right)}\right), \tag{C.14}$$

which is strictly positive for $\alpha \to 0$ or $\beta \to 1$. Hence, there is a threshold $\alpha_{u2} \in (0, 1]$, implicitly defined by the lowest root of (C.14) and, if this root does not exist, by $\alpha_{u2} = 1$, such that deviating is not profitable for $\alpha \leq \alpha_{u2}$.

Ruling Out Deviations to $\{D_1, D_2\} = \{0, 1\}$**or** $\{D_1, D_2\} = \{1, 0\}$**.** Next, if the speculator deviates to $\{D_1, D_2\} = \{0, 1\}$ or $\{D_1, D_2\} = \{1, 0\}$, which is only consistent with noise trading on the equilibrium path, her expected payoff is

$$\mathbf{1}_{q_0 \geq q^*}\left(\lambda_B + q\left(s\right)\Delta\lambda\right)\left(x - \frac{\overline{w}}{\left(\lambda_B + q_0\Delta\lambda\right)}\right) - p_{D_1D_2}, \tag{C.15}$$

where $p_{D_1D_2} = p_0$ if $D_1 = 0$ and $p_{D_1D_2} = p_1$ if $D_1 = 1$. In either case, (C.15) is (weakly) negative if $s = \{B, \varnothing\}$. If $s = G$, the speculator's equilibrium profit from $\{D_1, D_2\} = \{1, 0\}$ is less than from buying in both periods i.e., $\{D_1, D_2\} = \{1, 1\}$. Subtracting the expected profit from $\{D_1, D_2\} = \{0, 1\}$

$$\mathbf{1}_{q_0 \geq q^*}\left(\left(q\left(s\right) - q_0\right)\Delta\lambda\left(x - \frac{\overline{w}}{\left(\lambda_B + q_0\Delta\lambda\right)}\right)\right).$$

From the expected equilibrium payoff, we obtain

$$\Delta\lambda\left(\left(2\frac{\left(q_{11} - q\left(s\right)\right)}{\lambda_B + \Delta\lambda q_{11}} + \frac{q\left(s\right) - q_0}{\left(\lambda_B + q_0\Delta\lambda\right)}\right)\overline{w} + \left(q\left(s\right) - q_{11} - \pi_{11}\left(q_{11} - q_0\right)\right)x\right). \tag{C.16}$$

Plugging in for q_{11} and π_{11}, this difference becomes $\left(1 - q_0\right)\left(x - \frac{\overline{w}}{\lambda_B + q_0\Delta\lambda}\right)\Delta\lambda \geq 0$ for $\alpha \to 0$. Hence, there is a threshold, $\alpha_{u3} \in (0, 1]$, implicitly defined by the lowest root of (C.16), such that the positively-informed speculator does not deviate for $\alpha \leq \alpha_{u3}$.

Ruling Out Deviations to $\{D_1, D_2\} = \{1, 1\}$ **or** $\{-1, -1\}$**.** Since the IC of the uninformed speculator is the most restrictive, the relevant incentive constraints are $\Pi_{11}\left(\varnothing\right) \geq \Pi_{-1-1}\left(\varnothing\right)$ and $\Pi_{-1-1}\left(B\right) \geq \Pi_{11}\left(B\right)$.

Case: $q_0 \geq q^* > q_{-1-1}$**.** The incentive constraints $\Pi_{11}\left(\varnothing\right) \geq \Pi_{-1-1}\left(\varnothing\right)$ and $\Pi_{-1-1}\left(B\right) \geq$

$\Pi_{11}(B)$ are:

$$2q_0\Delta\lambda\left(x-\frac{\overline{w}}{\lambda_B+\Delta\lambda q_{11}}\right)+\Delta\lambda\left((1-\pi_{11})(q_{11}-q_0)x-2q_{11}\left(x-\frac{\overline{w}}{\lambda_B+\Delta\lambda q_{11}}\right)\right)$$
$$\geq(1-\pi_{-1-1})(\lambda_B+q_0\Delta\lambda)\left(x-\frac{\overline{w}}{\lambda_B+q_0\Delta\lambda}\right)$$
$$\geq\Delta\lambda\left((1-\pi_{11})(q_{11}-q_0)x-2q_{11}\left(x-\frac{\overline{w}}{\lambda_B+\Delta\lambda q_{11}}\right)\right).$$

For $\alpha\to 0$, the latter constraint reduces to $(\lambda_B+q_0\Delta\lambda)x\geq w$, which is satisfied, as $q_0\geq q^*$. Denoting with α_{u4} the lowest value of α for which the constraint continues to be satisfied at least weakly, we obtain that a sufficient condition for which it is satisfied is that $\alpha\in[0,\alpha_{u4}]$. However, if $\alpha\to 0$, the former constraint is not satisfied, but the difference between the left- and the right-hand side of the inequality increases in α. Thus, if the constraint is satisfied, there is a threshold α_{l1}, such that it is satisfied for $\alpha>\alpha_{l1}$. Numerically, it can be verified that, for example, for $\beta=0.8$, $\lambda_B=0.6$, $\Delta\lambda=0.4$, $q_0=.5$, $x=100$, and $\overline{w}=80$, there is a wide range of values for α that satisfy all incentive constraints.

Case $q_{-1-1}\geq q^*$. Finally, the incentive constraint that an uninformed speculator will not play the strategy of a negatively-informed speculator is

$$2q_0\Delta\lambda\left(x-\frac{\overline{w}}{\lambda_B+\Delta\lambda q_{11}}\right)+\Delta\lambda\left((1-\pi_{11})(q_{11}-q_0)x-2q_{11}\left(x-\frac{\overline{w}}{\lambda_B+\Delta\lambda q_{11}}\right)\right)$$
$$\geq\left((1-\pi_{-1-1})(q_0-q_{-1-1})\Delta\lambda x-2(q_0-q_{-1-1})\Delta\lambda\left(x-\frac{\overline{w}}{\lambda_B+q_{-1-1}\Delta\lambda}\right)\right).$$

For $\alpha\to 0$, this constraint is satisfied with equality, and the difference between the left- and right-hand side increases in α at $\alpha\to 0$. Thus, there is α_{u5}, such that the incentive constraint is satisfied for $\alpha\leq\alpha_{u5}$.

The incentive constraint that a negatively-informed speculator will not play the strategy of a positively-informed speculator is

$$(1-\pi_{-1-1})(q_0-q_{-1-1})\Delta\lambda x-2(0-q_{-1-1})\Delta\lambda\left(x-\frac{\overline{w}}{\lambda_B+q_{-1-1}\Delta\lambda}\right)$$
$$\geq\Delta\lambda\left((1-\pi_{11})(q_{11}-q_0)x-2q_{11}\left(x-\frac{\overline{w}}{\lambda_B+\Delta\lambda q_{11}}\right)\right).$$

The latter constraint reduces to $(\lambda_B+q_0\Delta\lambda)x\geq w$ for $\alpha\to 0$. Denoting with α_{u6} the lowest value of α for which the constraint continues to be satisfied at least weakly, we obtain that a sufficient condition for which it is satisfied is that $\alpha\in[0,\alpha_{u6}]$. Numerically, it can be verified that, for the same parameter values as above ($\beta=0.8$, $\lambda_B=0.6$, $\Delta\lambda=0.4$, $q_0=0.6$, $x=100$, and $\overline{w}=80$), there is a wide range of values for α that satisfy all incentive constraints. **Q.E.D.**

Lemma C.5 *There is an equilibrium in which the speculator buys at $t = 1$ and does not trade at $t = 2$ if $s \in \{G, \varnothing\}$ and sells at $t = 1$ and $t = 2$ if $s = B$. There are thresholds $\underline{\alpha}_{10}$, $\overline{\alpha}_{10}$ and $\overline{w}^*_{10}$, such that these equilibria can be supported if the probability that the speculator is informed is intermediate*

$$\alpha \in [\underline{\alpha}_{10}, \overline{\alpha}_{10}], \tag{C.17}$$

and $\overline{w} < \overline{w}^*_{10}$. It holds that $\underline{\alpha}_{10} > \underline{\alpha}_{11}, \overline{\alpha}_{10} > \overline{\alpha}_{11}$.

Proof of Lemma C.5. We consider, next, the equilibria in which the speculator buys at $t = 1$ and does not trade at $t = 2$ $(D_1 = 1, D_2 = 0)$ if she observes $s \in \{G, \varnothing\}$. There are again four possible such equilibria that differ in whether the speculator trades in one, both or none of the trading dates if $s = B$. We present in detail again only the proof for the case in which $D_1 = D_2 = -1$ if $s = B$ and focus on the case where $q_0 < q^*$. Extending the proof to the case where $q_0 \geq q^*$ follows the same steps as the proof of Lemma C.4.

Since the proof is very similar to the proof of Proposition 1, we only explain the differences. From expressions (C.1) and (C.2), the market maker's posterior belief that the firm-specific shock is $\omega = G$ is $q_{10} = q_{11}$, $\pi_{10} = \pi_{11}$, q_{-1-1} is the same as above, and $q_{D_1D_2} = q_0$ for all other orders D_1 and D_2. The stakeholders join only if $\alpha > \alpha^*_{11}$. Furthermore, the prices at $t = 2$ and $t = 1$ are

$$\begin{aligned} &p_1 = \pi_{10} (\lambda_B + q_{10}\Delta\lambda)(x - \Delta R) && \text{if } D_1 = 1 \\ &p_{D_1} = p_{D_1D_2} = 0 && \text{if } D_1 \in \{-1, 0\} \text{ or } D_2 \in \{-1, 1\}. \end{aligned}$$

The speculator's equilibrium expected payoff is given by expression (C.5). It holds that $\Pi(B) = 0$ (i.e., if $s = B$). Furthermore

$$\begin{aligned} \Pi_{10}(s) &= (\lambda_B + q(s)\Delta\lambda)(x - w) - p_{D_1} \\ &= ((q(s) - q_{10})\Delta\lambda + (1 - \pi_{10})\lambda_B)(x - \Delta R). \end{aligned} \tag{C.18}$$

Since $q(s) = 1$, if $s = G$, the speculator's expected payoff is positive if she observes $s = G$. However, this profit is lower than in the proof of Proposition 1, as the speculator makes a profit only on her first trade, which is at the same price as in the proof of Proposition 1. If the speculator observes $s = \varnothing$, $q(s) = q_0$ and we obtain again that $\Pi_{10}(\varnothing) > 0$ if and only if $\alpha < \overline{\alpha}_{10}$, where $\overline{\alpha}_{10}$ is a threshold implicitly defined by $\Pi_{10}(\varnothing) = 0$. The uninformed speculator's profit is higher than in the equilibrium in the proof of Proposition 1 since she trades at $t = 1$ at the same price but does not make a loss from trading at date $t = 2$. Thus, we have that $\overline{\alpha}_{10} > \overline{\alpha}_{11}$. Once again, we have that the set $[\alpha_{11}^{*}, \overline{\alpha}_{10}]$ is not empty if $w < \overline{w}_{10}^{*}$, where $\overline{w}_{10}^{*}$ is the value for $\overline{w}$ for which it holds that $\alpha_{11}^{*} = \overline{\alpha}_{10}$.

The argument that after playing $D_1 = 1$ at $t = 1$, the speculator cannot benefit from trading as a noise trader at $t = 2$ is identical to that in Step 2 of the proof of Proposition 1. The only differences are that the speculator's expected equilibrium payoff is given by (C.18) if $s \in \{\varnothing, G\}$ and that the deviations, in this case, are to $D_2 \in \{-1, 1\}$. The speculator's expected payoff from such deviations is negative or zero, which is (weakly) less than what she obtains in equilibrium.

Similarly, the argument that there are no profitable deviations at $t = 1$ is identical to Step 3 of the proof of Proposition 1. The only difference is that a speculator who has observed $s = B$ does not mimic $s = G$ by playing $D_1 = 1$ and $D_2 = 0$ if and only if $\alpha > \underline{\alpha}_{10}$, where α_{10} is implicitly defined by $\Pi_{10}(B) = 0$. Defining $\underline{\alpha}_{10} := \max\{\alpha_{10}, \alpha_{10}^{*}\}$, we obtain that there is no profitable deviation from the proposed equilibrium if $\alpha \in [\underline{\alpha}_{10}, \overline{\alpha}_{10}]$. Finally, as argued above, $\Pi_{10}(B)$ is higher than in the proof of Proposition 1. Thus, it holds that $\underline{\alpha}_{10} > \underline{\alpha}_{11}$.