Entry Deterrence Through Strategic Trading

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Abstract

This paper studies interactions between product market and secondary financial market. An entrant learns about product demand from the incumbent's stock market, where a strategic investor internalizes his trading impact on potential entry. Without an initial stake, the investor fully harvests arbitrage opportunities based on his private information. Conversely, with an initial stake, the investor sells in low-demand scenarios but may refrain from buying in high-demand situations to dissuade the entrant, with buying probability varying with entry cost non-monotonically. The initial stake increases (decreases) entry probability at relatively small (large) entry costs. Modest stock trading costs foster product market competition.

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1 Introduction

Entering a new industry is a pivotal strategic decision with long-term implications for a firm's growth. To maximize the likelihood of success, firms undertake comprehensive due diligence, prioritizing the evaluation of product market potential. Among the various information sources available for due diligence,[1] the stock market performance of incumbent firms stands out as both significant and cost-effective: Reflecting investors' collective insights into market prospects, the stock prices of incumbent firms serves as a valuable signal, shaping potential entrants' decisions.[2]

At the same time, an entrant's decision plays a crucial role in determining the incumbent firm's valuation and influencing consumer welfare. In fundamental industrial organization models, such as Cournot competition, new market entry heightens competition, diminishing the incumbent's profitability but enhancing consumer welfare. Hence, when an investor in the incumbent firm's stock market wields market power — meaning that his trades can influence stock prices — he may act strategically to manipulate the information conveyed by the incumbent's stock market, in an effort to deter potential entrants. This, in turn, significantly impacts the financial market efficiency.

The strategic interplay between a potential entrant and an incumbent firm's investor establishes a critical connection between product market competition and financial market dynamics, underscoring the broader relationship between real economic efficiency and financial market efficiency. This paper investigates such an interaction to address the following interesting questions. How does the ownership structure of the incumbent firm shape financial market efficiency and influence product market competition? Conversely, how do parameters of the product market, especially the entry cost, affect the incumbent firm's financial market? Additionally, will stock market trading cost, which will determine the stock market efficiency, play a role in driving or dampening competition in the product market? Answering these questions is not only interesting in theory but could also generate new empirical and policy implications.

To address these questions, we develop an informational feedback model that connects

[1] These information sources include, but are not limited to, incumbent firms' accounting data, public product market analyses, and social media discussions. However, if these sources fail to fully reveal the product market potential, the stock market performance of incumbent firms serves as a valuable complementary indicator.

[2] As highlighted by Fama and Miller (1972), securities market prices aggregate (at least partially) information about resource allocation, offering valuable guidance to firm decision-makers. A recent survey by Goldstein et al. (2021) of Chinese public firms revealed that over 90% consider stock markets a critical source of information for making real investment decisions. Also, since Hayek (1945), numerous studies have shown how stock prices effectively convey useful information to decision-makers. For example, Faure-Grimaud (2002) illustrates how regulators adjust policies based on stock prices. Chen et al. (2007), Bakke and Whited (2010), and Foucault and Frésard (2012) show that firms leverage their own stock markets to guide decisions. Studies such as Foucault and Frésard (2014), Foucault and Frésard (2019), and Dessaint et al. (2019) demonstrate how firms also learn from their peers' stock prices, and Yan (2022) highlights private firms learning from public firms' market performance. For a broader discussion of this topic, we refer audiences to the excellent surveys by Bond et al. (2012) and Goldstein (2023).

the product market and the incumbent stock market, highlighting a potential entrant's learning about product market potential through trading activity in the incumbent's stock market. In our model, a private firm (the entrant) contemplates breaking into a product market monopolized by an incumbent.[3] The total demand for the product may be either high or low and is unknown to the entrant. There is an informed investor, who engages in trading while internalizing the effects of his trading on stock price and the entrant's entry decision. The entrant infers product demand based on the net trading volume in the incumbent stock market and then decides whether to enter the product market. If the entrant chooses to enter (after paying an entry cost), she competes with the incumbent in a Cournot duopoly; otherwise, the incumbent remains a monopolist.

The informed investor trades in a simplified Kyle setting (Kyle, 1985). He may buy one share, not trade, or short one share. The informed investor may have an initial stake in the incumbent firm, which represents restricted shares that cannot be traded. There is also a liquidity investor who has an equal probability of buying one share, not trading, or shorting one share. Observing the net trading volume, a market maker sets a price to break even and clears the market by using his own inventory.

In our model, the interplay between financial and product markets is driven by the informed investor's trading incentive, which is two-fold. First, he seeks to profit from his private information through trading. Second, he may leverage trades to manipulate the entrant's beliefs and deter market entry, so that he can maximize the value of his initial stake. The latter incentive becomes significant when the investor holds an initial stake in the incumbent firm and believes his trades can influence the entrant's decision.

We establish a benchmark where the informed investor does not hold an initial stake. In such a benchmark, the investor does not have a strong incentive to deter entry and thus try to maximize trading profit. In equilibrium, the informed investor always trades on private information, as refraining from trading would yield zero profit. Specifically, he sells when product demand is low and buys when demand is high, fully harvesting arbitrage opportunities. Importantly, such an equilibrium trading strategy is independent of the product market entry cost, as the incentive to manipulate the entrant's beliefs is minimal.

When the informed investor has an initial stake, the incentive to maximize the value of this stake can significantly alter his trading behavior. We first show that, in equilibrium, the investor always shorts when product demand is low, regardless of the entry cost. This is because low demand predicts a decrease in the incumbent's stock value, making selling profitable. Additionally, shorting results in a negative net trading volume (and a lower stock price), signaling low demand to the entrant. This signal may deter the entrant from entering the market, thereby maintaining the incumbent's monopoly and leading

[3]To focus on the interaction between the entrant and the incumbent stakeholder, we set aside the incumbent firm's strategic entry deterrence behavior.

to a higher firm value than if market entry occurred. As both incentives — maximizing trading profit and deterring entry — align in this scenario, the product market entry cost does not influence the informed investor's trading behavior.

By contrast, when product demand is high, the trading behavior of the investor with an initial stake depends on the product market entry cost. We categorize four scenarios based on increasing entry costs. In a scenario with an extremely small entry cost, the entrant will join the market competition even if she believes demand is low. Here, the informed investor's trading does not affect the entrant's decision, leading the investor to buy one share to maximize trading profits. The market maker then prices the incumbent's stock under the assumption of Cournot competition.

Similarly, when entry costs are extremely large, the entrant never enters, even if aware of high demand. Again, the investor's trading does not influence the entrant's decision. Thus, when demand is high, the investor buys one share to maximize profits, and the market maker prices the stock based on the incumbent's continued monopoly.

In contrast to scenarios with extremely large or small entry costs, the informed investor may strategically manipulate the entrant's beliefs when entry costs are moderate. In a "relatively small" entry cost scenario, where the entrant would enter the market without new information but stay out if her posterior belief about low demand is sufficiently high, there is no pure-strategy equilibrium. This situation arises due to the trade-off between potential trading profits and the value of the investor's initial stake. Specifically, if the investor is believed to buy one share for sure when demand is high, a small negative net trading volume suggests that the investor has taken a short position, signaling low demand and deterring entry.[4] The investor could profitably deviate by not trading, thus increasing the likelihood of a small negative net trading volume, indicating that surely buying one share is not an equilibrium strategy.[5] Conversely, if the investor is believed to refrain from trading when demand is high, the small negative net trading volume does not convey new information to the entrant, leading her to maintain her initial decision and proceed with entry. Realizing that trading will not deter entry, the investor would then deviate to buying one share to maximize trading profits.[6]

We characterize a unique mixed-strategy equilibrium in this scenario. When the product demand is high, the investor randomizes between buying one share and not trading, choosing probabilities that make the entrant indifferent to entering or staying out of the market. The entrant also randomizes her decision, keeping the investor indifferent

[4]In our model, we assume that the informed investor and the liquidity investor trade only one share. Therefore, the possible values of the net trading volume can be $-2, -1, 0, 1$, and 2. A "small negative net trading volume" implies that the net trading volume is -1.

[5]As we shall show, incentive for trading profit is dominated because a large positive net trading volume fully reveals the informed investor's private information to the market maker, which results in a lower expected trading profit.

[6]The trading profit is realized at a zero net trading volume, which does not perfectly reveal the product demand.

when demand is high. Then, as the entry cost decreases, the entrant's expected payoff from entering the product market increases. In response, the informed investor will increase the probability of buying one share to reduce the entrant's posterior belief about a high product demand at the small negative net trading volume, keeping the entrant indifferent. Therefore, within a region of "relatively small" entry costs, the probability of the informed investor buying one share is negatively related to the entry cost.

Lastly, when the entry cost is "relatively large," the entrant typically stays out of the product market in the absence of new information but would enter if there is a strong indication of high product demand. In this scenario, a unique equilibrium arises: The investor refrains from trading when demand is high. This strategy ensures that a small negative or zero net trading volume, which does not clearly indicate demand, keeps the entrant out. However, positive net trading volumes would signal high product demand, encouraging entry. By not trading, the investor maximizes the likelihood of deterring entry, preserving the value of the initial stake, even if it means forgoing potential profits from buying one share.

In sum, with an initial stake, the informed investor's trading behavior at high product demand is influenced by the product market entry cost. The probability of buying starts at one for very low entry costs, then continuously declines to zero as the entry cost increases, before jumping back to one once the cost surpasses a certain threshold. The initial stake is crucial, as the investor balances its value against potential profits from purchasing a share. Thus, when the investor believes that deterring entry is possible, he may forgo trading profits, resulting in limits to arbitrage.

The initial stake and entry cost, therefore, become pivotal factors in shaping the informed investor's behavior, with interesting implications for the informativeness of financial markets. Specifically, the information conveyed by the small negative trading volume is influenced by the entry cost when the investor has an initial stake, while information from other net trading volumes remains constant regardless of entry costs. Thus, the financial market's informativeness depends on what the entrant can infer from the small negative trading volume. When entry costs fall within an intermediate range, an increase in cost makes the informed investor more likely to refrain from trading when product demand is high, thereby reducing the informativeness of the small negative trading volume. This occurs because the investor always sells when demand is low, and as the likelihood of buying decreases with high demand, the entrant's posterior belief for the small negative trading volume converges toward the prior belief. When the entry cost becomes relatively large, the informed investor surely refrains from trading in high demand scenarios, making the posterior belief at the small negative trading volume equal to the prior belief, and thus rendering the financial market least informative.

Extending beyond the implications for financial market informativeness, we further explore how the product market entry cost and the informed investor's initial stake affect

product market competition. Surprisingly, while the entrant's entry probability is naturally influenced by the entry cost, it is also affected by the incumbent firm's ownership, particularly the informed investor's initial stake, through the entrant's learning from financial market net trading volumes. Notably, the initial stake has different effects on the product market competition at different entry costs.

When the entry cost is relatively low, an initial stake held by the informed investor enhances competition. Intuitively, this stake only influences the entrant's decision at the small negative net trading volume. At this volume, if the informed investor holds an initial stake, the entrant enters the market with a positive probability. In contrast, without such a stake, the entrant stays out of the product market. Thus, the presence of the initial stake increases the entrant's probability of entry, intensifying product market competition.

However, at relatively large entry costs, the initial stake held by the informed investor can diminish product market competition. In this scenario, the entrant will only enter if the net trading volume is positive. Since the informed investor sells when product demand is low and refrains from trading when demand is high, the likelihood of a positive net trading volume decreases when an initial stake is present. As a result, market entry becomes less probable compared to a situation where the informed investor does not hold an initial stake. This stands in contrast to the case of relatively small entry costs, where the initial stake increases the probability of entry. At relatively large entry costs, the entrant enters only when the financial market strongly signals high demand, but the initial stake reduces the informativeness of these signals, lowering the probability of entry.

While our model does not explicitly incorporate a trading cost in the incumbent stock market, exploring the policy implications of introducing such costs can offer valuable insights into the interplay between financial and product markets.[7] We first assess the impact of a minimal trading cost in the secondary financial market. Except in scenarios with "relatively small" entry costs, a minimal trading cost does not influence the informed investor's behavior when he holds an initial stake. In such cases, one trading incentive strictly dominates the other, resulting in unchanged trading behavior. Consequently, the entrant's posterior beliefs and entry probability remain unaffected, as if no trading cost had been introduced.

However, when entry costs are relatively low, a minimal trading cost may influence the informed investor's behavior. As previously analyzed, the investor must be indifferent between trading and abstaining in this scenario. However, the introduction of a trading cost reduces the investor's incentive to purchase one share. Hence, to maintain the investor's indifference, the entrant must increase her likelihood of entering the product market, thereby lowering the value of the investor's initial stake. Thus, when an initial stake is present, introducing a minimal trading cost increases product market competition

[7]This assumption also distinguishes our model from that in Edmans et al. (2015).

in equilibrium. In this context, minor frictions in the financial market can enhance both product market competition and consumer surplus. By contrast, if the informed investor does not hold an initial stake, the incentive to maximize the stake value disappears. As a result, a minimal trading cost has no effect on the investor's trading behavior and the entrant's entry probability.

Additionally, we find that an intermediate level of trading cost can maximize product market competition, regardless of whether the informed investor holds an initial stake. On one hand, the cost is high enough to reduce the informed investor's incentive to buy one share when product demand is high, encouraging the entrant to enter the market with a higher probability. On the other hand, the cost is not so prohibitive as to prevent the informed investor from trading even when product demand is low. This allows the financial market to still convey information, particularly in scenarios involving "relatively large" entry costs, which can further encourage entry.

Our theoretical results generate a set of interesting, testable empirical implications about the secondary financial market and product market competition.[8] First, the entry cost, one of the important factors of the product market, affects the financial market trading and financial market informativeness, when the informed investor owns a stake at the incumbent firm. Interestingly, the effects of the entry cost is asymmetric and non-monotonic. It affects the informed investor's trading only when the product market demand is high; as the entry cost increases from zero, the probability of the informed investor buying decreases continuously from one to zero but will jump back to one, and correspondingly, the financial market informativeness decreases first and jumps back to the highest level. Second, the informed investor's stake, one important feature of the incumbent firm's ownership structure, impacts the product market competition. Such an effect differs at different entry cost: At a relatively low (high) entry cost, the initial stake increases (decreases) the entry probability. Third, the financial market transaction cost may also affect the entry probability. In particular, when transaction costs are less than a certain amount, the larger the transaction costs, the greater the probability of entry.

Although this paper focuses on scenarios where the incumbent and entrant produce perfectly substitute products, the key economic insights can easily extend to cases involving complementary products. With complementary products, the incumbent stakeholder benefits from the entrant's market entry, as it boosts firm value and, consequently, his

[8]The literature has shown that the primary financial market influences product market competition by providing firms with the necessary capital. For instance, Benoit (1984) shows how predatory pricing can deter entry when potential entrants face financial constraints. Poitevin (1989) finds that incumbents tend to finance through equity, while high-value entrants issue debt to signal their quality to investors, resulting in highly leveraged market entry. Similarly, Matveyev and Zhdanov (2019) reveal that entrants may issue significantly less debt than would be financially optimal, balancing the tax benefits against bankruptcy risks to achieve a leverage advantage over incumbents. However, the specific impact of the secondary financial market, which does not directly provide capital to firms, on product market competition remains under-explored.

stake value. Thus, equilibrium outcomes with complementary products contrast with those in this paper. Specifically, an investor with positive information will buy to signal good market potential, while an investor with negative information may refrain from selling. This discussion highlights that informed trading in the secondary financial market is significantly influenced by the nature of the product market, even when the informed investor faces similar strategic environments.

Beyond examining the interaction between financial and product markets, our paper makes several applied contributions. We develop a tractable model to explore the tension between an uninformed decision-maker and an informed investor. Specifically, when the investor's trading signals information to the decision-maker—whose actions can, in turn, impact the investor's stake value—the investor faces a trade-off between trading profits and the effect of his actions on his stake value.[9] Our model applies to various corporate contexts, such as firm-labor union negotiations. For instance, an investor with positive information may buy shares, raising the firm's stock price. This could lead the labor union to view the firm as more valuable, negotiate more aggressively, and thereby potentially reduce the investor's stake value, deterring further buying.

Literature Review Our paper contributes to several strands of literature. First, it aligns with research on the interaction between the secondary financial market and product market competition. Tookes (2008) argues that informed agents prefer trading shares in a more competitive firm, especially during significant shifts in market share. Similarly, Peress (2010) finds that firms with higher market power attract more trading volume from investors, which accelerates the incorporation of information into stock prices and draws additional capital. Xiong and Yang (2021) study voluntary information disclosure by oligopoly firms, showing that while a firm can better learn from the market, it may also lose competitive advantage. Cong et al. (2023) examine financial market and product market competition, focusing on the relationship between firm competition and real efficiency, and revealing non-monotonic welfare effects. Our paper complements this body of literature. In particular, the investor in our model has market power. Hence, he may manipulate the entrant's beliefs, and his incentive to do so is determined by characteristics of both the product market and the financial market.

Second, our paper contributes to the fast-growing literature on informational feedback with strategic investors.[10] In Goldstein and Guembel (2008), feedback effects from financial markets to real investment increase an uninformed speculator's incentive to sell stock,

[9] This differs from Edmans et al. (2015), where the investor's interests align with the corporate investment decision-maker's, as the investor's initial stake does not influence his strategic trading.

[10] In settings with competitive investors, Foucault and Frésard (2014) and Ozoguz et al. (2018) document that a firm's investment decisions are sensitive to its own (or its peers') stock price. Additionally, Dessaint et al. (2019) show that noise in stock prices influences real decisions.

inducing disinvestment and generating profit on the speculator's short position. Subrahmanyam and Titman (2013) propose a model showing that positive shocks in stock market participation can reduce expected returns and incentivize firms, especially those with investment-focused assets, to increase investment. Edmans et al. (2015) analyze how a firm's investment decisions respond to financial market trading, finding that intermediate trading costs lead to asymmetric trading and limits to arbitrage. Boleslavsky et al. (2017) consider a setting in which an authority decides on an intervention to improve the state based on asset market activity. Ahnert et al. (2023) also examine government bailout decisions influenced by stock market trading, finding that informed investors might refrain from trading or buy shares in a bad state if the bailout benefit is sufficiently high. We study the informational feedback of the financial market on a completely different but important economic environment — the product market. Here, the entrant will only enter if she believes that product demand is high, allowing the strategic investor to help the incumbent deter entry by refraining from trading. Consequently, limits to arbitrage occur when the product demand is high, as the investor strategically withholds information that would otherwise signal high product demand to the potential entrant.

Third, our paper compensates to the body of literature showing that market efficiency and real efficiency may clash by incorporating feedback effects from market prices to corporate decisions.[11] This line of literature dates back to at least Dow and Gorton (1997), who found that speculators do not generate information if they anticipate that a firm will not invest, leading to situations where firms indeed avoid investment due to the lack of market information. In Bond et al. (2010) and Bond and Goldstein (2015), the market's reflection of expected future decisions prevents it from effectively providing the information needed for making these decisions more efficient. Goldstein and Yang (2019) further explore the implications for optimal disclosure policies in scenarios where the two efficiencies conflict. They argue that disclosing more precise information is optimal on aspects where managers have a clear informational advantage. However, revealing information that managers actively seek may discourage speculators from trading on it. Our paper illustrates that imposing a trading cost can reduce the incentive for the informed investor to buy a share when product demand is high, which in turn can encourage a potential entrant to participate in the product market competition. Thus, we should not only focus on market efficiency while assuming that it lines up with what is happening in the industry organization.

More importantly, in line with our focus, our theoretical study generates a first set of empirical implications concerning the interaction between the secondary financial market and product market industrial organization. As we discussed, through the entrant's

[11] Based on Fama and Miller (1972), in an efficient market, security prices provide accurate signals for resource allocation, suggesting that market efficiency is a good proxy for real efficiency. However, later studies indicate the opposite.

learning, product market characteristics may influence financial market trading and efficiency, while the financial market characteristics, in turn, may affect the product market competition. These important economic relations are empirically testable, contributing to the literature on industrial organization. Furthermore, our model carries policy implications. Specifically, we find that putting some sands into the wheel of the financial market can positively impact product market competition, thereby enhancing consumer welfare.

Fourth, our paper relates to the literature on the limits to arbitrage. Campbell and Kyle (1993) study fundamental risk, which refers to the change of fundamentals in the process of pursuing arbitrage. DeLong et al. (1990) focus on noise trader risk, finding that mispricing may worsen in the short run, making early liquidation at a loss. As noted by Shleifer and Vishny (1997), such risk can make it hard for investors to secure financing for bets against mispricing. Other studies, including D'Avolio (2002), Gromb and Vayanos (2002), Jones and Lamont (2002), Lamont and Thaler (2003), and Nagel (2005), focus on implementation costs such as those for discovering or exploiting mispricing, transactions costs, and short-sale constraints. Our paper contributes by showing that limits to arbitrage can also arise from the informed investor's incentives to deter entry, which becomes significant when the informed investor holds an initial stake in the incumbent firm. This finding broadens the scope of limits to arbitrage by incorporating strategic motivations related to product market competition.

2 Model

This section presents a model exploring the interplay between financial market and product market competition over two periods ($t = 0, 1, 2$). It features a publicly traded incumbent firm and a private potential entrant.

At $t = 0$, trading occurs in the financial market for the incumbent's stock. Based on the net trading volume observed at $t = 1$, the entrant decides whether to enter the product market by paying an entry cost. At $t = 2$, firms produce in the product market, and payoffs are realized. Figure 1 describes the timeline.

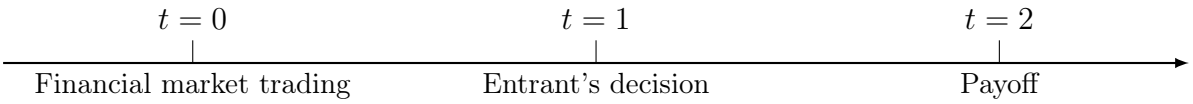


Figure 1: Timeline of Events

2.1 Product Market Competition

The industrial organization of the product market depends on whether the entrant chooses to enter the market. If the entrant does not enter, the incumbent remains a monopolist.

Otherwise, both firms compete in a Cournot duopoly, producing a homogeneous good.

Suppose that firm i produces q_i units of consumption goods, and the total output is then $Q = q_1 + q_2$. The product's inverse demand function is

$$p(Q) = S_\theta - Q, \tag{1}$$

where S_θ is the inverse demand intercept, representing the maximum price that consumers are willing to pay for one unit of the good. We assume that S_θ can be either high ($\theta = H$) or low ($\theta = L$), with $S_H > S_L > c$, where $c > 0$ is the constant marginal production cost for both the incumbent and the entrant. The parameter θ denotes the economic fundamentals of the market, and all agents share a common prior $q_0 = \Pr(\theta = H) = 1/2$ regarding it. Such a common prior encapsulates all other available information about the product market, including incumbent firm accounting data and professional market analyses; since these information sources are imperfect, the incumbent firm stock market performance will provide the entrant with an important supplement signal. Although the entrant does not know θ at the time of entry, it becomes common knowledge once production begins at $t = 2$.

When the entrant stays out of the market, the incumbent acts as a monopolist, choosing the optimal production quantity q_1 to maximize her profit. The incumbent's profit as a monopolist is:

$$V_\theta = \frac{(S_\theta - c)^2}{4}. \tag{2}$$

Equation (2) shows that the high product demand results in a higher incumbent's profit ($V_H > V_L$). In the absence of entry, the entrant's outside option is normalized to zero.

If the entrant enters, both firms simultaneously choose their production quantities to maximize their profits. The incumbent's profit and the entrant's profit are given by

$$V_\theta^e = \frac{(S_\theta - c)^2}{9} \quad \text{and} \quad V_\theta^e - E, \tag{3}$$

respectively, where E is an exogenous entry cost. We assume $V_H^e > V_L$, meaning that the impact of the product demand on the incumbent firm value dominates the competitive effect of entry. For simplicity, we assume that $S_L - c > 0$ is sufficiently small.

We denote by $d = 0$ the entrant's decision to stay out of the product market, and by $d = 1$ the entrant's decision to enter. If the entrant randomizes, $d \in (0, 1)$. Table 1 summarizes the incumbent firm value $v(\theta; d)$, which depends on both the market fundamentals $\theta \in \{H, L\}$ and the entrant's decision $d \in [0, 1]$.

		Entry Decision d		
		0	1	$(0,1)$
State θ	H	V_H	V_H^e	$dV_H^e + (1-d)V_H$
	L	V_L	V_L^e	$dV_L^e + (1-d)V_L$

Table 1: Incumbent Firm Value

2.2 Trading in Financial Market

The incumbent stock market includes an informed investor who knows the product market fundamentals θ perfectly from $t = 0$. Depending on whether product demand is high or low, the investor is called an H-investor or L-investor, respectively.

The informed investor may hold an initial stake in the incumbent firm. To analyze the effects of the initial stake on trading behavior and product market competition, we consider two cases: a benchmark without an initial stake ($s = 0$), and a core model with one share already owned prior to trading ($s = 1$).[12] This initial stake is common knowledge and treated as restricted stock.

The stock market microstructure follows a simplified setting of Kyle (1985). Specifically, the informed investor can buy one share ($X_I = 1$), not trade ($X_I = 0$), or sell one share ($X_I = -1$). We allow the informed investor to employ mixed strategies, denoting by β_H^b and β_H^s the probabilities that the H-investor buys or sells, respectively, with $1 - \beta_H^b - \beta_H^s$ representing the probability of choosing not to trade. Similarly, for the L-investor, β_L^b, β_L^s, and $1 - \beta_L^b - \beta_L^s$ are the probabilities of buying, selling, and not trading, respectively.

Present in the incumbent stock market is also a liquidity investor, who has an equal probability of buying one share ($X_N = 1$), selling one share ($X_N = -1$), or not encountering a liquidity shock ($X_N = 0$). The informed investor and the liquidity investor trade simultaneously. There is also a competitive market maker, who observes the net trading volume $X = X_I + X_N$ but not the individual orders. Therefore, $X \in \{-2, -1, 0, 1, 2\}$. Based on the net trading volume, the market maker sets prices to break even, with the pricing strategy $P(X) = \mathbb{E}(v|X)$. He also uses his inventory to clear the market.

[12] In Online Appendix B, we extend the model to allow the initial stake s to vary continuously within the range $(0, +\infty)$. In equilibrium, the L-investor sells for sure, regardless of the value of s and the entry cost. The H-investor, on the other hand, is influenced by the value of initial stake only when the entry cost is relatively large. Specifically, with a relatively large entry cost, the H-investor surely buys when s is extremely small, does not trade when s is not too large, and surely sells when s is large. In these three cases, the entrant will enter the product market only when she observes positive net trading volumes from the financial market.

2.3 Equilibrium

The informed investor's trading strategy is a mapping from the product market fundamentals θ to his trading $\{-1, 0, 1\}$. The entrant's strategy is a mapping from the net trading volume to the entry decision. The market maker's pricing strategy is a mapping from the net trading volume to prices. We are interested in a perfect Bayesian equilibrium.

Definition 1. The informed investor's trading strategy $\beta^* : \{H, L\} \to \{-1, 0, 1\}$, the entrant's entry strategy $d^* : X \to [0, 1]$, and the market maker's pricing strategy $P^*(X)$ constitute a perfect Bayesian equilibrium if

1. for each $\theta \in \{H, L\}$, β^*_θ maximizes the θ-investor's expected payoff, given the market maker's pricing strategy and the entrant's entry strategy;

2. for each $X \in \{-2, -1, 0, 1, 2\}$, $d^*(X)$ maximizes the entrant's expected payoff, given other agents' strategies;

3. for each $X \in \{-2, -1, 0, 1, 2\}$, the market maker's pricing strategy is $P^*(X) = \mathbb{E}(v|X)$, given other agents' strategies;

4. the entrant and the market maker update their beliefs by Bayes' rule after observing the net trading volume in the financial market.

When there are multiple equilibria due to off-equilibrium beliefs, we apply the intuitive criterion to refine the equilibrium set.

3 Informed Trading

This section explores the informed investor's trading strategies. Specifically, we shall characterize how the product market entry cost and the initial stake affect the informed investor's trading behavior. These factors significantly affect the H-investor's trading behavior when financial market information can impact the entrant's decision to enter the market.

We solve the model by backward induction. Subsection 3.1 examines the entrant's decision and the market maker's pricing strategy for different net trading volumes $X \in \{-2, -1, 0, 1, 2\}$, based on posterior belief $q(X) = \Pr(\theta = H|X)$. We prove that the posterior belief increases with the net trading volume. Subsection 3.2 establishes that the L-investor surely sells one share in equilibrium, independent of the entry cost or initial stake. Subsection 3.3 and Subsection 3.4 then characterize the H-investor's trading strategies, both without and with an initial stake, respectively. Finally, Subsection 3.5 summarizes the effects of entry cost and initial stake on the informed investor's trading strategy, illustrated in Figure 2.

3.1 Entry Decision, Pricing, and Increasing Posterior

We begin by analyzing the entrant's decision through backward induction. For each possible net trading volume $X \in \{-2, -1, 0, 1, 2\}$, and given a posterior belief $q(X)$, the entrant's expected payoff from enter is

$$q(X)V_H^e + [1 - q(X)]V_L^e - E. \tag{4}$$

Since the entrant has a zero outside option, she will choose to enter if and only if her expected payoff from entry is non-negative. Define a threshold q_I such that

$$q_I V_H^e + (1 - q_I)V_L^e = E. \tag{5}$$

Then, Lemma 1 establishes that the entrant's entry decision follows a cutoff rule based on posterior belief $q(X)$.

Lemma 1. *Given a posterior belief $q(X)$, the entrant's entry decision after a net trading volume $X \in \{-2, -1, 0, 1, 2\}$ is*

$$d(X) = \begin{cases} 1, & \text{if } \ q(X) > q_I, \\ \in [0, 1], & \text{if } \ q(X) = q_I, \\ 0, & \text{if } \ q(X) < q_I. \end{cases} \tag{6}$$

Given the posterior belief system $q(X)$ and the entrant's entry strategy $d(X)$, the market maker sets a price $P(X)$ that allows him to break even in expectation:

$$P(X) = \mathbb{E}(v|X) = q(X)v(H; d(X)) + (1 - q(X))\, v(L; d(X)). \tag{7}$$

Equation (6) and equation (7) show that the posterior belief system $q(X)$ is central role to both the entrant's entry choice and the market maker's pricing strategy. Consequently, to solve for the informed investor's best responses to the entrant's and the market maker's strategies, it is important to explore the properties of the posterior belief system. Intuitively, given the entrant's entry strategy, the H-investor has a higher incentive to hold a larger position than the L-investor, since the incumbent's firm value is higher when the product demand is high. By "a larger position," we mean using a ranking system where shorting one share is the smallest position, holding no position is intermediate, and buying one share is the largest. This argument suggests that the posterior belief increases with the net trading volume.

In addition, because the liquidity investor is equally likely to buy, sell, or not trade, a zero net trading volume ($X = 0$) always appears on the equilibrium path. We further show that, for any trading strategy of the informed investor, zero net trading volume is entirely uninformative. Lemma 2 formalizes these results.

Lemma 2. *In equilibrium, the posterior belief $q(X)$ increases with the net trading volume X. In addition, following zero net trading volume ($X = 0$), the entrant and the market maker hold a posterior belief $q(0) = q_0 = 1/2$.*

The first part of Lemma 2 arises from the single-crossing property of the informed investor's preference. Denote $U(\theta; X_I)$ as the expected payoff for an investor of type θ when holding a position X_I. For two trading positions, $X_I' > X_I$, if $U(L; X_I') \succcurlyeq U(L; X_I)$, then $U(H; X_I') \succ U(H; X_I)$. That is, if the L-investor weakly prefers X_I' to X_I, the H-investor will strictly prefer X_I', implying that a larger net trading volume is more likely driven by the H-investor, increasing the posterior belief $q(X)$.

The second part of Lemma 2 is due to liquidity trading. For any position X_I held by the informed investor, there exists a liquidity trading position X_N that results in zero net trading volume ($X = X_I + X_N = 0$). Since each X_N occurs with equal probability, the posterior belief after observing $X = 0$ remains unchanged at $q(0) = q_0 = 1/2$, implying that zero trading volume conveys no new information about product demand.

3.2 L-investor Always Sells

We are now in a position to analyze the informed investor's equilibrium trading behavior. We will start by considering the L-investor. The payoff to the L-investor from holding a trading position X_I is

$$U(L; X_I) = \frac{s}{3} \sum_{X_N=-1}^{1} v(L; d(X)) + \frac{X_I}{3} \sum_{X_N=-1}^{1} [v(L; d(X)) - P(X)] \tag{8}$$

$$= \frac{s}{3} \sum_{X_N=-1}^{1} v(L; d(X)) - \frac{X_I}{3} \sum_{X_N=-1}^{1} q(X) [v(H; d(X)) - v(L; d(X))] . \tag{9}$$

Since the net trading volume is $X = X_I + X_N$, choosing a position X_I means that the resultant net trading volume could be $-1 + X_I$, X_I, and $1 + X_I$, each with equal probability. In equation (8), the first component represents expected value of the initial stake, which depends on the entrant's entry decision and is non-zero only when the informed investor holds an initial stake ($s = 1$). The second component represents the informed investor's expected trading profit. Substituting the market maker's pricing strategy (7) into equation (8) yields equation (9).

Proposition 1 shows that the L-investor surely sells one share in equilibrium, regardless of the product market entry cost or whether the informed investor holds an initial stake.

Proposition 1. *For any given increasing belief $q(X)$ and an associated entry strategy $d(X)$ specified in equation (6), the L-investor's payoffs satisfy*

$$U(L;-1) > U(L;0) > U(L;1), \quad \forall s \in \{0,1\}. \tag{10}$$

Hence, regardless of the initial stake, the L-investor will always sell one share in equilibrium. That is, in equilibrium, $\beta_L^s = 1$.

The fact that the L-investor always sells one share in equilibrium arises from the alignment of his two trading incentives. First, low product demand implies a low firm value for the incumbent, so selling one share maximizes the L-investor's trading profit. This logic is encapsulated in the second component of equation (9). Because of the assumption $V_H^e > V_L$, the second component of equation (9) is positive, zero, and negative for X_I values of -1, 0, and 1, respectively. Hence, $X_I = -1$ will maximize the L-investor's trading profit.

Second, if the informed investor holds an initial stake, selling one share lowers the net trading volume, which signals low product demand to the entrant. This occurs because the posterior belief, and subsequently the probability of entry, both increase with the net trading volume. Therefore, by selling one share, the L-investor may deter entry, preserving his initial stake value. Consequently, to maximize his expected payoff, the L-investor always sells one share in equilibrium.

3.3 H-investor without an Initial Stake

Next, we analyze the H-investor's trading behavior. Similar to equation (8), we write down the H-investor's expected payoff from a trading position X_I as

$$\begin{aligned} U(H;X_I) = &\frac{s}{3}\sum_{X_N=-1}^{1} v(H;d(X)) + \frac{X_I}{3}\sum_{X_N=-1}^{1}\left[v(H;d(X)) - P(X)\right] &(11)\\ = &\frac{s}{3}\sum_{X_N=-1}^{1} v(H;d(X)) + \frac{X_I}{3}\sum_{X_N=-1}^{1}\left[1-q(X)\right]\left[v(H;d(X)) - v(L;d(X))\right]. &(12)\end{aligned}$$

When the informed investor does not hold an initial stake ($s = 0$),

$$U(H;X_I) = \frac{X_I}{3}\sum_{X_N=-1}^{1}\left[1-q(X)\right]\left[v(H;d(X)) - v(L;d(X))\right].$$

Given that economic fundamentals dominate firm value, $v(H; d(X)) - v(L; d(X)) > 0$ for any decision $d(X)$ by the entrant. In addition, since the L-investor always sells one share in equilibrium, $q(0) = 1/2$, making the zero net trading volume an imperfect signal about the product demand. Importantly, the zero net trading volume always occurs with a positive probability in equilibrium. Therefore, $U(H; X_I)$ is strictly positive if and only if $X_I = 1$. This implies Proposition 2.

Proposition 2. *Without an initial stake (i.e., $s = 0$), the H-investor surely buys one share in equilibrium, and such an equilibrium trading behavior is independent of the entry cost.*

In Proposition 2, the H-investor's trading behavior is independent of the entry cost. This is due to the no initial stake condition. As we shall show shortly, when the informed investor holds an initial stake, he may have incentives to manipulate the entrant's belief to maximize the initial stake value. Combining Proposition 1 and Proposition 2, we conclude that without an initial stake, the informed investor always trades on his private information: buying at $\theta = H$ and selling at $\theta = L$. Therefore, given his information advantage, the informed investor fully harvests the arbitrage opportunity.

3.4 H-investor with an Initial Stake

We now turn to the case where the H-investor holds an initial stake — a restricted share that cannot be traded. The expected payoff for the H-investor from taking a position X_I is

$$U(H; X_I) = \frac{1}{3} \sum_{X_N=-1}^{1} v(H; d(X)) + \frac{X_I}{3} \sum_{X_N=-1}^{1} [1 - q(X)] [v(H; d(X)) - v(L; d(X))]. \quad (13)$$

The initial stake significantly affects the H-investor's payoff, as its value is influenced by the entrant's entry decision. Thus, the entry cost plays a key role in determining the H-investor's trading strategy. According to Lemma 1, we partition the space of the entry cost into four components. The first is a case with an "extremely large" entry cost ($E \geq V_H^e$), which makes $q_I = 1$. The entry cost is so high that the entrant stays out of the product market regardless of her posterior belief. The second is when the entry cost is "relatively large", that is, $E \in \left(\frac{V_H^e + V_L^e}{2}, V_H^e\right)$. The entrant stays out based on the prior belief alone but may enter if her posterior belief about $\theta = H$ is sufficiently high. The third component is when $E \in \left(V_L^e, \frac{V_H^e + V_L^e}{2}\right]$, a "relatively small" entry cost. The entrant will enter based on her prior belief but may refrain from doing so if she is convinced that $\theta = L$. The last is when $E \leq V_L^e$, the entrant faces an "extremely small" entry cost, leading to $q_I = 0$. The entrant will always enter the product market, regardless of the

posterior belief. Then, we proceed to examine the H-investor's trading behavior in each case.

3.4.1 Extreme Entry Costs

In the first and fourth cases, where the entry cost is either extremely large or extremely small, the entrant's decision is independent of financial market trading. As a result, the H-investor's initial stake value is unaffected by his trading. Hence, his optimization problem is reduced to

$$\begin{aligned} &\arg \max_{X_I \in \{-1,0,1\}} \quad U(H; X_I) \\ =&\arg \max_{X_I \in \{-1,0,1\}} \quad \frac{X_I}{3} \sum_{X_N=-1}^{1} \left[1 - q(X)\right] \left[v(H; d(X)) - v(L; d(X))\right], \end{aligned} \tag{14}$$

where $d(X) = 0$ when $E \geq V_H^e$, and $d(X) = 1$ when $E \leq V_L^e$, for $X_I \in \{-1, 0, 1\}$.

Since equation (14) is equivalent to the optimization problem when the H-investor does not hold an initial stake, the H-investor will surely buy one share in equilibrium, as stated formally in Proposition 3.

Proposition 3. *When the product market is characterized by either an extremely large entry cost ($E \geq V_H^e$) or an extremely small entry cost ($E \leq V_L^e$), a unique equilibrium emerges. In this equilibrium, the H-investor will surely buy one share ($\beta_H^b = 1$).*

Proposition 3 arises from the fact that, with extreme entry costs, the H-investor is unable to influence the entrant's decision. Technically, in these cases, holding an initial stake merely adds a constant to the H-investor's trading profits. Therefore, the H-investor's optimal decision remains the same as if he had no initial stake. This implies that the H-investor would only have an incentive to manipulate the entrant's beliefs through trading if he could affect the entrant's decision, which occurs only at moderate levels of entry costs.

3.4.2 Relatively Large Entry Cost

When the entry cost is relatively large, i.e., $E \in \left(\frac{V_H^e + V_L^e}{2}, V_H^e\right)$, the entrant's decision may be affected by the incumbent stock market trading. Intuitively, given the common prior belief of $q_0 = \Pr(\theta = H) = 1/2$, a relatively large entry cost suggests that the entrant will only enter the product market if the incumbent stock market provides a positive signal about $\theta = H$. Since the L-investor surely sells one share, it is the H-investor's trading behavior that will shape the entrant's posterior belief and the valuation of the H-investor's initial stake.

We begin by calculating the difference in the H-investor's expected payoffs between no trade and selling one share as

$$\begin{aligned} & U(H;0) - U(H;-1) \\ = \; & \frac{1}{3}\left[v(H;d(1)) - v(H;d(-2))\right] \\ & + \frac{1}{3}\sum_{X_N=-1}^{1}\left[1-q(X_N-1)\right]\left(v(H;d(X_N-1)) - v(L;d(X_N-1))\right) \end{aligned} \tag{15}$$

The first component in equation (15) represents the difference in the initial stake value, while the second component captures the difference in trading profits. Because the L-investor surely sells one share, a net trading volume of zero ($X = 0$) suggests a probability of $1/2$ that the product demand is high. With a relatively large entry cost, the entrant will not enter the market after observing a net trading volume of zero. Since V_L^e is very small, the trading profit gained at $X_I = 0$ outweighs the difference in the initial stake value as indicated in equation (15), leading to $U(H;0) > U(H;-1)$. Thus, in equilibrium, the H-investor strictly prefers no trade over selling one share.

Next, we compare the H-investor's expected payoff from no trade with that from buying one share. From Lemma 2, we know that a net trading volume of zero is uninformative about $\theta = H$; that is, $q(0) = q_0 = 1/2$. Then, the increasing posterior shown in Lemma 2 implies that $q(-1) \leq 1/2$. Thus, a relatively large entry cost ensures that the entrant stays out of the market when the net trading volume is $X \in \{-2,-1,0\}$. By contrast, due to Proposition 1's declaration that the L-investor surely sells one share, the net trading volumes of $X = 1$ and $X = 2$ perfectly indicate $\theta = H$, leading to $q(1) = q(2) = 1$. Therefore, with a relatively large entry cost, the entrant will surely enter the market following $X = 1$ and $X = 2$.

We then calculate the difference in the H-investor's expected payoff between no trade and buying one share as

$$\begin{aligned} & U(H;0) - U(H;1) \\ = \; & \frac{1}{3}\left[v(H;d(-1)) - v(H;d(2))\right] \\ & - \frac{1}{3}\sum_{X_N=-1}^{1}\left[1-q(X_N+1)\right]\left(v(H;d(X_N+1)) - v(L;d(X_N+1))\right) \\ = \; & \frac{1}{3}\left\{\left[\frac{(S_H-c)^2}{4} - \frac{(S_H-c)^2}{9}\right] - \frac{1}{2}\left(\frac{(S_H-c)^2}{4} - \frac{(S_L-c)^2}{4}\right)\right\} \\ > \; & 0. \end{aligned} \tag{16}$$

In equation (16), the first component captures the difference in the initial stake value.

When the H-investor chooses not to trade, the net trading volume could be $X = -1$, 0, or 1, with equal probability. If the H-investor buys one share, the net trading volume shifts to $X = 0$, 1, or 2. The difference in the initial stake value is thus the difference between the value at $X = -1$ and the value at $X = 2$. At $X = -1$, the entrant does not enter, leaving the firm's value at the monopoly profit $(S_H - c)^2/4$. At $X = 2$, the entrant's certain entry changes the incumbent firm value to the Cournot competition profit $(S_H - c)^2/9$. The second component of equation (16) reflects the trading profit from buying one share at $X = 0$. When $X = 1$ or $X = 2$, the market maker, knowing $\theta = H$, prices the stock accordingly, resulting in zero trading profit for the H-investor. The monopoly profit substantially exceeds the Cournot profit, making equation (16) positive.

Proposition 4 summarizes the above arguments, showing that the H-investor refrains from trading when the entry cost is relatively large.

Proposition 4. *With a relatively large entry cost* $E \in \left(\frac{V_H^e + V_L^e}{2}, V_H^e\right)$*, the* H*-investor does not trade in equilibrium.*

Proposition 4 stems from the trade-off between the initial stake value and trading profit. By not trading, the H-investor avoids the risk of a very large net trading volume $(X = 2)$, which would signal high demand and encourage market entry, while allowing for a small negative net trading volume $(X = -1)$ that helps preserve the initial stake value. However, refraining from trading comes at the cost of forfeiting potential profits from a long position. Ultimately, since the value of maintaining the incumbent's monopoly significantly exceeds that under Cournot competition, the initial stake value becomes the dominant consideration. This dominance leads the H-investor to refrain from trading in equilibrium.

3.4.3 Relatively Small Entry Cost

In the final case, we consider a relatively small entry cost, specifically, $E \in \left(V_L^e, \frac{V_H^e + V_L^e}{2}\right]$. The most significant difference between a relatively small and a relatively large entry cost is that the former leads the entrant to enter the product market with the prior belief $q_0 = 1/2$. Given $q(0) = q_0 = 1/2$, the entrant will choose to enter the product market when the net trading volume is $X \in \{0, 1, 2\}$. Additionally, since the L-investor surely sells and the H-investor never sells, a large negative net trading volume $X = -2$ perfectly signals $\theta = L$, deterring the entrant from entering the market. However, the entrant's posterior belief $q(-1)$ and her entry decision $d(-1)$ at the small negative trading volume $(X = -1)$ depend on the H-investor's trading behavior.

Due to the trade-off between the initial stake value and trading profit, equilibrium analysis in this scenario becomes more complex. Lemma 3 demonstrates that, in the case of a relatively small entry cost, there cannot be a pure-strategy equilibrium.

Lemma 3. *When the entry cost is relative small, that is, for any* $E \in \left(V_L^e, \frac{V_H^e+V_L^e}{2}\right]$, *the model has no pure-strategy equilibrium.*

Lemma 3 explores the H-investor's strategic behavior when faced with the possibility of the entrant entering the market at a net trading volume of $X = -1$. If the entrant believes that the H-investor will surely buy one share, her posterior belief at $X = -1$ will be $q(-1) = 0$, causing her to stay out of the market. However, anticipating this belief, the H-investor has an incentive to deviate and refrain from trading, increasing the likelihood of a net trading volume of -1, thereby deterring the entrant and increasing the H-investor's initial stake value.

Conversely, if the entrant expects the H-investor not to trade, her posterior belief at $X = -1$ will be $q(-1) = 1/2$. Given the relatively low entry cost, the entrant will choose to enter the market. In this case, when choosing between no trade and buying (recall that the H-investor will never sell), the H-investor realizes that he cannot influence the entrant's decision. As a result, the H-investor would deviate to buying one share to maximize his trading profit.

Proposition 5 characterizes the unique mixed-strategy equilibrium for the H-investor. In this equilibrium, the H-investor randomizes between no trade and buying, with the probability of buying negatively related to the entry cost.

Proposition 5. *When the entry cost is relatively small, that is, when* $E \in \left(V_L^e, \frac{V_H^e+V_L^e}{2}\right]$, *there is a unique equilibrium in which the H-investor randomizes between no trade and buying, with the probability of buying*

$$\beta_H^b = \frac{V_H^e + V_L^e - 2E}{V_H^e - E}, \tag{17}$$

which strictly decreases as the entry cost increases.

Proposition 5 follows a mixed-strategy equilibrium approach. As will be shown in Section 4, when the entry cost is relatively small, the entrant randomizes at $X = -1$ to keep the H-investor indifferent between no trade and buying. Consequently, the H-investor also randomizes between no trade and buying. Additionally, as argued in Lemma 3, the entrant's equilibrium decision can be neither to enter for sure nor to stay out for sure. Thus, the H-investor's buying probability must be calibrated to maintain the entrant's indifference. Furthermore, as the entry cost decreases within the interval $\left(V_L^e, \frac{V_H^e+V_L^e}{2}\right]$, the entrant's incentive to enter strengthens. To keep the entrant indifferent, the probability of the H-investor buying must increase to reduce the entrant's posterior belief and expected profit of entering the market when $X = -1$. Therefore, β_H^b is strictly decreasing as E increases, as characterized in equation (17).

3.5 Effects of Entry Cost and Initial Stake

Having characterized the informed investor's trading behavior in Proposition 1 to Proposition 5, we are now in a position to summarize the impact of entry cost and initial stake on financial market trading. Figure 2 illustrates the H-investor's trading as a function of the entry cost, both with and without an initial stake.

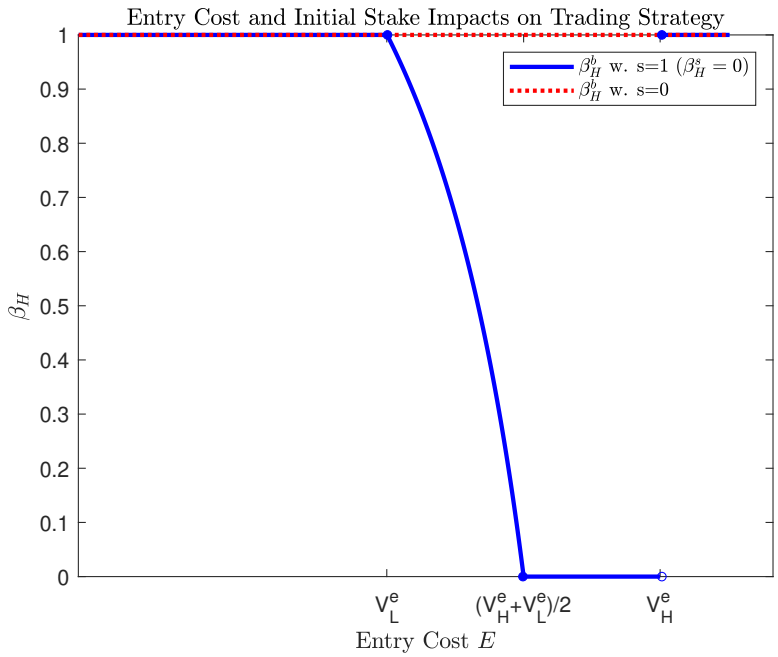


Figure 2: Impact of Entry Cost and Initial Stake on H-investor's Trading

In Figure 2, the red dotted line represents the probability of the H-investor buying when he does not hold an initial stake ($s = 0$), while the blue line depicts the probability of buying when he holds an initial stake ($s = 1$).

Several insights emerge from Figure 2. Firstly, whether the entry cost is extremely large or extremely small, the H-investor chooses to buy, regardless of whether he holds an initial stake. The intuition in both scenarios is comparable. Without an initial stake, the H-investor's sole incentive is to maximize his trading profits. With an initial stake, the H-investor recognizes that his trading cannot influence the entrant's decision under extreme entry costs, thus his focus remains solely on profit maximization.

Secondly, at an intermediate level of entry cost, the presence of an initial stake reduces the likelihood of the H-investor buying. Faced with a medium entry cost, the H-investor is aware that his trading can influence the entrant's beliefs and, in turn, the entrant's entry decision. Therefore, the H-investor must weigh the value of his initial stake against potential trading profits when deciding whether to trade, as these two incentives may not align with an increased probability of buying.

Thirdly, when the H-investor holds an initial stake, his probability of buying displays a non-monotonic relationship with the entry cost. As the entry cost increases from zero, the probability of the H-investor buying initially decreases from one to zero. However, once the entry cost surpasses a certain threshold, the probability jumps back to one, indicating a shift in behavior when the entry cost reaches extremely high levels.

Finally, with an initial stake, an increase in entry cost within the intermediate range leads to a reduction in the H-investor's buying probability. In this process, the entrant's posterior belief remains constant across all net trading volumes, except at $X = -1$. Thus, the impact of the entry cost on the information conveyed by financial markets is only driven by the net trading volume at $X = -1$. This is shown in Table 2, where β_H^b is characterized by equation (17).

X	-2	-1	0	1	2
q	0	$\frac{1-\beta_H^b}{2-\beta_H^b}$	$\frac{1}{2}$	1	1

Table 2: Posterior belief $q(X)$

Note that when the H-investor refrains from trading at relatively large entry costs, the net trading volume $X = 2$ is off the equilibrium path. According to the intuitive criterion, $q(2) = 1$, as the L-investor would not buy even if mistakenly perceived as the H-investor.

As the entry cost increases from V_L^e to V_H^e, the buying probability β_H^b decreases from 1 to 0 until $\frac{V_H^e+V_L^e}{2}$, then holds at 0, while the posterior belief $q(X)$ increases from 0 to 1/2 and then remains constant. This indicates that as the entry cost rises within the intermediate range, the financial market informativeness decreases. At relatively large entry costs, the net trading volume $X = -1$ becomes completely uninformative, with $q(-1) = q_0 = 1/2$. Proposition 6 formally shows how the entry cost in the product market affects financial market informativeness.

Proposition 6. *With an initial stake ($s = 1$), as the entry cost increases within the range (V_L^e, V_H^e), financial market informativeness decreases. Moreover, when $E \in \left(\frac{V_L^e+V_H^e}{2}, V_H^e\right)$, the net trading volume $X = -1$ becomes completely uninformative, resulting in the lowest level of financial market informativeness.*

4 Initial Stake and Product Market Competition

We have demonstrated that both product and financial market characteristics influence the informed investor's trading behavior, which in turn affects the information about product demand revealed by the financial market. In this section, we explore how the informed investor's initial stake impacts the product market competition. This analysis is important because the industrial organization of the product market — whether it

remains a monopoly or transitions into a duopoly — has significant implications for consumer welfare.

We begin by considering the entrant's ex-ante probability of entering the market:

$$\begin{aligned} Pr(d=1) &= \sum_{X=-2}^{2} Pr(d(X)=1) \times Pr(X) \\ &= \frac{1}{2}\sum_{X=-2}^{2} Pr(d(X)=1) \times Pr(X|\theta=H) \\ &\quad + \frac{1}{2}\sum_{X=-2}^{2} Pr(d(X)=1) \times Pr(X|\theta=L). \end{aligned} \tag{18}$$

As shown in Proposition 1 and Proposition 2, when the informed investor holds no initial stake ($s=0$), the H-investor will buy, and the L-investor will sell. Consequently, when $\theta=H$, the net trading volume X can only be 0, 1, or 2, each with a probability of 1/3. Similarly, when $\theta=L$, the net trading volume X can be -2, -1, or 0, each with a probability of 1/3. The entrant's decision to enter the market depends on the entry cost at each of these net trading volumes. Proposition 7 summarizes the probability of a duopoly market when the informed investor holds no initial stake.

Proposition 7. *When the informed investor holds no initial stake, the ex-ante entry probability is*

$$\Pr(d=1) = \begin{cases} 1, & \text{if } E \le V_L^e \\ \frac{2}{3}, & \text{if } E \in \left(V_L^e, \frac{1}{2}\left(V_L^e + V_H^e\right)\right] \\ \frac{1}{3}, & \text{if } E \in \left(\frac{1}{2}\left(V_L^e + V_H^e\right), V_H^e\right) \\ 0, & \text{if } E \ge V_H^e \end{cases} \tag{19}$$

Proposition 7 follows from the entrant's equilibrium posterior belief at each possible net trading volume. When the entry cost is extremely small, the entrant will surely enter the market, regardless of the net trading volume. For relatively small entry costs, the entrant will enter at any non-negative net trading volume, as these signal that $\theta=H$ with a probability of at least 1/2. In contrast, with relatively large entry costs, the entrant will stay out of the product market for any non-positive net trading volume, since her posterior belief at each such volume is at most 1/2. At extremely large entry costs, the entrant refrains from entering the market regardless of net trading volume.

Next, we consider the scenario where the informed investor holds an initial stake. Recall that even with an initial stake, the entrant will surely enter the market if the entry cost is extremely small and refrain from entering if the cost is extremely large. However, at relatively large entry costs, the H-investor chooses not to trade, leading to

posterior beliefs at $X = -1$ and $X = 0$ being equal to $1/2$, which deters the entrant from entering.

However, when the entry cost is relatively small, particularly at the net trading volume $X = -1$, the entrant will enter with a probability that keeps the H-investor indifferent between not trading and buying. Lemma 4 provides the conditional entry probabilities for each net trading volume.

Lemma 4. *When the informed investor holds an initial stake and the entry cost satisfies* $E \in \left(V_L^e, \frac{1}{2}\left(V_L^e + V_H^e\right)\right]$, *the entrant's conditional entry probability is provided in Table 3, where* $d_I = \frac{V_H^e + 4V_L^e}{5V_H^e}$.

X	-2	-1	0	1	2
d	0	d_I	1	1	1

Table 3: Entry Probability with $s = 1$

Proposition 5 characterizes the H-investor's trading behavior in this scenario, leading to the conditional (on $\theta = H$) distribution of net trading volumes as shown in Table 4.

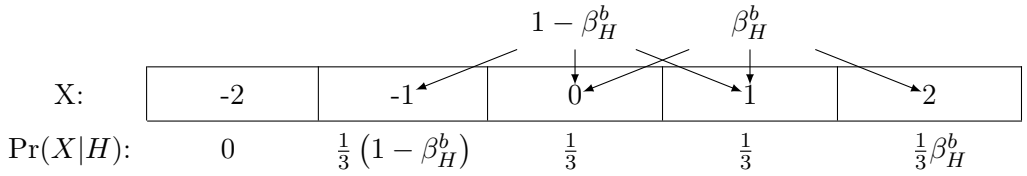


Table 4: Conditional distribution over X when $V_L^e < E \leq \frac{V_H^e + V_L^e}{2}$

These arguments imply the ex-ante entry probability when the informed investor has an initial stake, formally characterized as a function of the entry cost in Proposition 8.

Proposition 8. *When the informed investor holds an initial stake, the entrant's ex-ante entry probability is*

$$\Pr(d=1) = \begin{cases} 1, & \text{if } E \leq V_L^e \\ \frac{3+2d_I+\beta_H^b(1-d_I)}{6}, & \text{if } E \in \left(V_L^e, \frac{1}{2}\left(V_L^e + V_H^e\right)\right] \\ \frac{1}{6}, & \text{if } E \in \left(\frac{1}{2}\left(V_L^e + V_H^e\right), V_H^e\right) \\ 0, & \text{if } E \geq V_H^e, \end{cases} \tag{20}$$

where β_H^b *is defined in equation* (17).

The impact of the informed investor's initial stake on the ex-ante entry probability is

illustrated by comparing Proposition 7 with Proposition 8. This comparative analysis is summarized in Figure 3.

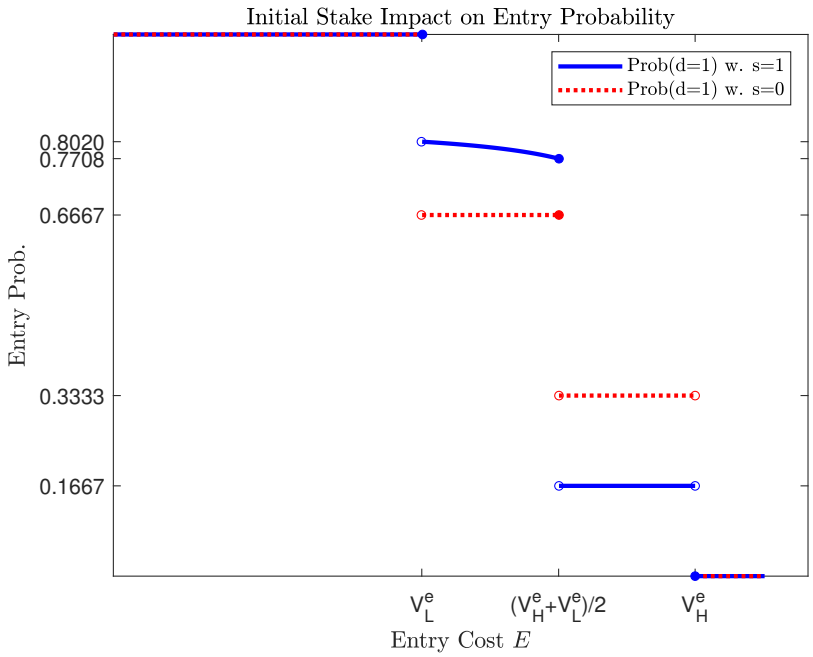


Figure 3: Initial Stake Impacts on Entry Probability

Figure 3 illustrates that when the entry cost is either extremely small or extremely large, the initial stake has no impact on product market competition. This is because, at these extreme entry cost levels, the entrant's decision is unaffected by financial market trading. In other words, under these conditions, any information derived from the financial market fails to influence the entrant's behavior. As a result, the learning channel, which typically allows financial market characteristics to impact product market competition, becomes inactive.

However, at intermediate entry costs, the initial stake plays a critical role, as the entrant's decision is influenced by the information conveyed through the financial market. Interestingly, the impact of the initial stake on product market competition varies depending on entry cost level. This relationship is summarized in Proposition 9.

Proposition 9. *The initial stake enhances the product market competition when the entry cost is relatively small (that is,* $E \in \left(V_L^e, \frac{1}{2}\left(V_L^e + V_H^e\right)\right]$*), but reduces the product market competition when the entry cost is relatively large (that is,* $E \in \left(\frac{1}{2}\left(V_L^e + V_H^e\right), V_H^e\right)$*).*

The enhancement of product market competition due to the initial stake arises from the entrant's learning at a small negative net trading volume ($X = -1$). Without an initial stake, the H-investor will surely buy, making $X = -1$ a perfect signal of $\theta = L$, which keeps the entrant out of the product market. However, when the H-investor holds

an initial stake, he may choose not to trade, leading the entrant to infer that product demand could still be high, even at this small negative net trading volume. As a result, the entrant enters with a positive probability.

The second part of Proposition 9 suggests that the initial stake reduces product market competition when entry costs are relatively high. This effect is mechanically driven by the equilibrium net trading volumes. Without an initial stake, the H-investor surely buys, leading to net trading volumes of $X = 1$ and $X = 2$, where the entrant enters the market with an equal ex-ante probability of $1/6$ at each volume. In contrast, with an initial stake, the H-investor may refrain from trading, so the large positive net trading volume $X = 2$ no longer occurs in equilibrium. The likelihood of the entrant entering at the small positive net trading volume ($X = 1$) remains at $1/6$, but the reduction in trading volume lowers the overall likelihood of market entry. As a result, the initial stake decreases product market competition in this scenario.

5 Trading Cost and Product Market Competition

One key difference between our model and that of Edmans et al. (2015) is the exclusion of trading costs in the incumbent stock market, which are critical in Edmans et al. (2015). However, studying the implications of trading costs on the probability of market entry by entrants can provide insights into how financial market policies may influence the industrial organization of product markets. This section explores how introducing trading costs could intensify competition in the product market.

We begin by postulating a symmetric trading cost, denoted by $k > 0$, which is assumed to be negligibly small. This cost is incurred by the informed investor whenever one share is bought or sold. As suggested by our equilibrium analysis in Section 3, the informed investor generally has a strict incentive to maintain his equilibrium position, except in the case where he hold an initial stake and faces a relatively small entry cost. As shown in Proposition 5, under these conditions, the H-investor is indifferent between no trade and buying. Therefore, even a minimal trading cost could affect the H-investor's behavior exclusively in this scenario. Proposition 10 formalizes this intuition, showing that a minimal trading cost enhances product market competition when the informed investor holds an initial stake and the entry cost is relatively small.

Proposition 10. *Suppose that the incumbent stock market has a trading cost k, which is positive but sufficiently small. When the informed investor lacks an initial stake, this trading cost has no effect on product market competition across all levels of entry cost. However, when the informed investor holds an initial stake, the trading cost may influence market dynamics differently. Specifically, for relatively small entry costs, that is, $E \in \left(V_L^e, \frac{1}{2}\left(V_L^e + V_H^e\right)\right]$, the minimal trading cost increases the ex-ante probability of market entry. For entry costs outside this range, the minimal trading cost does not affect the*

ex-ante probability of entry.

Figure 4 depicts the impact of a minimal trading cost on product market competition when the informed investor holds an initial stake.

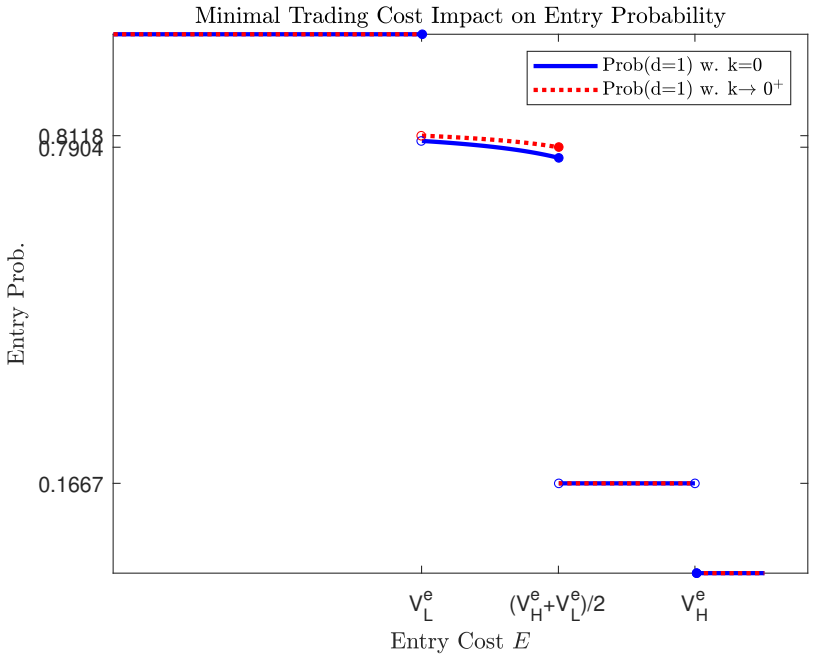


Figure 4: Minimal Trading Cost Impact on Entry Probability with $s = 1$

The intuition behind how a minimal trading cost enhances product market competition is as follows. Recall that when the H-investor holds an initial stake and the entry cost is relatively low, the investor is indifferent between trading and not trading. A small trading cost reduces the investor's incentive to buy, effectively preventing any trade. This requires the entrant to increase the entry probability at $X = -1$, decreasing the initial stake's value and lowering the H-investor's incentive to refrain from trading. In this way, the H-investor remains indifferent, as required in equilibrium.

Exploring the optimal trading cost that maximizes product market competition is another intriguing aspect. We characterize the equilibrium for each possible trading cost and compute the equilibrium ex-ante probability of market entry. The comprehensive analysis is provided in Online Appendix A. The effects of trading costs on the ex-ante probability of market entry are summarized in Table 5.

Entry Cost	Extremely Small	Relatively Small		Relatively Large		Extremely Large
Initial stake / Trading cost	$s \in \{0,1\}$	1	0	1	0	$s \in \{0,1\}$
$k = 0$	1	$\frac{3+2d_I+\beta_H^b(1-d_I)}{6}$	2/3	1/6	1/3	0
$k < \frac{2(V_H-V_L)}{27}$	1	$\frac{3+2d_I^*+\beta_H^b(1-d_I^*)}{6}$	2/3	1/6	1/3	0
$\frac{2(V_H-V_L)}{27} < k < \frac{4(V_H-V_L)}{27}$	1	5/6	5/6	1/6	1/3	0
$\frac{4(V_H-V_L)}{27} < k < \frac{V_H-V_L}{6}$	1	1	1	1/6	1/3	0
$\frac{V_H-V_L}{6} < k < \frac{V_H-V_L}{3}$	1	1	1	1/6	1/6	0
$\frac{V_H-V_L}{3} < k$	1	1	1	0	0	0

**Note:* $d_I^* = d_I + \frac{2(V_H-V_L)+27k}{5V_H}$ *is entrant's probability of entering with a minimal trading cost.*

Table 5: Trading Cost and Ex-ante Entry Probability

Table 5 shows that when the entry cost is either extremely large or extremely small, trading costs do not affect the entry probability, regardless of whether the informed investor has an initial stake. This is because, in both scenarios, the entrant's learning from the financial market does not impact her entry decision. Therefore, the impact of trading costs on the informed investor's trading behavior does not alter the entry probability.

For relatively small entry costs, the entry probability increases with the trading cost and reaches one when the trading cost becomes sufficiently large, specifically when $k \geq \frac{4(V_H-V_L)}{27}$. This relationship holds regardless of whether the informed investor holds an initial stake. Intuitively, at lower levels of trading costs, an increase in trading costs discourages the H-investor from trading, thereby raising the likelihood of market entry at the net trading volume of $X = -1$. However, once the trading cost reaches a certain threshold, the informed investor abstains from trading entirely. In this case, the entrant, unable to glean information from the financial market, bases her decision solely on prior beliefs.

Conversely, when the entry cost is relatively large, the probability of entry drops to zero as the trading cost becomes prohibitively large, regardless of whether the informed investor holds an initial stake. This outcome is intuitive: a higher trading cost makes the informed investor more reluctant to trade, leading to a less informative financial market. Consequently, the entrant is less likely to enter the market. As the trading cost increases further, the informed investor withdraws from trading entirely, depriving the entrant of any information from the market, prompting her to stay out.

Table 5 directly suggests that, to maximize product market competition, policymakers should implement a trading cost at an intermediate level.

Proposition 11. *Imposing a trading cost* $k \in \left(\frac{4(V_H-V_L)}{27}, \frac{V_H-V_L}{6}\right)$ *will maximize product market competition for any entry cost and initial stake.*

Figures 5 and 6 illustrate the impacts of optimal trading costs on product market competition, specifically when k lies within the range $\left(\frac{4(V_H-V_L)}{27}, \frac{V_H-V_L}{6}\right)$. These figures contrast scenarios where the informed investor holds an initial stake against those where no initial stake exists. Intuitively, when the entry cost is relatively small, the informed investor refrains from trading once the trading cost reaches an optimal level, regardless of the information held or the initial stake. As a result, the entrant's decision to enter the market is based solely on prior beliefs about product demand.

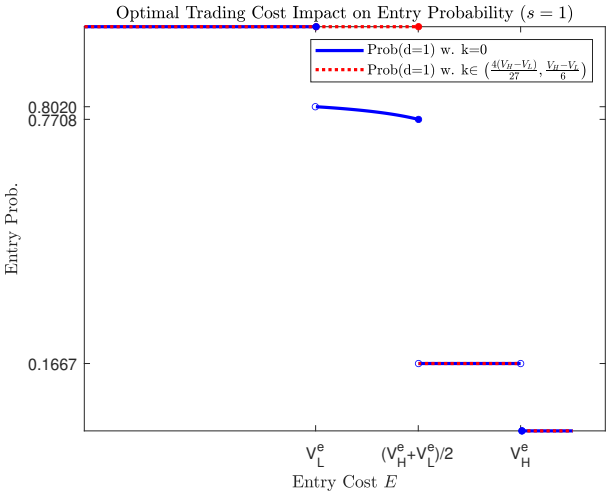


Figure 5: Optimal k Impact with $s = 1$

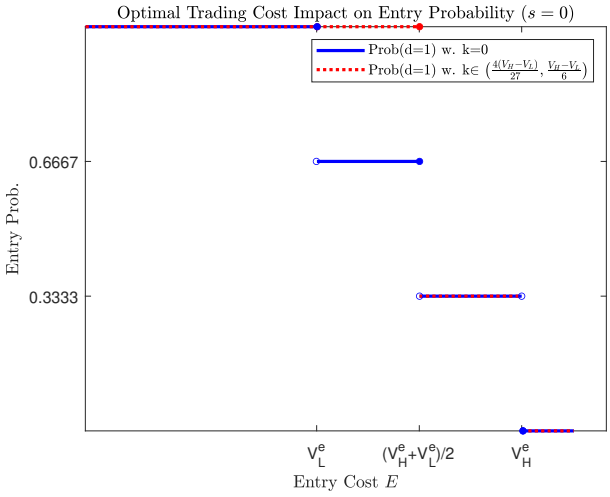


Figure 6: Optimal k Impact with $s = 0$

6 Empirical and Policy Implications

This section discusses the empirical and policy implications of our theoretical analysis. The empirical implications focus on the relationship between entry costs, initial stake, and both financial market informativeness and product market competition. We propose that initial stake impacts stock price informativeness differently depending on entry cost levels, with intermediate entry costs leading to a decrease in informativeness as institutional investors may adjust trading behavior to discourage potential entrants. Additionally, we hypothesize that initial stake can influence product market competition by either deterring or encouraging entry based on the relative entry costs within the industry.

To empirically test these hypotheses, we outline key variables, including institutional ownership as a proxy for the informed investor's initial stake, competition from potential entrants to represent entry costs, and measures such as price non-synchronicity and the Probability of Informed Trading (PIN) to capture price informativeness.

The policy implications of our model suggest that moderate transaction costs in secondary financial markets could enhance product market competition. By reducing stock price informativeness, such costs may promote product market competition. This outlines the potential trade-offs for policymakers between fostering product market competition

and preserving financial market informativeness, suggesting that well-calibrated transaction costs could support a more competitive and stable market environment.

6.1 Empirical Implications

The feedback effects between the incumbent informed investor's trading and the product market entrant's entry decision lead to a set of new empirical implications regarding the relationships among initial stakes, entry costs, stock price informativeness, and product market competition.

Our first implication addresses how initial stakes held by institutional investors, combined with product market entry costs, influence stock price informativeness. Specifically, we hypothesize that as institutional investors' initial stakes (captured by institutional ownership) increase, stock price informativeness decreases in industries with moderate entry costs. At intermediate entry costs, institutional investors may strategically adjust their trading behavior to influence potential entrants' beliefs of market demand. This results in less informative stock prices, as strategic trading creates uncertainty about demand, deterring entry and preserving the incumbent's market position. This effect could be observed empirically by assessing how the level of institutional ownership correlates with stock price informativeness, especially in firms within medium entry-cost markets. Price informativeness could be gauged through measures like price non-synchronicity, which assesses the correlation between a firm's stock returns and the returns of its industry and the market (Roll (1988), Morck et al. (2000), Durnev et al. (2003), and Durnev et al. (2005)) or the Probability of Informed Trading (PIN) measure, which reflects information asymmetry in trading (Easley et al. (1996, 1997a,b), Easley et al. (1998a), Easley et al. (1998b), Easley et al. (2002), and Vega (2006)).

Our second implication explores the interaction between entry costs, initial stake, and product market competition. Specifically, we suggest that in industries with relatively low entry costs, higher levels of incumbent stakes by informed investors may correlate positively with increased competition, as the likelihood of entry by potential entrants rises. In contrast, in industries with relatively high entry costs, greater institutional stakes by informed investors are expected to correlate negatively with competition due to a reduced probability of entry. This pattern arises because, at relatively high entry costs, institutional investors' initial stakes create incentives for trading behaviors that signal low demand, effectively deterring entry and reducing competitive pressures. In such relatively high-cost scenarios, informed investors' trading strategies align with maintaining the incumbent's market dominance.

In relatively low entry-cost scenarios, however, the effect of the initial stake can reverse. Investors may choose not to trade, leading to ambiguous signals of product demand. This ambiguity may encourage potential entrants to infer high demand, thereby increas-

ing the likelihood of entry and product market competition. Entry costs could be proxied by industry-level measures such as property, plant, and equipment (PP&E), R&D intensity, and capital expenditures, which reflect the investment required for potential entrants in a product market (Li, 2010). These measures could allow for empirical testing of the correlation between entry cost levels, initial stakes, and resulting competition intensity in various product markets.

In sum, these theoretical insights offer a foundation for potential empirical exploration of how institutional stakes, trading behavior, and entry costs interact to shape stock price informativeness and product market competition.

6.2 Policy Implications

This paper demonstrates that implementing moderate transaction costs in secondary financial markets can intensify competition in the product market. The central mechanism behind this effect is that increased transaction costs discourage informed trading, thereby reducing the informativeness of the financial market. This makes it more difficult for an entrant to infer product demand from incumbent stock prices, forcing the entrant to make entry decisions with less reliance on financial market information.

Existing literature on transaction costs has primarily examined their impact on trading volume and liquidity (Amihud and Mendelson, 1986, 1992; Jean-Edouard Colliard, 2017; Kupiec, 1996; Pomeranets and Weaver, 2018). Additionally, research by Wang et al. (2021) highlights a negative association between product market competition and stock price informativeness. Complementing these studies, our paper reveals that moderate transaction costs can enhance product market competition by reducing financial market informativeness.

This finding suggests important policy implications. Implementing moderate transaction costs, like securities transaction taxes, could limit informed trading without significantly harming liquidity. By reducing the deterrent effect of incumbents' stock price signals on potential entrants, these costs may promote a more competitive product market. However, while moderate transaction costs could foster competition, they may also slow price discovery. Policymakers should therefore carefully weigh the benefits of increased competition against the potential drawbacks of reduced financial market informativeness.

7 Conclusion

This paper explores the strategic interplay between an informed investor who trades in the incumbent stock market and an entrant who decides whether to enter the product market. It broadly touches an important question — how the secondary financial market and the product market interact with each other. To characterize such interactions, we propose an entry game in which the entrant learns about product demand from the

incumbent stock market.

We show that the product market entry cost and the informed investor's initial stake significantly influence the informed investor's trading strategy and the entrant's market entry decision. In particular, when the informed investor does not have an initial stake in the incumbent firm, he trades on his private information regardless of the entry cost, fully harvesting the arbitrage opportunity. By contrast, when the informed investor has an initial stake, as the entry cost increases from zero, the probability of the informed investor buying at high product demand decreases from one to zero continuously and then jumps back to one, showing significant limits to arbitrage in the intermediate entering costs. Such a trading strategy also implies that the financial market informativeness is a non-monotonic function of the entry cost. Particularly, when the entry cost is relatively large, the financial market is least informative.

The entry cost and the initial stake also affect the real effect of the financial market. Interestingly, while an initial stake boosts product market competition with relatively small entry costs, it diminishes competition when entry costs are relatively large.

Furthermore, our discussion on financial market trading cost policies reveals their influence on product market competition. In particular, even a minimal trading cost can enhance competition, suggesting that put some sand into the wheel of the financial market can benefit consumer surplus in the product market. An intermediate level of trading cost emerges as optimal for promoting product market competition.

The contributions of this paper are threefold. First, it is among the first papers that discuss the interaction between the secondary financial market and product market competition. We model a strategic investor whose trading behavior is shaped by the characteristics of both markets. Second, we investigate the informational feedback loop between the financial and product markets. Our theoretical study generates a first set of empirical implications about secondary financial market and product market industrial organization. Third, our theoretical results offer policy implications. Surprisingly, we show that financial market trading cost policies can influence product market competition and, by extension, consumer surplus.

References

Ahnert, T., C. Machado, and A. E. Pereira. 2023. Trading for Bailouts. Working paper, Universidad de los Andes.

Amihud, Y., and H. Mendelson. 1986. Asset Pricing and the Bid-Ask Spread. *Journal of Financial Economics* 17:223–249.

Amihud, Y., and H. Mendelson. 1992. Transaction Taxes and Stock Values. In *K. Lehn and R. W. Kamphuis, Jr. (eds.)*, p. 90–350. Modernizing U.S. Securities Regulation. New York: Irwin.

Bakke, T.-E., and T. M. Whited. 2010. Which Firms Follow the Market? An Analysis of Corporate Investment Decisions. *The Review of Financial Studies* 23:1941–1980.

Benoit, J.-P. 1984. Financially Constrained Entry in a Game with Incomplete Information. *The RAND Journal of Economics* 15:490–499.

Boleslavsky, R., D. Kelly, and C. R. Taylor. 2017. Selloffs, bailouts, and feedback: Can asset markets inform policy? *Journal of Economic Theory* 169:294–343.

Bond, P., A. Edmans, and I. Goldstein. 2012. The Real Effects of Financial Markets. *Annual Review of Financial Economics* 4:339–360.

Bond, P., and I. Goldstein. 2015. Government Intervention and Information Aggregation by Prices. *Journal of Finance* 70:2777–2812.

Bond, P., I. Goldstein, and E. Prescott. 2010. Market-Based Corrective Actions. *Review of Financial Studies* 23:781–820.

Campbell, J. Y., and A. S. Kyle. 1993. Smart Money, Noise Trading and Stock Price Behaviour. *The Review of Economic Studies* 60:1–34.

Chen, Q., I. Goldstein, and W. Jiang. 2007. Price Informativeness and Investment Sensitivity to Stock Price. *The Review of Financial Studies* 20:619–650.

Cong, L. W., X. Huang, S. Li, and J. Ni. 2023. Cournot Competition, Informational Feedback, and Real Efficiency. Working paper, NBER Working Paper Series.

D'Avolio, G. 2002. The Market for Borrowing Stock. *Journal of Financial Economics* 66:271–306.

DeLong, J. B., A. Shleifer, L. H. Summers, and R. J. Waldmann. 1990. Noise Trader Risk in Financial Markets. *The Journal of Political Economy* 98:703–738.

Dessaint, O., T. Foucault, L. Frésard, and A. Matray. 2019. Noisy Stock Prices and Corporate Investment. *Review of Financial Studies* 32:2625–2672.

Dow, J., and G. Gorton. 1997. Stock Market Efficiency and Economic Efficiency: Is There a Connection? *Journal of Finance* 52:1087–1129.

Durnev, A., R. Morck, and B. Yeung. 2005. Value enhancing capital budgeting and firm-specific stock return variation. *Journal of Finance* 59:65–105.

Durnev, A., R. Morck, B. Yeung, and P. Zarowin. 2003. Does Greater Firm-Specific Return Variation Mean More or Less Informed Stock Pricing? *Journal of Accounting Research* 41:797–836.

Easley, D., S. Hvidkjaer, and M. O'Hara. 2002. Is information risk a determinant of asset returns? *Journal of Finance* 57:2185–2221.

Easley, D., N. M. Kiefer, and M. O'Hara. 1996. Cream-Skimming or Profit-Sharing? The Curious Role of Purchased Order Flow. *811-833* 51:811–833.

Easley, D., N. M. Kiefer, and M. O'Hara. 1997a. The information content of the trading process. *Journal of Empirical Finance* 4:159–186.

Easley, D., N. M. Kiefer, and M. O'Hara. 1997b. One Day in the Life of a Very Common Stock. *The Review of Financial Studies* 10:805–835.

Easley, D., M. O'Hara, and J. Paperman. 1998a. Financial analysts and information-based trade. *Journal of Financial Markets* 1:175–201.

Easley, D., M. O'Hara, and P. Srinivas. 1998b. Option Volume and Stock Prices: Evidence on Where Informed Traders Trade. *Journal of Finance* 53:431–465.

Edmans, A., I. Goldstein, and W. Jiang. 2015. Feedback Effects, Asymmetric Trading, and the Limits to Arbitrage. *American Economic Review* 105:3766–97.

Fama, E. F., and M. H. Miller. 1972. The Theory of Finance. In *Hardcopy*, p. 335. DRYDEN PRESS.

Faure-Grimaud, A. 2002. Using Stock Price Information to Regulate Firms. *Review of Economic Studies* 69:169–190.

Foucault, T., and L. Frésard. 2012. Cross-listing, investment sensitivity to stock price, and the learning hypothesis. *The Review of Financial Studies* 25:3305–3350.

Foucault, T., and L. Frésard. 2014. Learning from peers' stock prices and corporate investment. *Journal of Financial Economics* 111:554–577.

Foucault, T., and L. Frésard. 2019. Corporate strategy, conformism, and the stock market. *The Review of Financial Studies* 32:905–950.

Goldstein, I. 2023. Information in Financial Markets and Its Real Effects. *Review of Finance* 27:1–32.

Goldstein, I., and A. Guembel. 2008. Manipulation and the Allocational Role of Prices. *The Review of Economic Studies* 75:133–164.

Goldstein, I., B. Liu, and L. Yang. 2021. Market feedback: Evidence from the horse's mouth. *Rotman School of Management Working Paper* .

Goldstein, I., and L. Yang. 2019. Good disclosure, bad disclosure. *Journal of Financial Economics* 131:118–138.

Gromb, D., and D. Vayanos. 2002. Equilibrium and welfare in markets with financially constrained arbitrageurs. *Journal of Financial Economics* 66:361–407.

Hayek, F. A. 1945. The Use of Knowledge in Society. *American Economic Review* 35:519–530.

Jean-Edouard Colliard, P. H. 2017. Financial Transaction Taxes, Market Composition, and Liquidity. *Journal of Finance* 72:2685–2716.

Jones, C. M., and O. Lamont. 2002. Short-sale constraints and stock returns. *Journal of Financial Economics* 66:207–239.

Kupiec, P. H. 1996. Noise Traders, Excess Volatility, and A Securities Transactions Tax 10:115–129.

Kyle, A. S. 1985. Continuous Auctions and Insider Trading. *Econometrica* 53:1315–1335.

Lamont, O. A., and R. H. Thaler. 2003. Can the Market Add and Subtract? Mispricing in Tech Stock Carve-outs. *Journal of Political Economy* 111:227–268.

Li, X. 2010. The Impact of Product Market Competition on the Quantity and Quality of Voluntary Disclosures. *Review of Accounting Studies* 15:663–711.

Matveyev, E., and A. Zhdanov. 2019. Optimal Capital Structure with Imperfect Competition. Working paper, MIT Sloan School of Management.

Morck, R., B. Yeung, and W. Yu. 2000. The information content of stock markets: why do emerging markets have synchronous stock price movements? *Journal of Financial Economics* 58:215–260.

Nagel, S. 2005. Short sales, institutional investors and the cross-section of stock returns. *Journal of Financial Economics* 78:277–309.

Ozoguz, A., M. J. Rebello, and M. Wardlaw. 2018. Information, Competition, and Investment Sensitivity to Peer Stock Prices. Working paper, SMU Cox School of Business Research Paper.

Peress, J. 2010. Product Market Competition, Insider Trading, and Stock Market Efficiency. *The Journal of Finance* 65:1–43.

Poitevin, M. 1989. Financial Signalling and the "Deep-Pocket" Argument. *The RAND Journal of Economics* 20:26–40.

Pomeranets, A., and D. G. Weaver. 2018. Securities Transaction Taxes and Market Quality. *Journal of Financial and Quantitative Analysis* 53:455–484.

Roll, R. 1988. R^2. *Journal of Finance* 43:541–566.

Shleifer, A., and R. W. Vishny. 1997. The Limits of Arbitrage. *The Journal of Finance* 52:35–55.

Subrahmanyam, A., and S. Titman. 2013. Financial Market Shocks and the Macroeconomy. *Review of Financial Studies* 26:2687–2717.

Tookes, H. E. 2008. Information, Trading, and Product Market Interactions: Cross-sectional Implications of Informed Trading. *The Journal of Finance* 63:379–413.

Vega, C. 2006. Stock price reaction to public and private information. *Journal of Financial Economics* 82:103–133.

Wang, J., W. Li, and A. Forst. 2021. Product Market Competition, Stock Price Informativeness, and IFRS Adoption: Evidence from Europe. *Review of Quantitative Finance and Accounting* 56:1–23.

Xiong, Y., and L. Yang. 2021. Disclosure, Competition, and Learning from Asset Prices. *Journal of Economic Theory* 197:105331.

Yan, D. 2022. Do Private Firms (Mis)Learn from the Stock Market? *Review of Finance* Forthcoming.

A Proofs

In this section, we present all omitted proofs.

Proof of Lemma 1:

By the definition of the threshold q_I in equation (5), if $q(X) < q_I$, the assumption that $V_H^e > V_L^e$ implies

$$q(X)V_H^e + [1 - q(X)]V_L^e < q_I V_H^e + [1 - q_I]V_L^e = E.$$

Since the expected payoff from entry is strictly smaller than the entry cost, the entrant will not enter the product market. Similarly, if $q(X) > q_I$,

$$q(X)V_H^e + [1 - q(X)]V_L^e > q_I V_H^e + [1 - q_I]V_L^e = E,$$

implying that the entrant will enter the product market.

When $q(X) = q_I$, the entrant's expected payoff from entry is the same as the entry cost, so she is indifferent and may randomize between entering and staying out of the product market.

Q.E.D.

Proof of Lemma 2:

We show that the informed investor's preference satisfies the single-crossing property. Specifically, given the entrant's entry strategy $d(X)$ and the market maker's pricing strategy $P(X)$, we calculate the difference between the L-investor's expected payoffs from not trading and from selling one share as

$$\begin{aligned}
& U(L;0) - U(L;-1) \\
= \; & \frac{s}{3}\sum_{X_N=-1}^{1} v(L;d(X_N)) \\
& \quad - \left[\frac{1}{3}\sum_{X_N=-1}^{1}\left(P(X_N-1) - v(L;d(X_N-1))\right) + \frac{s}{3}\sum_{X_N=-1}^{1} v(L;d(X_N-1))\right] \qquad (21) \\
= \; & \frac{s}{3}\left[v(L;d(1)) - v(L;d(-2))\right] \\
& \quad - \frac{1}{3}\sum_{X_N=-1}^{1} q(X_N-1)\left(v(H;d(X_N-1)) - v(L;d(X_N-1))\right) \qquad (22)
\end{aligned}$$

In equation (21), the first term is the L-investor's expected payoff from choosing not to trade, while the second term is the L-investor's expected payoff from selling one share. Importantly, if he chooses not to trade, the net trading volume will be -1, 0, and 1 with equal probability. On the other hand, if he sells one share, the net trading volume will be -2, -1, and 0 with equal probability.

Similarly, the difference between the H-investor's expected payoffs from not trading and from selling one share can be calculated by

$$\begin{aligned}
& U(H;0) - U(H;-1) \\
= \; & \frac{s}{3} \sum_{X_N=-1}^{1} v(H; d(X_N)) \\
& \quad - \left[\frac{1}{3} \sum_{X_N=-1}^{1} (P(X_N - 1) - v(H; d(X_N - 1))) + \frac{s}{3} \sum_{X_N=-1}^{1} v(H; d(X_N - 1)) \right] \qquad (23) \\
= \; & \frac{s}{3} \left[v(H; d(1)) - v(H; d(-2)) \right] \\
& \quad + \frac{1}{3} \sum_{X_N=-1}^{1} \left[1 - q(X_N - 1) \right] \left(v(H; d(X_N - 1)) - v(L; d(X_N - 1)) \right) \qquad (24)
\end{aligned}$$

Therefore, we have

$$\begin{aligned}
& \left[U(H;0) - U(H;-1) \right] - \left[U(L;0) - U(L;-1) \right] \\
= \; & \frac{s}{3} \left[\left(v(H; d(1)) - v(L; d(1)) \right) - \left(v(H; d(-2)) - v(L; d(-2)) \right) \right] \\
& \quad + \frac{1}{3} \sum_{X_N=-1}^{1} \left(v(H; d(X_N - 1)) - v(L; d(X_N - 1)) \right) \qquad (25)
\end{aligned}$$

Because $V_H^e > V_L$, $v(H; d(X)) - v(L; d(X)) > 0$. Then, when $s = 0$, equation (25) is strictly positive. When $s = 1$, equation (25) equals $\frac{1}{3} \sum_{X_N=-1}^{1} (v(H; d(X_N)) - v(L; d(X_N)))$, which is also strictly positive. Hence,

$$U(H;0) - U(H;-1) > U(L;0) - U(L;-1).$$

In the same method, we obtain

$$\begin{aligned}
& [U(H;1) - U(H;0)] - [U(L;1) - U(L;0)] \\
= \quad & \frac{s}{3}\left[(v(H;d(2)) - v(L;d(2))) - (v(H;d(-1)) - v(L;d(-1)))\right] \\
& + \frac{1}{3}\sum_{X_N=-1}^{1}(v(H;d(X_N+1)) - v(L;d(X_N+1))) \qquad (26)
\end{aligned}$$

When $s = 0$, equation (26) is obviously positive. When $s = 1$, we note that

$$\begin{aligned}
\max_{d(X)}\{v(H;d(X)) - v(L;d(X))\} &= \frac{(S_H - c)^2 - (S_L - c)^2}{4} \\
\min_{d(X)}\{v(H;d(X)) - v(L;d(X))\} &= \frac{(S_H - c)^2 - (S_L - c)^2}{9}.
\end{aligned}$$

So, equation (26) is greater than

$$\frac{4}{3}\frac{(S_H - c)^2 - (S_L - c)^2}{9} - \frac{1}{3}\frac{(S_H - c)^2 - (S_L - c)^2}{4},$$

which is strictly positive. Therefore, we have

$$U(H;1) - U(H;0) > U(L;1) - U(L;0).$$

Hence, the informed investor's preference satisfies the single-crossing property. This implies that in equilibrium, the posterior belief about high product demand is increasing in the net trading volume, since a larger net trading volume is more likely to result from trading by the H-investor.

The net trading volume in the financial market is zero when either both investors trade with opposite positions or neither trades at all. Conditional on $\theta = H$, the zero net trading volume occurs with a probability $\frac{1}{3}\beta_H^s + \frac{1}{3}(1 - \beta_H^s - \beta_H^b) + \frac{1}{3}\beta_H^b = \frac{1}{3}$. Similarly, conditional on $\theta = L$, the zero net trading volume occurs with probability $\frac{1}{3}$ too. Then, by Bayes' rule, when the net trading volume in the financial market is zero, the entrant and the market maker hold a posterior belief about $\theta = H$:

$$\Pr(\theta = H|X = 0) \triangleq q(0) = \frac{\frac{1}{2}\frac{1}{3}}{\frac{1}{2}\frac{1}{3} + \frac{1}{2}\frac{1}{3}} = \frac{1}{2},$$

for any informed investor's trading strategy.

Q.E.D.

Proof of Proposition 1:

In equation (22), the second term is strictly positive because $v(H;d(X)) > v(L;d(X))$. Hence, $U(L;0) < U(L;-1)$ unless $v(L;d(1)) - v(L;d(-2))$ is positive. Because $q(X)$ is increasing, $v(L;d(1)) > v(L;d(-2))$ only when $0 \leq d(1) < d(-2) \leq 1$. This implies that $q(X) = q_I$ for $X \in \{-2,-1,0,1\}$. By Bayes' rule, this can be true only if $\beta_H^s = \beta_L^s$ and $\beta_H^b = \beta_L^b$, which implies that the informed investor is completely pooling, and $q(X) = q_I = 1/2$ for $X \in \{-2,-1,0,1\}$. As we shall show, a completely pooling equilibrium does not exist. Hence, $v(L;d(1)) \leq v(L;d(-2))$, implying $U(L;0) < U(L;-1)$. Similarly, we show that $U(L;1) < U(L;0)$. Therefore, in equilibrium, the L-investor always sells one share.

Q.E.D.

Proof of Lemma 4:

When the entry cost is relative low, the entrant's posterior belief and her entry decision at each net trading volume is shown in

X	-2	-1	0	1	2
q	0	$\frac{1-\beta_H^b}{2-\beta_H^b}$	$\frac{1}{2}$	1	1
d	0	d_I	1	1	1

Table 6: Posterior Belief and Entry Decision

The H-investor's expected profit from buying in the financial market is

$$U(H;1) = V_H^e + \frac{1}{6}(V_H^e - V_L^e), \tag{27}$$

and his expected profit from no trade is

$$U(H;0) = \frac{2}{3}V_H^e + \frac{1}{3}d_I V_H^e + \frac{1}{3}(1-d_I)V_H. \tag{28}$$

Solving from the H-investor's indifferent condition $\big(U(H;1) = U(H;0)\big)$ gives

$$d_I = \frac{V_H + 4V_L}{5V_H}.$$

Plugging $q(-1) = \frac{1-\beta_H^b}{2-\beta_H^b}$ into the entrant's indifferent condition $\big(q(-1)V_H^e + (1-q(-1))V_L^e = E\big)$ gives

$$\beta_H^b = \frac{V_H^e + V_L^e - 2E}{V_H^e - E}.$$

Q.E.D.

Online Appendix (Not for Publication)

In this online appendix, we first present the full analysis for any given trading costs. We then consider a general case where the informed investor's initial stake s is any positive real number.

A Trading Costs

In this appendix, we present the full analysis of all possible trading costs in the financial market. The results are presented in a sequence of propositions and summarized in Table 5, which helps derive the optimal trading cost that can maximize the product market competition.

With a trading cost $k > 0$, the H-investor's expected profit from a position X_I is

$$U(H;X_I) = \frac{s}{3}\sum_{X_N=-1}^{1} v(H;d(X)) + \frac{X_I}{3}\sum_{X_N=-1}^{1}[v(H;d(X)) - P(X)] - |X_I|k \tag{1}$$

$$= \frac{s}{3}\sum_{X_N=-1}^{1} v(H;d(X)) + \frac{X_I}{3}\sum_{X_N=-1}^{1}[1-q(X)][v(H;d(X)) - v(L;d(X))] - |X_I|k. \tag{2}$$

When the H-investor does not hold an initial stake ($s = 0$),

$$U(H;X_I) = \frac{X_I}{3}\sum_{X_N=-1}^{1}[1-q(X)][v(H;d(X)) - v(L;d(X))] - |X_I|k. \tag{3}$$

Similarly, if imposing a trading cost k, L-investor's expected profit from a position X_I is

$$U(L;X_I) = \frac{s}{3}\sum_{X_N=-1}^{1} v(L;d(X)) + \frac{X_I}{3}\sum_{X_N=-1}^{1}[v(L;d(X)) - P(X)] - |X_I|k \tag{4}$$

$$= \frac{s}{3}\sum_{X_N=-1}^{1} v(L;d(X)) - \frac{X_I}{3}\sum_{X_N=-1}^{1} q(X)[v(H;d(X)) - v(L;d(X))] - |X_I|k. \tag{5}$$

When the L-investor does not hold an initial stake ($s = 0$),

$$U(L;X_I) = -\frac{X_I}{3}\sum_{X_N=-1}^{1} q(X)[v(H;d(X)) - v(L;d(X))] - |X_I|k. \tag{6}$$

We first consider the scenario where the informed investor does not have an initial stake. Proposition 1 then summarizes the equilibrium outcomes in cases where the entry cost is either extremely small or relatively small.

Proposition 1. *When the entry cost is extremely small or relatively small* $\left(k \in \left(0, \frac{1}{2}(V_H^e + V_L^e)\right]\right)$,

and the informed investor does not have an initial stake, his trading strategy will depend on the trading cost. Specifically,

1. *for any* $k \in \left(0, \frac{2(V_H - V_L)}{27}\right)$, *there is a unique equilibrium where the informed investor trades on both directions for sure, that is,* $\beta_H^b = \beta_L^s = 1$.

2. *for any* $k \in \left(\frac{2(V_H - V_L)}{27}, \frac{4(V_H - V_L)}{27}\right)$, *two equilibria coexist. The informed investor is certain to base their trading exclusively on one type of information, that is,* $\beta_H^b = \beta_H^s = 0, \beta_L^s = 1$, *or* $\beta_H^b = 1, \beta_L^b = \beta_L^s = 0$.

3. *for any* $k \in \left(\frac{4(V_H - V_L)}{27}, +\infty\right)$, *the unique equilibrium is that the informed investor will not engage in trading in either direction, that is,* $\beta_H^b = \beta_H^s = \beta_L^b = \beta_L^s = 0$.

According to Lemma 2, which states that the posterior belief $q(X)$ is increasing in the net trading volume X, it becomes evident from equation 6 that the L-investor never buys. Next, we proceed to analyze the informed investor's trading strategy when the entry cost is relatively small.

Consider the *Equilibrium* $\beta_H^b = \beta_L^s = 1$. In scenarios where the entry cost is extremely small, learning from the financial market does not alter the entrant's decision to enter. However, when the entry cost is relatively small, such learning leads to real effects (denoted as $d = 0$) when the net trading volume is -2 and -1.

To determine the H-investor's expected profit from buying, we refer to equation 3, which yields

$$U(H;1) = \frac{1}{6}(V_H^e - V_L^e) - k, \qquad 0 < E < \frac{1}{2}(V_L^e + V_H^e). \tag{7}$$

If the H-investor deviates to no trade, his expected profit is $U(H;0) = 0$ when $0 < E < \frac{1}{2}(V_L^e + V_H^e)$. By equation 3, his expected profit from selling is

$$U(H;-1) = \begin{cases} \frac{5}{6}(V_L^e - V_H^e) - k, & E \le V_L^e, \\ \frac{1}{6}(V_L^e - V_H^e) + \frac{2}{3}(V_L - V_H) - k, & V_L^e < E < \frac{1}{2}(V_L^e + V_H^e), \end{cases} \tag{8}$$

which is negative.

Similarly, solving for the L-investor's expected profit by equation 6 gives

$$U(L;-1) = \frac{1}{6}(V_H^e - V_L^e) - k, \qquad 0 < E < \frac{1}{2}(V_L^e + V_H^e). \tag{9}$$

If the L-investor deviates to no trade, his expected profit is $U(L;0) = 0$ when $0 < E < \frac{1}{2}(V_L^e + V_H^e)$.

Thus, the equilibrium where $\beta_H^b = \beta_L^s = 1$ is sustainable if $U(H;1) > U(H;0)$ and $U(L;-1) > U(L;0)$. This condition is satisfied for $0 < k < \frac{2(V_H - V_L)}{27}$.

Consider the *Equilibrium* $\beta_H^b = \beta_H^s = 0, \beta_L^s = 1$. In cases where the entry cost is extremely small, it results in no real effects. However, if the entry cost is relatively small, we observe $d = 1$ at $X = -2$.

The H-investor's expected profit from not trading is $U(H;0) = 0$ when $0 < E < \frac{1}{2}(V_L^e + V_H^e)$.

If the H-investor deviates to buying, his expected profit is

$$U(H;1) = \frac{1}{6}(V_H^e - V_L^e) - k, \qquad 0 < E < \frac{1}{2}(V_L^e + V_H^e). \tag{10}$$

If he deviates to selling, his expected profit is

$$U(H;-1) = \begin{cases} \frac{2}{3}(V_L^e - V_H^e) - k, & E \leq V_L^e, \\ \frac{1}{3}(V_L^e - V_H^e) + \frac{1}{3}(V_L - V_H) - k, & V_L^e < E < \frac{1}{2}(V_L^e + V_H^e), \end{cases} \tag{11}$$

which is negative.

Similarly, the L-investor's expected profit is given by

$$U(L;-1) = \frac{1}{3}(V_H^e - V_L^e) - k, \qquad 0 < E < \frac{1}{2}(V_L^e + V_H^e). \tag{12}$$

If the L-investor deviates to not trading, his expected profit is $U(L;0) = 0$ when $0 < E < \frac{1}{2}(V_L^e + V_H^e)$.

Thus, the equilibrium where $\beta_H^b = \beta_H^s = 0, \beta_L^s = 1$ is sustainable if $U(H,0) > U(H,1)$ and $U(L;-1) > U(L;0)$. This condition is satisfied for $k \in \left(\frac{2(V_{1H} - V_{1L})}{27}, \frac{4(V_{1H} - V_{1L})}{27}\right)$.

Consider *Equilibrium* $\beta_H^b = 1, \beta_L^b = \beta_L^s = 0$. When the entry cost is extremely small, there are no real effects. However, when the entry cost is relatively small, $d = 0$ when the net trading volume is -2 and -1.

The H-investor's expected profit is given by

$$U(H;1) = \frac{1}{3}(V_H^e - V_L^e) - k, \qquad 0 < E < \frac{1}{2}(V_L^e + V_H^e). \tag{13}$$

If the H-investor deviates to not trading, his expected profit is $U(H;0) = 0$ when $0 < E < \frac{1}{2}(V_L^e + V_H^e)$.

If he deviates to selling, his expected profit is

$$U(H;-1)=\begin{cases}\frac{5}{6}(V_L^e-V_H^e)-k, & E\leq V_L^e,\\ \frac{1}{6}(V_L^e-V_H^e)+\frac{2}{3}(V_L-V_H)-k, & V_L^e<E<\frac{1}{2}(V_L^e+V_H^e),\end{cases} \tag{14}$$

which is negative.

Similarly, the L-investor's expected profit from not trading is $U(L;0)=0$ when $0<E<\frac{1}{2}(V_L^e+V_H^e)$.

If the L-investor deviates to selling, his expected profit is

$$U(L;-1)=\frac{1}{6}(V_H^e-V_L^e)-k. \tag{15}$$

Thus, the equilibrium where $\beta_H^b=1,\beta_L^b=\beta_L^s=0$ is sustainable if $U(H;1)>U(H;0)$ and $U(L;0)>U(L;-1)$. This condition is satisfied for $k\in\left(\frac{2(V_{1H}-V_{1L})}{27},\frac{4(V_{1H}-V_{1L})}{27}\right)$.

Consider *Equilibrium* $\beta_H^b=\beta_H^s=0,\beta_L^b=\beta_L^s=0$. When the entry cost is extremely small, there is no real effects. However, when the entry cost is relatively small, $d=0$ at $X=-2$.

The H-investor's expected profit from not trading is $U(H;0)=0$ when $0<E<\frac{1}{2}(V_L^e+V_H^e)$.

If the H-investor deviates to buying, his expected profit is

$$\frac{1}{3}(V_H^e-V_L^e)-k,\qquad 0<E<\frac{1}{2}(V_L^e+V_H^e). \tag{16}$$

If he deviates to selling, his expected profit is

$$U(H;-1)=\begin{cases}\frac{2}{3}(V_L^e-V_H^e)-k, & E\leq V_L^e,\\ \frac{1}{3}(V_L^e-V_H^e)+\frac{1}{3}(V_L-V_H)-k, & V_L^e<E<\frac{1}{2}(V_L^e+V_H^e),\end{cases} \tag{17}$$

which is negative.

Similarly, the L-investor's expected profit from not trading is $U(L;0)=0$ when $0<E<\frac{1}{2}(V_L^e+V_H^e)$.

If the L-investor deviates to selling, his expected profit is

$$U(L;-1)=\frac{1}{3}(V_H^e-V_L^e)-k,\qquad 0<E<\frac{1}{2}(V_L^e+V_H^e). \tag{18}$$

Thus, the equilibrium $\beta_H^b=\beta_H^s=0,\beta_L^b=\beta_L^s=0$ is sustainable if $U(H;0)>U(H;1)$ and $U(L;0)>U(L;-1)$. This condition is satisfied for $k\in\left(\frac{4(V_{1H}-V_{1L})}{27},+\infty\right)$.

Following the same logic, when the entry cost is extremely large or relatively large, there are

multiple equilibrium outcomes. Proposition 2 characterizes the equilibrium results.

Proposition 2. *When the entry cost is extremely large or relatively large* $\left(k \in \left(\frac{1}{2}(V_H^e + V_L^e), +\infty\right)\right)$*, and the informed investor does not have an initial stake, his trading strategy will depend on the trading cost. In particular,*

1. *for any* $k \in \left(0, \frac{V_{1H}-V_L}{6}\right)$*, a unique equilibrium is established wherein the informed investor will surely trade in both directions, characterized by* $\beta_H^b = \beta_L^s = 1$*.*

2. *for any* $k \in \left(\frac{V_{1H}-V_L}{6}, \frac{V_{1H}-V_L}{3}\right)$*, two equilibria coexist. In these equilibria, the informed investor will surely trade based on only one type of information. Specifically, this means either* $\beta_H^b = \beta_H^s = 0, \beta_L^s = 1$*, or* $\beta_H^b = 1, \beta_L^b = \beta_L^s = 0$*.*

3. *for any* $k \in \left(\frac{V_{1H}-V_L}{3}, +\infty\right)$*, there exists a unique equilibrium where the informed investor surely does not engage in trading in either direction, that is,* $\beta_H^b = \beta_H^s = \beta_L^b = \beta_L^s = 0$*.*

We now turn our attention to the scenario in which the informed investor holds an initial stake ($s = 1$). In cases where the entry cost is either extremely large or extremely small, the equilibrium outcomes mirror those observed when the informed investor does not have an initial stake. This similarity arises because, with extreme values of entry cost, learning from the financial market does not influence the entrant's entry decision, and consequently, does not affect the informed investor's equilibrium trading strategy. In our subsequent analysis, we will first examine the scenario where the entry cost is relatively small, followed by an exploration of the scenario where the entry cost is relatively large.

Proposition 3. *When the informed investor holds an initial stake* ($s = 1$) *and the entry cost is relatively small, multiple equilibria emerge, each contingent upon the varying trading costs.*

1. *for any* $k \in \left(0, \frac{2(V_{1H}-V_L)}{27}\right)$*, a unique equilibrium exists with real effects:* $d = 0$ *at* $X = 0$*, and* $d = 1 - d_I^* \in (0, 1)$ *where* $d_I^* = \frac{3V_H+2V_L+27k}{5V_H}$ *at* $X = -1$*. In this equilibrium, the* H*-investor buys with a probability of* $\beta_H^b = \frac{V_H^e+V_L^e-2E}{V_H^e-E}$*, while the* L*-investor surely sells.*

2. *for any* $k \in \left(\frac{2(V_{1H}-V_L)}{27}, \frac{4(V_{1H}-V_L)}{27} + \frac{5V_L}{27}\right)$*, there exists a unique equilibrium characterized by a real effect of* $d = 0$ *at* $X = -2$*. In such an equilibrium, the* H*-investor does not engage in trading* ($\beta_H^b = \beta_H^s = 0$)*, while the* L*-investor surely sells* ($\beta_L^s = 1$)*.*

3. *for any* $k \in \left(\frac{4(V_{1H}-V_L)}{27} + \frac{5V_L}{27}, +\infty\right)$*, a unique equilibrium exists, characterized by real effects with* $d = 0$ *at* $X = -2$*. In this equilibrium, the informed investor refrains from trading in either direction, indicated by* $\beta_H^b = \beta_H^s = \beta_L^b = \beta_L^s = 0$*.*

Consider the *Equilibrium* $\beta_H^b = \beta_H^s = 0, \beta_L^b = \beta_L^s = 0$. In situations where the entry cost is relatively small, we observe $d = 0$ at $X = -2$.

Under these conditions, the expected profit for the H-investor from not trading is denoted as $U(H;0) = V_H^e$.

If the H-investor deviates to buying, his expected profit is

$$U(H;1) = V_H^e + \frac{1}{3}(V_H^e - V_L^e) - k. \tag{19}$$

If he deviates to selling, his expected profit is

$$U(H;-1) = \frac{1}{3}V_H + \frac{2}{3}V_H^e + \frac{1}{3}(V_L - V_H) + \frac{1}{3}(V_L^e - V_H^e) - k. \tag{20}$$

Similarly, the L-investor's expected profit from no trade is $U(L;0) = V_L^e$.

If he deviates to selling, his expected profit is

$$U(L;-1) = \frac{1}{3}V_L + \frac{2}{3}V_L^e + \frac{1}{3}(V_H^e - V_L^e) - k. \tag{21}$$

Therefore, the equilibrium where $\beta_H^b = \beta_H^s = 0, \beta_L^b = \beta_L^s = 0$, with real effects $d = 0$ at $X = -2$, is sustainable if $U(H;0) > U(H;1), U(H;0) > U(H;-1)$, and $U(L;0) > U(L;-1)$. This condition is satisfied for $k \in \left(\frac{4(V_{1H} - V_L)}{27} + \frac{5V_L}{27}, +\infty\right)$.

Consider the *Equilibrium* $\beta_H^b = \beta_H^s = 0, \beta_L^s = 1$. In cases where the entry cost is relatively small, the real effect is $d = 0$ for $X = -2$.

In this scenario, the expected profit for the H-investor, who chooses not to trade, is $U(H;0) = V_H^e$.

If the H-investor deviates to buying, his expected profit is

$$U(H;1) = V_H^e + \frac{1}{6}(V_H^e - V_L^e) - k. \tag{22}$$

If he deviates to selling, his expected profit is

$$U(H;-1) = \frac{1}{3}V_H + \frac{2}{3}V_H^e + \frac{1}{3}(V_L - V_H) + \frac{1}{3}(V_L^e - V_H^e) - k. \tag{23}$$

Similarly, the L-investor's expected profit from selling is

$$U(L;-1) = \frac{1}{3}V_L + \frac{2}{3}V_L^e + \frac{1}{3}(V_H^e - V_L^e) - k. \tag{24}$$

If he deviates to no trade, his expected profit is $U(L;0) = V_H^e$.

Therefore, if $U(H;0) > U(H;1), U(H;0) > U(H,-1)$ and $U(L;-1) > U(L;0)$, the equilibrium with $\beta_H = 1, \beta_L = 0$ and the real effects $d = 0$ at $X = -2$ is sustainable. This condition is met for $k \in \left(\frac{2(V_{1H}-V_L)}{27}, \frac{4(V_{1H}-V_L)}{27} + \frac{5V_L}{27}\right)$.

Consider the *Equilibrium* $\beta_H^b \in (0,1), \beta_L = 1$. The entrant's posterior belief and corresponding entry decision for each net trading volume are detailed in

X	-2	-1	0	1	2
q	0	$\frac{1-\beta_H^b}{2-\beta_H^b}$	$\frac{1}{2}$	1	1
d	0	d_I^*	1	1	1

Table 7: Posterior Belief and Entry Decision with Trading Cost

The H-investor's expected profit from buying in the financial market is

$$U(H;1) = V_H^e + \frac{1}{6}(V_H^e - V_L^e) - k, \tag{25}$$

and his expected profit from no trade is

$$U(H;0) = \frac{2}{3}V_H^e + \frac{1}{3}d_I^* V_H^e + \frac{1}{3}(1-d_I^*)V_H. \tag{26}$$

Solving from the H-investor's indifferent condition $\big(U(H;1) = U(H;0)\big)$ gives

$$d_I^* = \frac{3V_H + 2V_L + 27k}{5V_H}.$$

Plugging $q(-1) = \frac{1-\beta_H^b}{2-\beta_H^b}$ into the entrant's indifferent condition $\big(q(-1)V_H^e + (1-q(-1))V_L^e = E\big)$ gives

$$\beta_H^b = \frac{V_H^e + V_L^e - 2E}{V_H^e - E}.$$

Finally, we turn our analysis to the equilibrium outcomes in scenarios where the entry cost is relatively large. These outcomes are characterized in Proposition 4.

Proposition 4. *When the informed investor possesses an initial stake ($s = 1$), and the entry cost is relatively large, multiple equilibria emerge, each influenced by varying trading costs.*

1. *for any $k \in \left(0, \frac{V_{1H}-V_{1L}}{3} + \frac{5V_L}{27}\right)$, a unique equilibrium is established, characterized by real effects $d = 1$ when the net trading volume is 1 and 2. In this equilibrium, the H-investor abstains from trading ($\beta_H^b = \beta_H^s = 0$), while the L-investor surely sells ($\beta_L^s = 1$).*

2. *for any* $k \in \left(\frac{V_{1H}-V_{1L}}{3}, +\infty\right)$*, there exists a unique equilibrium characterized by real effects* $d = 1$ *at* $X = 2$*. . In this equilibrium, the informed investor definitively does not engage in trading in either direction, as indicated by* $\beta_H^b = \beta_H^s = \beta_L^b = \beta_L^s = 0$*.*

Consider the *Equilibrium* $\beta_H^b = \beta_H^s = 0, \beta_L^b = \beta_L^s = 0$. In situations where the entry cost is relatively large, the real effect is $d = 1$ at $X = 2$.

The H-investor's expected profit from no trade is $U(H;0) = V_H$.

If he deviates to buying, his expected profit is

$$U(H;1) = \frac{1}{3}V_H^e + \frac{2}{3}V_H + \frac{1}{3}(V_H - V_L) - k. \tag{27}$$

If he deviates to selling, his expected profit is

$$U(H;-1) = V_H + \frac{2}{3}(V_L - V_H) - k. \tag{28}$$

Similarly, the L-investor's expected profit from no trade is $U(L;0) = V_L$.

If he deviates to selling, his expected profit is

$$U(L;-1) = V_L + \frac{1}{3}(V_H - V_L) - k. \tag{29}$$

Therefore, if $U(H;0) > U(H,1), U(H;0) > U(H;-1)$ and $U(L;0) > U(L;-1)$, the equilibrium characterized by $\beta_H^b = \beta_H^s = 0$ and $\beta_L^b = \beta_L^s = 0$, with real effects $d = 1$ at $X = 2$, is sustainable. This condition is satisfied when $k \in \left(\frac{V_{1H}-V_{1L}}{3}, +\infty\right)$.

Consider the *Equilibrium* $\beta_H^b = \beta_H^s = 0, \beta_L^s = 1$. In scenarios where the entry cost is relatively large, the real effect is $d = 1$ at net trading volumes of 1 and 2.

In such an equilibrium, the H-investor's expected profit from no trade is $U(H;0) = \frac{2}{3}V_H + \frac{1}{3}V_H^e$.

If he deviates to buying, his expected profit is

$$U(H;1) = \frac{1}{3}V_H + \frac{2}{3}V_H^e + \frac{1}{6}(V_H - V_L) - k. \tag{30}$$

If he deviates to selling, his expected profit is

$$U(H;-1) = V_H + \frac{2}{3}(V_L - V_H). \tag{31}$$

Similarly, the L-investor's expected profit from selling is

$$U(L;-1) = V_L + \frac{1}{3}(V_H - V_L) - k. \tag{32}$$

If he deviates to no trade, his expected profit is $U(L;0) = \frac{2}{3}V_L + \frac{1}{3}V_L^e$.

Therefore, if $U(H;0) > U(H;1), U(H;0) > U(H;-1)$ and $U(L;-1) > U(L;0)$, then the equilibrium characterized by $\beta_H^b = \beta_H^s = 0$ and $\beta_L^s = 1$, with real effects $d = 1$ at net trading volumes of 1 and 2, is sustainable. This condition is met when $k \in \left(0, \frac{V_{1H}-V_{1L}}{3} + \frac{5V_{1L}}{27}\right)$.

The trading strategy of the informed investor, when holding an initial stake ($s = 1$), is concisely summarized in Table 8.

Trading cost \ Entry cost	Extremely Small	Relatively Small	Relatively Large	Extremely Large
$k = 0$	$\beta_H^b = \beta_L^s = 1$	$\beta_H^b = \frac{(V_H^e+V_L^e)-2E}{V_H^e-E}, \beta_L^s = 1$	$\beta_H^{b,s} = 0, \beta_L^s = 1$	$\beta_H^b = \beta_L^s = 1$
$k < \frac{2(V_H-V_L)}{27}$	$\beta_H^b = \beta_L^s = 1$	$\beta_H^b = \frac{(V_H^e+V_L^e)-2E}{V_H^e-E}, \beta_L^s = 1$	$\beta_H^{b,s} = 0, \beta_L^s = 1$	$\beta_H^b = \beta_L^s = 1$
$\frac{2(V_H-V_L)}{27} < k < \frac{4(V_H-V_L)}{27}$	$\beta_H^b = 1, \beta_L^{b,s} = 0$ $\beta_H^{b,s} = 0, \beta_L^s = 1$	$\beta_H^{b,s} = 0, \beta_L^s = 1$	$\beta_H^{b,s} = 0, \beta_L^s = 1$	$\beta_H^b = \beta_L^s = 1$
$\frac{4(V_H-V_L)}{27} < k < \frac{V_H-V_L}{6}$	$\beta_H^{b,s} = \beta_L^{b,s} = 0$	$\beta_H^{b,s} = \beta_L^{b,s} = 0$	$\beta_H^{b,s} = 0, \beta_L^s = 1$	$\beta_H^b = \beta_L^s = 1$
$\frac{V_H-V_L}{6} < k < \frac{V_H-V_L}{3}$	$\beta_H^{b,s} = \beta_L^{b,s} = 0$	$\beta_H^{b,s} = \beta_L^{b,s} = 0$	$\beta_H^{b,s} = 0, \beta_L^s = 1$	$\beta_H^b = 1, \beta_L^{b,s} = 0$ $\beta_H^{b,s} = 0, \beta_L^s = 1$
$\frac{V_H-V_L}{3} < k$	$\beta_H^{b,s} = \beta_L^{b,s} = 0$	$\beta_H^{b,s} = \beta_L^{b,s} = 0$	$\beta_H^{b,s} = \beta_L^{b,s} = 0$	$\beta_H^{b,s} = \beta_L^{b,s} = 0$

Table 8: Trading Cost and Informed Investor's Trading Strategy ($s = 1$)

Building on the informed investor's trading strategy, the entrant's ex-ante entry probability is determined using equation 18. Consequently, to maximize product market competition, a trading cost $k \in \left(\frac{V_H^e-V_L^e}{27}, \frac{V_H^e-V_L^e}{6}\right)$ should be imposed for any given entry cost and initial stake.

Q.E.D.

B Continuous Initial Stake

In the paper, we focus on the case where the informed investor holds one restricted share as an initial stake (i.e., $s = 1$) and take the case without initial state ($s = 0$) as the benchmark. In this appendix, instead of setting $s = 1$, we allow s to vary continuously within the range $(0, +\infty)$. This variation helps us understand the trading strategy of the informed investor.

We first consider the L-investor's trading strategy and find it to be independent of both the value of s and entry cost. This independence is due to two reasons: selling conveys to the potential entrant that the product demand is low, which might deter her entry, and it allows for

profit generation through trading on information.

We then analyse the H-investor's trading strategy. Firstly, we find that for extremely large or extremely small entry costs, the H-investor will buy for sure, regardless of the value of s. This is because the H-investor knows that he cannot influence the entrant's market entry decision. Hence, his objective is to maximize trading profits by trading on information.

Secondly, we examine scenarios with relatively small entry costs. In these cases, the H-investor randomizes between buying and not trading. Moreover, the likelihood of the H-investor buying decreases as the entry cost increases. Consistent with our main analysis, given that the L-investor sells for sure, the H-investor cannot solely buy or not trade. Nor is it feasible for the H-investor to deviate to selling. Intuitively, if the informed investor sells for sure, regardless of his information type, the financial market becomes least informative and reveals no information to the entrant. Consequently, with a relatively small entry cost, the entrant will enter the market for sure, even if she observes a large negative net trading volume ($X = -2$). Thus, she has incentive to deviate to maximize her trading profit.

Finally, when considering the H-investor's strategy at relatively large entry costs, specifically when E lies in the range $\left(\frac{V_H^e+V_L^e}{2}, V_H^e\right)$, we find that the H-investor's trading strategies vary depending on the initial stake value. Proposition 5 summarizes how the H-investor's trading strategy changes with the value of the initial stake when the entry cost is relatively large.

Proposition 5. *When the entry cost is relatively large (that is, $E \in \left(\frac{V_H^e+V_L^e}{2}, V_H^e\right)$), given that the L-investor surely sells, the H-investor's trading strategy varies with the initial stake value. Specifically,*

1. *for any $s \in \left(0, \frac{9(V_H-V_L)}{10V_H}\right]$, the H-investor buys for sure.*
2. *for any $s \in \left(\frac{9(V_H-V_L)}{10V_H}, \frac{27(V_H-V_L)}{10V_H}\right]$, the H-investor does not trade.*
3. *for any $s \in \left(\frac{27(V_H-V_L)}{10V_H}, \frac{18(V_H-V_L)}{5V_H}\right)$, the H-investor may either not trade or sell for sure.*
4. *for any $s \in \left[\frac{18(V_H-V_L)}{5V_H}, +\infty\right)$, the H-investor surely sells.*

When $s \in \left(0, \frac{9(V_H-V_L)}{10V_H}\right]$, the initial stake value is relatively low. Therefore, the H-investor buys for sure to maximize his trading profit. For $s \in \left(\frac{9(V_H-V_L)}{10V_H}, \frac{18(V_H-V_L)}{5V_H}\right)$, the initial stake value is relatively high. Since the entrant will enter the market when observing positive net trading volumes, the informed investor will not trade to maximize the likelihood of deterring entry and thus maximizing his initial stake value. For $s \in \left(\frac{27(V_H-V_L)}{10V_H}, +\infty\right)$, the entrant will enter the market when observing positive net trading volumes. Therefore, the H-investor, when holding a relatively high initial stake, chooses to sell to completely deter entry. Note that the

situation becomes more complex when $s \in \left(\frac{27(V_H-V_L)}{10V_H}, \frac{18(V_H-V_L)}{5V_H}\right)$. Here, multiple equilibria can coexist, which is a consequence of a self-fulfilling prophecy. In such scenarios, the H-investor's decision to sell or not trade can be influenced by market maker's and entrant's expectations, creating a feedback loop that stabilizes different equilibria under similar conditions.

We present the proof of Proposition 5 below.

Proof of Proposition 5:

We first consider the *Equilibrium* $\beta_H^b = 1, \beta_L^s = 1$. In situations where the entry cost is relatively large, the entrant enters the market when observing $X \in \{1, 2\}$.

The H-investor's expected profit from buying is $U(H;1) = \frac{2}{3}sV_H^e + \frac{1}{3}sV_H + \frac{1}{6}(V_H - V_L)$. If he deviates to no trade, his expected profit is $U(H;0) = \frac{2}{3}sV_H + \frac{1}{3}sV_H^e$. If he deviates to selling, his expected profit is $U(H;-1) = sV_H + \frac{1}{6}(V_L - V_H)$. Similarly, the L-investor's expected profit from selling is $U(L;-1) = sV_L + \frac{1}{6}(V_H - V_L)$. If he deviates to no trade, his expected profit is $U(L;0) = \frac{2}{3}sV_L + \frac{1}{3}sV_L^e$. If he deviates to buying, his expected profit is $U(L;1) = \frac{2}{3}(V_L^e - V_H^e + sV_L^e) + \frac{1}{3}sV_L + \frac{1}{6}(V_L - V_H)$. Therefore, if $U(H;1) > U(H;0)$, $U(H;1) > U(H;-1)$, $U(L;-1) > U(L;0)$, and $U(L;-1) > U(L;1)$, then the equilibrium characterized by $\beta_H^b = \beta_L^s = 1$, and entrant enters only for $X \in \{1, 2\}$ is sustainable. This condition is satisfied when $s \in \left(0, \frac{9(V_H-V_L)}{10V_H}\right]$.

Next, consider the *Equilibrium* $\beta_H^b = \beta_H^s = 0, \beta_L^s = 1$. In situations where the entry cost is relatively large, the entrant enters the market when observing $X \in \{1, 2\}$.

The H-investor's expected profit from no trade is $U(H;0) = \frac{22}{27}sV_H$. If he deviates to buying, his expected profit is $U(H;1) = \frac{17}{27}sV_H + \frac{1}{6}(V_H - V_L)$. If he deviates to selling, his expected profit is $U(H;-1) = sV_H + \frac{2}{3}(V_L - V_H)$. Similarly, the L-investor's expected profit from selling is $U(L;-1) = sV_L + \frac{1}{3}(V_H - V_L)$. If he deviates to no trade, his expected profit is $U(L;0) = \frac{2}{3}sV_L + \frac{1}{3}sV_L^e$. If he deviates to buying, his expected profit is $U(L;1) = \frac{2}{3}(sV_L^e + V_L^e - V_H^e) + \frac{1}{3}sV_L + \frac{1}{6}(V_L - V_H)$. Therefore, if $U(H;0) > U(H;1)$, $U(H;0) > U(H;-1)$, $U(L;-1) > U(L;0)$, and $U(L;-1) > U(L;1)$, then the equilibrium characterized by $\beta_H^b = \beta_H^s = 0, \beta_L^s = 1$, and entrant enters only for $X \in \{1, 2\}$ is sustainable. This condition is satisfied when $s \in \left(\frac{9(V_H-V_L)}{10V_H}, \frac{18(V_H-V_L)}{5V_H}\right)$.

Finally, consider the *Equilibrium* $\beta_H^s = \beta_L^s = 1$. In situations where the entry cost is relatively large, the entrant enters the market when observing $X \in \{1, 2\}$.

The H-investor's expected profit from selling is $U(H;-1) = sV_H + \frac{1}{2}(V_L - V_H)$. If he deviates to no trade, his expected profit is $U(H;0) = \frac{22}{27}sV_H$. If he deviates to buying, his expected profit is $U(H;1) = \frac{17}{27}sV_H + \frac{1}{6}(V_H - V_L)$. Similarly, the L-investor's expected profit from selling is $U(L;-1) = sV_L + \frac{1}{2}(V_H - V_L)$. If he deviates to no trade, his expected profit

is $U(L;0) = \frac{2}{3}sV_L + \frac{1}{3}sV_L^e$. If he deviates to buying, his expected profit is $U(L;1) = \frac{2}{3}(V_L^e - V_H^e + sV_L^e) + \frac{1}{3}sV_L + \frac{1}{6}(V_L - V_H)$. Therefore, if $U(H;-1) > U(H;0)$, $U(H;-1) > U(H;1)$, $U(L;-1) > U(L;0)$, and $U(L;-1) > U(L;1)$, then the equilibrium characterized by $\beta_H^s = \beta_L^s = 1$, and entrant enters only for $X \in \{1,2\}$ is sustainable. This condition is satisfied when $s \in \left(\frac{27(V_H - V_L)}{10V_H}, +\infty\right)$.

Q.E.D.

The informed investor's trading strategy with relatively large entry cost is summarized in Figure 7. When the entry cost is relatively large, while the L-investor sells for sure, the H-investor's trading strategy varies with the initial stake value.

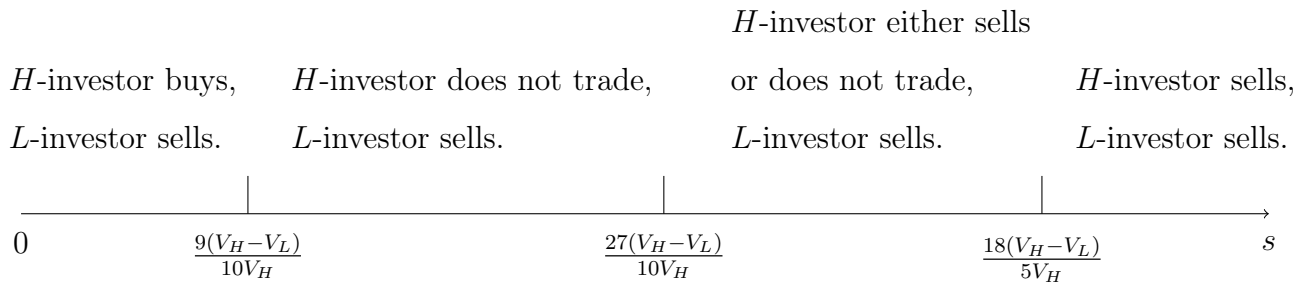


Figure 7: Informed Investor Trading Strategy with Relatively Large Entry Cost