Secondary Markets for VC-Backed Startup Equity*

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Abstract

This paper provides the first systematic evidence on secondary markets for equity in VC-backed startups, a fast-growing segment of private capital markets. Using proprietary data from a large market maker, we show that shares typically trade at a discount to prior venture capital valuations, with discounts narrowing when buyer demand is strong. We find that market activity responds to new information: in an event study, order flow and prices react quickly to VC financing events. Furthermore, secondary prices are forward-looking and predict future VC valuations. These signals are partially incorporated by mutual funds valuing their startup holdings. By providing both liquidity and price discovery, secondary markets are becoming an integral part of private capital markets, and their importance is likely to grow as startups remain private longer.

JEL classification: G23, G24, G32.

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A growing share of economically important firms remain private for extended periods, amplifying three frictions in private markets: access, illiquidity, and limited information.[1] For outside investors, access to high-growth firms is limited; for employees and early investors, wealth remains locked in illiquid equity; and for investors, valuing those holdings without reliable market prices is difficult. Specialized secondary markets have emerged to connect buyers and sellers and may help alleviate these frictions.[2] Despite their growing role, we know little about how these markets function or whether their prices convey meaningful information about firm value.

In this paper, we provide the first systematic evidence on supply, demand, and price formation in the secondary market for startup shares. Using proprietary order-level data from a leading platform, we show that secondary market prices typically trade at a discount to the prices from prior venture capital (VC) rounds, with discounts narrowing as liquidity improves and around financing events. These prices are informative: they predict subsequent changes in valuations at future venture capital rounds and are partially incorporated into mutual fund marks. Thus, although this market is thin and opaque, it already provides a degree of liquidity and price discovery. As these markets continue to grow, their ability to do both is likely to improve.

Our analysis draws on three complementary datasets that together shine a light on an otherwise opaque market. We observe 11,925 orders for 1,474 VC-backed private companies between 2021 and 2024, including both executed trades and buy and sell orders indicating interest, enabling us to study supply, demand, and pricing. Each order records the firm, timing, type, and, when available, the quoted price per share. We link these data to granular venture capital financing histories that include round-level prices per share for 772 companies, which allows us to benchmark secondary market prices against the most recent VC valuation. Finally,

[1] A growing literature studies the causes behind this trend, including the expansion of private capital and regulatory changes (e.g., Gao, Ritter, and Zhu 2013; Doidge, Karolyi, and Stulz 2017; de Fontenay 2017; Kahle and Stulz 2017; Ewens and Farre-Mensa 2020). For a survey on the differences between the firms that stay private for longer and their public counterparts, see Lowry (2024).

[2] Related work studies secondary markets for private equity fund stakes and equity crowdfunding (Nadauld et al. 2019; Boyer et al. 2023; Lukkarinen and Schwienbacher 2023). Our setting is distinct in that we focus on a market for startup shares. While these markets share similar liquidity-provision motives, they differ in structure and market participants.

we incorporate 21,384 quarterly valuations of mutual fund holdings in private firms, enabling us to test whether institutional investors respond to price signals emerging from this market.

The data reveal a thin but economically meaningful market. Activity is concentrated in later-stage firms, and although many orders simply express interest, those with quoted prices provide benchmarks for the effective cost of liquidity. In this market, sellers are typically employees or early investors, so prices likely reflect both liquidity needs and information asymmetries. Standard adverse selection arguments predict discounts when sellers may have private information, while strong investor demand for scarce shares in high-growth startups can generate premiums. On average, secondary prices reflect an 11% discount to the most recent VC valuation, but this headline figure masks important variation: prices are higher when buyer interest outweighs seller interest, when other participants indicate high valuations, and when preferred rather than common equity is targeted. By contrast, secondary market prices do not depend on valuation momentum between VC rounds, suggesting that secondary market prices provide independent signals rather than simply extrapolating past VC valuations.

An interesting question is whether activity responds to new firm-level information, and if so, how quickly that happens. The empirical challenge is to separate the response to firm news from time-varying market conditions. To isolate the effect of information arrival, we implement a stacked difference-in-differences design that compares firms experiencing VC financing events to similar matched firms without such events in an event window. We find that both order flow and prices increase around financing rounds relative to matched controls, driven primarily by buyers. These results indicate that, even in a thin and opaque market, investors actively respond to the arrival of new information about firm value.

A related question is whether secondary prices contain information about firms' future valuations. A priori, it is not obvious that secondary prices should reflect information beyond the most recent VC round pricing. On the one hand, most firms see only sporadic activity, and the lack of publicly available information raises doubts about whether participants can improve meaningfully on prior VC pricing. Quotes may instead reflect opportunistically low bids, liquidity-constrained sellers willing to accept steep discounts, or overly optimistic sellers

posting aspirational asks. On the other hand, there are both explicit and reputational costs of not being a serious counterparty, and participants may aggregate fragments of private information and limited public signals. Whether secondary market prices contain information matters for investors who must assign values to private holdings between infrequent VC rounds, which are typically the only source of price signals.

To assess informativeness, we test whether higher prices in secondary markets predict larger percentage increases in startups' post-money valuations. We find that they do. Interestingly, the predictive power is not limited to executed trades but is also evident in buy and sell orders. It persists even when focusing on orders placed more than three months before the next VC round, and is stronger for signals originating from executives and institutional investors. This suggests that secondary market prices capture forward-looking assessments rather than simply reflecting opportunistic or distressed participants.

Having established that secondary market prices are informative, we next examine whether investors actually use this information. Specifically, we study whether mutual funds adjust their valuations of private holdings in response to price signals from the secondary market. Mutual funds are a natural setting for this test: they are increasingly invested in private firms (Kwon, Lowry, and Qian 2020), are required to redeem shares daily at stated NAV, yet face the same opacity and infrequent valuation events that challenge all market participants. Ex ante, it is not clear that they will rely on secondary market data. While these prices could offer valuable signals between infrequent financing rounds, the market is thin, particularly for executed trades, and scattered quotes or outlier prices may not be considered reliable indicators of fundamental value.

Our evidence shows that mutual funds incorporate signals from secondary market prices, but only partially. Funds hold valuations of their startup holdings constant in roughly one-third of quarters. Revisions are more likely when secondary market prices diverge from prior valuations and move in the direction implied by those prices. This response appears for both executed trades and submitted buy and sell orders, suggesting that funds treat secondary market activity as a relevant input even when transactions are sparse. However, the adjustment is incomplete:

higher secondary prices predict larger gaps between future VC round prices and current fund marks even after revisions, indicating that funds move in the right direction but do not fully incorporate these price signals. This evidence complements prior findings that mutual funds imperfectly account for differences in liquidation rights across share classes (Agarwal et al. 2025). Overall, the results show that secondary market prices are not merely informative in principle but are actively used by institutional investors.

While this paper is the first to systematically study price formation and trading activity on the secondary market for startup shares, several caveats are worth noting. Our analysis focuses on the selected subset of startups that attract attention in this market: large, relatively mature, and successful. These are, however, precisely the firms that matter for the questions we study—they are the companies that attract institutional capital, and where employees have had time to vest their equity, making illiquidity a meaningful source of lock-in beyond merely vesting periods (Bias 2021). A further limitation is that because of the recency of these markets, our data cover only a short time period, which restricts what we can say about how this market responds to broader macroeconomic cycles or structural shifts in financing conditions.

Overall, our findings suggest that secondary markets for startup shares are emerging as an important part of the financial market for private firms. In addition to offering liquidity solutions and access to investment opportunities for outside investors, prices in these markets are informative about firm value and are used by institutional investors when valuing their holdings. Furthermore, the existence of well-functioning secondary markets is likely to increase employees' willingness to accept equity-based compensation ex ante and may expand the set of investors willing to participate in financing startups (Maurin, Robinson, and Strömberg 2023).

Our paper contributes to several strands of the literature. A growing body of work has documented the growing economic weight of private markets and the lengthening timelines before companies go public (Doidge, Karolyi, and Stulz 2017; Ewens and Farre-Mensa 2020). This trend has shifted investment opportunities away from public exchanges and into private markets, prompting institutional investors to shift their investments to gain exposure (Kwon, Lowry, and Qian 2020; Chernenko, Lerner, and Zeng 2021). Our paper contributes to this

literature by studying a market development that has emerged to partially fill this gap: the secondary market for startup shares. These markets provide both liquidity for early shareholders and price signals about firm value, a dual role that is likely to grow in importance as the market deepens and startups remain private for longer. Recent work by Bisotto (2025) examines which startups become actively traded on these markets, and our order-level data allow us to study the functioning of this market, including drivers of demand, price formation, and the informational content of secondary market prices.

These developments also carry implications for traditionally public investors who increasingly allocate capital to startups but need to update valuations of these illiquid holdings with complex share structures (Kwon, Lowry, and Qian 2020; Gornall and Strebulaev 2020; Huang et al. 2020; Chernenko, Lerner, and Zeng 2021; Agarwal et al. 2023; Imbierowicz and Rauch 2024; Agarwal et al. 2025). Our results suggest that secondary markets help reduce these frictions by providing price signals that institutional investors incorporate when revising their marks. Investors in venture capital funds, whose returns often depend on "home runs," also stand to benefit from more transparent, market-based indications of startup value, which could reduce concerns about subjective NAV valuations (Barber and Yasuda 2017; Brown, Gredil, and Kaplan 2019). While still nascent, these markets are poised to become an increasingly important reference point for investors seeking to benchmark valuations in an otherwise opaque asset class.

The trend toward reducing illiquidity in traditionally non-tradable assets is not unique to startup shares. A secondary market has developed for private equity fund stakes, allowing investors to exit before fund liquidation (Albuquerque et al. 2018; Nadauld et al. 2019; Boyer et al. 2023; Maurin, Robinson, and Strömberg 2023), and also for equity crowdfunding (Lukkarinen and Schwienbacher 2023). Our finding that price signals in startup share markets are informative parallels the assumption underpinning Boyer et al. (2023), who use secondary market prices to construct a private equity index. Despite these similarities, the two markets are structurally distinct. Private equity funds have contractually finite lives, providing a known endpoint even if the precise timing of distributions remains uncertain (Robinson and Sensoy 2016). By contrast,

startups can remain private indefinitely so long as they continue attracting capital or generating cash flows, leaving employees and investors with far less clarity about when they will be able to liquidate shares. The presence of institutional investors such as mutual funds—obligated to offer daily liquidity—further differentiates the investor base and heightens the need for price discovery. These distinctions underscore that the secondary market for startup shares occupies a unique role in the evolving private-capital ecosystem.

The remainder of the paper is organized as follows: Section 1 provides institutional details on secondary markets and compares them with public equity markets. Section 2 describes our data. Section 3 outlines our empirical strategy and presents our key findings. Section 4 concludes.

1. Institutional Background

Shares of venture-backed startups trade in a decentralized over-the-counter market shaped by both securities regulation and firm-level transfer restrictions. Because these shares are issued in private placements, resales must rely on exemptions such as Rule 144, Rule 144A, or Section 4(a)(7), which in practice limit participation primarily to accredited investors and qualified institutions. Company charters typically impose additional constraints that give the issuer and existing investors control over who can enter the cap table. Common provisions include rights of first refusal, co-sale rights, or requirements to seek approval for sales.

Seller participation differs from public markets, as startup equity stakes are primarily held by founders, employees, and venture capital investors (Gornall and Strebulaev 2020). As a result, supply in secondary markets is largely generated by insiders and other concentrated holders rather than diversified investors. Larcker, Tayan, and Watts (2018) document that many sellers are employees who may seek to liquidate concentrated wealth or finance consumption, or early investors seeking an exit. At the same time, firm-level transfer restrictions limit when and how these shareholders are able to transact, impeding the conversion of trading interest into completed transactions.

These features make secondary transactions fundamentally different from trading on a public exchange. Transfers are negotiated bilaterally, require company consent, and involve customized documentation, leading to long and uncertain settlement timelines. Furthermore, the private status of these firms implies that trading takes place with limited publicly available information. As a result, trading is sporadic and market depth remains low. Prices are not continuously updated through a centralized order book but instead emerge from dispersed negotiations, often anchored to the most recent venture capital round.

Panel A of Figure 1 illustrates the role of specialized broker-dealer platforms such as Forge Global, EquityZen, or Nasdaq Private Markets in mitigating frictions in this market. These intermediaries aggregate buyer and seller interest, facilitate compliance and settlement, and consolidate the limited information available about private issuers, including prior VC rounds, mutual fund marks, 409A valuations, news, and market activity. Larcker, Tayan, and Watts (2018) describe how sellers list shares through such platforms, with intermediaries assisting counterparties in navigating company approval, rights-of-first-refusal procedures, and transaction requirements once a match is found. However, these platforms do not eliminate the underlying constraints: participation remains restricted, information about issuers is limited, and many posted orders do not culminate in trades. Consequently, observed prices, whether from executed transactions or quoted orders, should be interpreted as signals generated in a thin and frictional market where information remains incomplete.

[INSERT FIGURE 1 ABOUT HERE.]

These institutional features are central to our empirical setting. They imply that secondary prices may deviate from prior VC valuations due to both liquidity considerations and heterogeneous beliefs, and they raise the question of whether price discovery can take place in such an opaque market. This question is particularly relevant for investors such as mutual funds, which must assign timely values to their pre-IPO holdings despite the absence of continuous market prices (Agarwal et al. 2025).

The market we study is one part of a larger set of liquidity solutions in private markets,

illustrated in Panel B of Figure 1. Startups may facilitate liquidity through structured tender offers or company buybacks, where timing, pricing, and participation are largely controlled by the issuer. By contrast, the market we study allows prices and demand to emerge organically from decentralized buyer and seller interaction, though execution remains uncertain and subject to issuer approval. More generally, investor access to startup equity ranges from direct ownership through share transfers to more indirect exposure through pooled investment vehicles and synthetic exposure, although the data in this paper are based on direct ownership stakes.[3] Related secondary markets also exist in private capital funds, encompassing LP-led sales of fund stakes (Nadauld et al. 2019; Boyer et al. 2023) and GP-led transfers of selected assets from existing funds into continuation vehicles (Abuzov et al. 2025).

[INSERT TABLE 1 ABOUT HERE.]

We provide additional details in Table 1, which summarizes key differences between the secondary market for private shares and the public equity market, and Section IA.1 in the Internet Appendix provides a detailed discussion of the legal and regulatory setting in which these markets operate.

2. Samples and Data

This section describes the data used in our study, explains the sample constructions, and provides descriptive statistics.

2.1. Secondary Market Order Data

Our main data source is the complete order book for shares of 1,492 startups from one of the leading U.S. intermediaries. We observe three order types: *buy* and *sell* orders, which are expressions of interest to purchase or sell shares, and *trades*, which are executed transactions.

[3]In May 2026, Anthropic publicly warned investors that some intermediaries offering exposure to Anthropic shares were unauthorized and that transfers without board approval would be void (see Anthropic's blog post, accessed May 23, 2026). The episode highlights the legal and contractual risks associated with indirect exposure to startup equity.

For each order we observe the firm identifier and time stamp. For a subset of orders, we observe the quoted price per share, the share count, and the notional value of the order. For sell orders and trades, we also observe the share class.

While we do not observe participant identities, the structure of startup equity claims allows us to infer seller type as employee, executive, or institutional investor. Venture capital investors are typically issued preferred equity with preferential liquidation rights, whereas founders, employees, and executives hold common shares (Gornall and Strebulaev 2020; Fu, Jenkinson, and Rauch 2023). Accordingly, we treat sell orders and trades involving common shares as employee or executive sales and code the remainder as institutional investor sales. To separate employees from executives among common share sales, we scale each order by the most recent post-money valuation and classify those below 0.1% as employee sales, with the remainder coded as executive sales.[4] When share class is not observed, we impute seller type using a multinomial logit estimated on the subset of observations that can be classified directly.[5] Each observation is assigned the seller type with the highest predicted probability, which approximately doubles the number of orders for which we can classify seller type.

2.2. VC Financing, Founding Year, and Exit Data

The provider of the secondary market data also maintains detailed information on 4,961 venture capital (VC) financing rounds for a subset of 772 firms spanning October 1999 to December 2024, including the post-money valuation, total number of shares issued, price per share, round stage, and total amount raised. We use this to benchmark prices in the market and to classify the startup stage. We classify Seed and Series A rounds as *early stage*, Series B

[4]Bengtsson and Hand (2013) report an average employee ownership share of 1.8% among vice presidents, directors, C-suite roles, and founders, suggesting that a typical employee stake is likely smaller than 1.8%. Furthermore, Ewens, Nanda, and Stanton (2024) document a substantial dilution of founder stakes over successive VC rounds. Given that our sample predominantly consists of late-stage startups, that further suggests a smaller typical employee stake. Our 0.1% threshold should therefore be viewed as a heuristic. The main patterns documented in the paper persist when we instead use a 0.5% threshold.

[5]The model includes log order value, log share volume, log firm valuation, log cumulative VC capital raised, log number of prior VC rounds, log firm age, log time since the last VC round, an indicator for whether the observation is a sell order or a completed trade, financing stage indicators, event-time buckets relative to the last VC round, and calendar-year indicators.

and C as *mid stage*, and Series D and later as *late stage* startups.

In addition, we collect data on founding years, industry sectors, and startup exits from PitchBook.

2.3. Mutual Fund Startup Holdings

The third datasetwe use includes quarterly holdings of startup shares for 309 mutual funds. For each holding, we observe the end-of-quarter valuation and link these fund holdings to secondary market activity at the firm-quarter level.

2.4. Sample Construction

We use three samples for our analysis. We construct the first sample of secondary market orders as follows. We begin with 12,059 unique orders for shares of 1,492 startups between April 2018 and December 2024. Trading activity is sporadic in the first years: 1% of orders arrive before 2021, 9% in 2021 and 2022, and 90% in 2023 and 2024. We restrict our sample to the period from January 2021 to December 2024, resulting in a sample of 11,925 orders for 1,474 startups. We supplement the order sample with data on VC financing to compare the share price of an order with the share price from the most recent VC financing round.

As startups vary significantly in size, industry, and current momentum, there is a significant risk that our analyzes are confounded by differences in attributes that correlate with orders. This concern motivates a shift from order-level data to a panel setting that enables systematic comparisons across firms and time. Accordingly, our second sample is an unbalanced firm-month panel for 422 startups from our secondary market order sample, for which we have information on founding year, exits, and industry from PitchBook. The panel starts in January 2021. 38 firms are founded after January 2021 and enter the sample in the month of birth. The panel ends in December 2024, although 7 firms leave the panel earlier due to an exit event. For each firm-month, we aggregate the order flow and calculate the average price ratio relative to the most recent VC round. The panel contains 7,583 orders distributed across 19,828 firm-month

observations and is the input for the construction of our matched sample.

The third sample is an unbalanced panel of quarterly startup holdings by mutual funds. The unit of observation is a valuation of a startup by a given mutual fund reported at the end of a quarter. The panel spans quarterly valuations from 2021 to 2024 and includes 309 mutual funds investing in 342 startups, for a total of 21,384 fund-startup-quarter valuations. For each observation, we observe the reported price per share and position size. We link these valuations to secondary market activity at the startup-quarter level as well as VC financing history. For each fund-startup–quarter, we aggregate orders arriving between consecutive mutual fund valuations. This yields measures of trading intensity, direction, and pricing in the quarter between mutual fund valuations.

2.5. Descriptive Statistics

Figure 2 distinguishes the 1,474 startups in our order sample by their trading activity and firm characteristics. Panel (a) classifies firms according to whether they receive only buy orders, only sell orders, both without a trade, or at least one completed trade. Slightly more than half of the firms in our sample receive only a sell order, 10% attract only a buy order, about a third have a buy and a sell order but no trade, and only 7% experience a completed trade. Panel (b) reports the distribution of orders by firm trading activity. Orders are highly concentrated. The 7% of firms that experience a trade account for 38.7% of all orders and the 28.6% of firms with buy and sell orders but no trade account for 39.1% of all orders. A plausible explanation for the large number of buy and sell orders in the latter category that do not result in a trade is that these firms use their right to block transactions (Larcker, Tayan, and Watts 2018). Panel (c) decomposes the firms by VC stage. About three quarters of both traded firms and firms with buy and sell orders but no trade belong to late-stage startups. In contrast, mid-stage and early-stage startups account for about 70% of the firms with only buy orders, suggesting that investors seek access to less mature startups while insiders are either not interested in selling or the firms restrict selling. Interestingly, more than half of the firms with only sell orders are

late-stage startups, consistent with insiders seeking liquidity after a prolonged period of being private.

[INSERT FIGURE 2 ABOUT HERE.]

Panel (a) in Figure 3 splits sell orders and executed trades by their inferred seller type from our own classification approach. It shows that 30.5% of sell-side orders originate from employees, 19.8% from executives, and 49.6% from institutional investors. Panel (b) splits the firms that allow at least one trade by seller type. Interestingly, about two thirds of those firms agree to a trade by an institutional investor, while only about one half authorize a trade by an employee.

[INSERT FIGURE 3 ABOUT HERE.]

Table 2 reports descriptive statistics for the 11,925 orders in our sample. Most orders do not lead to a trade. We observe 457 trades, which account for 3.8% of all orders. Among the remaining orders, sell orders exceed buy orders: 7,965 vs. 3,503, accounting for 66.8% and 29.4% of all orders. About two thirds of orders include a price, and three quarters have a price from a prior VC financing round. Both variables are available for 6,375 orders (53.5%). The average price relative to the most recent VC round is 89%, implying an 11% discount.

[INSERT TABLE 2 ABOUT HERE.]

Table 3 summarizes the mutual fund valuation data. On average, 69% of holdings are revalued each quarter. When valuations are updated, they change by an average of 3.2%, although this masks substantial dispersion. In 69.7% of fund-quarters, we observe a prior VC round. We observe at least one secondary market order for the underlying firm in 43.0% of fund-quarters, and 29.0% have at least one priced order. In quarters with priced orders, the distribution of secondary market price ratios relative to the previous mutual fund mark is wide, with an interquartile range from 72% to 116%, and an average of 104%.

[INSERT TABLE 3 ABOUT HERE.]

3. Results

This section examines three empirical questions about order flow and pricing in secondary markets for startup shares. First, we assess whether secondary market prices trade at discounts or premiums relative to the most recent VC round. Second, we test whether the order flow and quoted prices are informative. Third, we evaluate whether mutual funds incorporate these secondary market signals when updating the valuations of their private holdings.

3.1. Are Firms Priced at a Discount or a Premium?

Secondary market prices for VC-backed startups can deviate from the price of their most recent VC round due to three underlying features of the market: (i) restricted access to shares in successful startups, which may generate excess investor demand, (ii) illiquidity and the presence of sellers with liquidity needs, and (iii) limited and uneven information about fundamentals. Market microstructure theories suggest that price concessions increase with thin liquidity and asymmetric information (Glosten and Milgrom 1985; Kyle 1985), both of which are first-order features of this market. Discounts arise when liquidity-driven selling and adverse selection risks dominate, whereas premiums may emerge when demand for access is strong.

Figure 4 plots the quarterly time series of the total number of buy and sell orders, the mean percentage discount or premium relative to the price from the most recent VC round, and the net demand imbalance, expressed in percent as buys minus sells divided by buys plus sells. In 2021, buying interest substantially exceeded selling interest, and secondary prices traded at a premium, consistent with exuberant VC pricing at the time. These early-sample patterns should be interpreted with caution, given the thin activity on the platform. As the VC market cooled in 2022, secondary prices shifted to discounts, and overall activity pulled back before beginning to recover in 2023. By 2024, prices had returned to a premium and overall activity reached new highs, alongside elevated sell interest.

[INSERT FIGURE 4 ABOUT HERE.]

To test the determinants of the secondary market prices relative to the most recent VC round price, Table 4 estimates versions of the following regression model using our order-level data:

$$\log(\frac{\text{Price}_{\text{order}}}{\text{Price}_{\text{VC}}})_{oit} = \beta_1 X_{oit} + \beta_2 \Gamma_{it} + \pi_i + \phi_t + \psi_{it} + \epsilon_{it}, \tag{1}$$

where o denotes an order, i a firm, and t a calendar-year-quarter. X_{oit} is the vector of interest, including indicators for the order type, proxies for market liquidity, valuation signals from other market participants, and measures of firm momentum. Γ_{it} controls for log firm age, the log cumulative VC capital raised, the log number of VC rounds raised, and indicators for early-stage, mid-stage, and late-stage startups. π_i denotes firm fixed effects controlling for unobserved time-invariant firm characteristics, ϕ_t calendar-year-quarter fixed effects controlling for market-wide time trends, and ψ_{it} the fixed effects for the number of quarters since the most recent VC round.

[INSERT TABLE 4 ABOUT HERE.]

The estimates yield five key takeaways. First, in column 1, the price ratio of buy orders is roughly 17% lower than that of sell orders ($p < 0.001$), indicating a large gap between the requested prices and what buyers are willing to pay. Executed trades clear at prices between the two, though on average closer to buyer quotes than to seller asks, with prices about 13% below sell quotes ($p = 0.001$). This is the familiar bid–ask structure: trades settle between posted bids and asks, but the substantial gap signals frictions that may impede transactions.

Second, discounts are lower when buyer demand is high. We proxy for buyer demand in column 2 by using the net demand imbalance for the firm in the previous 90 days. Demand imbalance has an economically meaningful effect: moving from a market with only sell orders to one with balanced demand raises prices by about 3.9 percentage points—roughly half the average discount ($p = 0.06$).

Third, price quotes incorporate other information available in the market. We capture other participants' pricing for the same firm using the logarithm of the average price ratio from orders

in the previous 90 days. We find a strong but not perfect relation: a one percent increase in recent average prices is associated with roughly 0.4% higher quoted prices ($p < 0.001$).

Fourth, we test whether discounts reflect underlying firm momentum by incorporating the change in price per share in the most recent VC round, measured both continuously and as an indicator of whether that round was a down round. In contrast to liquidity and information proxies, these measures are statistically and economically insignificant. Orders do not appear to be particularly optimistic or pessimistic, regardless of whether the last round represented a large step-up or markdown, once firm and time effects are accounted for. This null result suggests that the discounts we observe are not merely lagged reflections of recent VC pricing dynamics.

Lastly, in column 3, we find that the discounts on common equity are, on average, 9% larger than those on preferred equity ($p < 0.001$). This suggests that market participants in secondary markets account for differential liquidation rights when valuing these shares, though the magnitude is below differences implied by model fair values (Gornall and Strebulaev 2020; Agarwal et al. 2025).

Taken together, these patterns suggest that supply–demand imbalances are central: prices rise when buyers are active and fall when the market is dominated by sellers. Furthermore, our results indicate that participants anchor their quotes to recent market prices and account for liquidation rights common in startup equity structures. The lack of sensitivity to recent VC pricing dynamics underscores that secondary prices provide an independent signal. We therefore next turn to testing directly whether order flow and prices on secondary markets respond to fundamental events.

3.2. Are Order Flow and Prices Informative?

Ex ante, it is not obvious whether secondary market prices are informative. On the one hand, prices are predominantly derived from quotes; quotes may reflect opportunistically low bids from buyers hoping to find sellers desperate for liquidity, or aspirational asks from current

shareholders hoping to profit on high demand from outside investors seeking exposure to startup growth. In addition, the lack of publicly available information raises doubts about the ability of participants to determine accurate valuations. On the other hand, participants in these markets must be either qualified institutional buyers (large institutions) or accredited investors, and sellers are typically insiders who may possess information beyond that publicly available. Ultimately, whether prices contain valuable information is an empirical question, which we study along two margins: how investors respond to new information and whether prices are forward-looking.

3.2.1. Event Study Around VC Financing Rounds

VC financing rounds provide natural events for studying whether secondary market activity and prices respond to information. These rounds involve specialized investors who commit capital at negotiated valuations after due diligence, thus generating credible signals of firm value. To examine how secondary market activity responds, we implement an event-study design that tracks order flow and pricing surrounding these events.

The empirical challenge is that the timing of VC financing is not random. For example, firms are more likely to raise money in hot VC markets, when investor demand for access to startup shares may also be elevated. To mitigate omitted variable concerns, we compare firms raising VC funding to matched control firms that do not raise VC funding but have similar pre-event characteristics.

We begin with our firm-month panel spanning January 2021 through December 2024. We identify 401 "treated" firms 845 VC funding events. Panel (a) in Figure 5 shows the distribution of events by month and stage. Most of the financing rounds take place between 2021 and mid-2022 when the VC market was especially active. We define a 9-month event window around the VC funding month t, from 6 months before (t–6) to 2 months after (t+2). We exclude events at the beginning and at the end of our sample, for which we do not observe the full event window, and impose a clean-window restriction to exclude other VC financing rounds. These filters reduce the number of events to 401 and the number of treated firms to 288.

[INSERT FIGURE 5 ABOUT HERE.]

We match each "treated" firm to one control firm in the same calendar month and industry that does not experience the focal event within the corresponding window. Matching uses only pre-event information. We require exact matches on the startup stage and coarse measures of prior market activity, including indicators for recent and current buy and sell interest. Among these firms, we select the nearest neighbor using normalized differences in years since the first VC round, log cumulative VC capital raised, cumulative buy and sell orders, and current-month buy and sell orders. We allow matching with replacement to preserve match quality in a thin market. Our algorithm finds a matched control firm for 365 of the 401 events. Panel (b) in Figure 5 shows the distribution of the matched events by month and stage. Table IA.1 in the Internet Appendix shows that the resulting matched sample is well balanced on these observables.

We then stack the matched "treated" and control observations into event-time panels and estimate a stacked difference-in-differences (DiD) design:

$$y_{ict} = \sum_{\tau \in \mathcal{T}, \tau \neq \tau_0} \beta_\tau \left[T_{ic} \times \mathbb{1}(\tau_{ict} = \tau) \right] + \alpha_{ic} + \delta_{ct} + \gamma_\tau + \varepsilon_{ict}, \tag{2}$$

where T_{ic} indicates that firm i experiences the focal event in cohort c, τ_{ict} denotes event time in months, α_{ic} are firm-by-cohort fixed effects, δ_{ct} are calendar-month-by-cohort fixed effects, and γ_τ are event-time fixed effects. The outcome y is a firm-month measure of activity in the secondary market, such as the number of orders or the latest observed price ratio. The omitted period τ_0 is the matching month $(t-4)$. We cluster standard errors by firm. Conceptually, we group t–6 and t–5 into the pre-event period, for which we assume parallel trends, t–3 to t–1 into the anticipation period, for which we might find significant differences if insiders submit orders or information about the upcoming VC round leaks, and t to t+2 as the post-event period.

Figure 6 plots the estimated DiD coefficients for measures of secondary market order flow and pricing, alongside 90% confidence intervals. For all six measures, the coefficients in the pre-event period are not statistically different from zero, supporting the underlying parallel trends

assumption. Panel (a) shows the estimates for the number of orders. We observe an increase in orders for treated firms relative to their matched control firms starting during the anticipation period, in t–2, building over the following months, and becoming statistically significant in t+1 and t+2 ($p = 0.031$ and 0.006). The estimates for the number of buy and sell orders in Panels (b) and (c) reveal that the increase in orders during the anticipation period is driven by increased buyer interest, while the number of sell orders tends to decrease. A plausible explanation is that insiders know about the upcoming event and delay selling. Consistent with that, we find an increase for both buy and sell orders in t+2 ($p = 0.044$ and 0.046). We do not see any significant patterns in demand imbalance in Panel (d) or trades in Panel (e). In line with the observed patterns for the order flow, Panel (f) shows that the price ratio relative to the most recent *prior* VC round starts to increase in t–2 ($p = 0.119$), continues to increase over the following months, and turns statistically significant in t ($p = 0.095$).[6]

[INSERT FIGURE 6 ABOUT HERE.]

Table 5 reports the coefficient estimates after grouping the event-time indicators into pre-event, anticipation, and post-event periods to facilitate the discussion of effects. Consistent with Figure 6, we find an increase after a VC financing event in the number of orders of 64.9% (0.127 divided by the treated firms' mean in t–4 of 0.077; $p = 0.010$), in the number of buy orders of 89.4% (0.089 divided by the mean in t–4 of 0.047; $p = 0.019$), and in the log price ratio of 29.9% ($p = 0.041$).[7] An important caveat is that our estimates using the price ratio are based on a smaller sample of 17 financing events (instead of 365 financing events). The large drop in the number of observations has two main reasons: (i) a lack of good controls, where both the treated and control firms have orders with prices in the match period, and (ii) actively traded firms raise capital more frequently, violating our clean event-window requirement.

[INSERT TABLE 5 ABOUT HERE.]

[6]Figure IA.1 in the Internet Appendix plots the means of the six measures for treated and control firms over the event window. It shows that the results are driven by changes in the order flow and pricing of the treated firms and not the control firms.

[7]We find similar results for the number of orders and buy orders using a Poisson specification in Table IA.2 in the Internet Appendix.

Overall, the evidence suggests that secondary market order flow and pricing respond to VC financing events and partially anticipate them. While this indicates that prices incorporate new information as it arrives, possibly even before it becomes public, it does not establish that the market generates price discovery outside such events. We therefore next examine whether secondary market prices contain forward-looking information by testing their ability to predict subsequent VC valuations.

3.2.2. Can Secondary Prices Predict Future Valuations?

Having established that investors respond to new information, we next examine whether prices are forward-looking. To that end, we test whether secondary market prices predict subsequent changes in firms' VC valuations. Specifically, we regress a startup's log price ratio of the *subsequent* VC round to the most recent VC round on the log price ratio of the secondary market price to the most recent VC round. This provides an apples-to-apples comparison, since both measures are defined relative to the most recent VC round's pricing. We include controls for the size of the last VC round, the time elapsed since that round, and year–quarter fixed effects to account for overall macro conditions. Table 6 presents the results.

[INSERT TABLE 6 ABOUT HERE.]

We find that secondary market prices are strongly predictive of VC valuations. The implied magnitude is economically meaningful: column 1 suggests that a 10% higher secondary market price ratio predicts a 5.4% larger increase in the next VC round's price per share ($p < 0.001$). Interestingly, this predictive relationship exists for executed trades as well as buy and sell orders (see column 3), which is consistent with our finding in Section 3.2.1 that order flow anticipates the closing of a VC financing round. However, we find that the presence of an executed trade generally predicts an additional increase in a startup's valuation ($p < 0.001$). Column 4 tests whether the predictive relationship between secondary market prices and future changes in startup valuation varies by seller type. Consistent with different levels of inside knowledge, the

predictive strength is weaker for employees than for executives, institutions, and unclassified sellers ($p = 0.04$).

We find a similar predictive relation between secondary prices and future changes in startup valuations when excluding all orders that are placed within a 90-day window of the VC round. The results are presented in Table IA.3 in the Internet Appendix.

Taken together, our findings imply that secondary market prices are informative because they predict both the direction and magnitude of future revaluations in the VC market. The fact that this also holds for buy and sell quotes is particularly valuable in a market with few completed transactions, since quotes are far more common and thus provide a richer stream of pricing signals. In other words, the secondary market appears to provide an avenue for price discovery even for opaque startup firms.

These findings raise a natural question: do institutional investors, such as mutual funds, incorporate these signals when updating the valuations of their private holdings?

3.3. Do Market Participants Use Secondary Prices?

Having established that secondary market prices contain information about firm value, we next ask whether institutional investors incorporate these signals when updating valuations. Mutual funds provide a natural setting. Over the past two decades, these traditionally public investors have become major investors in late-stage startups (Kwon, Lowry, and Qian 2020; Chernenko, Lerner, and Zeng 2021), offering daily liquidity at reported NAVs while holding illiquid and opaque assets. Because startups rarely disclose interim performance and VC rounds occur infrequently, secondary market activity may provide a valuable interim pricing signal if funds are willing to rely on it. At the same time, the market's thinness implies that even informative prices may be viewed as too noisy to warrant adjustments.

We test whether mutual funds incorporate secondary market prices by linking market activity between fund valuation dates to subsequent changes in reported marks. Our baseline specification aggregates all priced orders that arrive between two fund valuation dates and

relates them to whether the fund updates its mark that quarter and, if so, by how much. We construct measures of secondary market activity at the level of each mutual fund holding, defining an average price ratio that compares secondary market prices during the quarter to the fund's prior quarterly valuation. This generates a dataset at the mutual fund-startup-quarter level, where the secondary market price ratio may differ across funds holding the same startup in a given quarter.

As our main focus is to explore whether changes in valuations relate to secondary market activity, we exclude the first quarter of every holding. Furthermore, we exclude quarters in which a VC round takes place, as both secondary market activity and mutual fund marks are likely to be anchored to that pricing, and our interest is in whether independent signals from secondary markets generate updates.

We present our analysis in Table 7. Columns 1 and 2 examine the extensive margin of whether a mutual fund updates its valuation, using a linear probability model. Column 1 tests whether the presence of any secondary market activity increases the likelihood of a valuation update. We find that the mere presence of secondary market activity in the quarter does not make funds more likely to initiate an update. Column 2 replaces the indicator with the log ratio of the average price of the secondary market relative to the current fund mark. We find that a 10% increase in the deviation of the secondary market price form the fund's current mark increases a fund's probability to update its mark by 2.4% (0.0167 divided by 0.687, the funds average probability of updating a mark; $p = 0.001$). Interacting with an indicator for at least one trade reveals that mutual funds only respond to price signals with at least one realized trade ($p = 0.004$). Generally, funds are less likely to update their marks if there are only buy and sell orders but no executed trades ($p = 0.015$).

[INSERT TABLE 7 ABOUT HERE.]

Column 3 turns to the intensive margin, restricting the sample to quarters when a fund updates a valuation. We test whether the direction and magnitude of the revision reflect secondary market signals by relating the percentage change in the fund's valuation to secondary

market prices during the quarter. It shows that when the average secondary market price ratio exceeds the mutual fund's mark by 10%, the fund raises its valuation by roughly 2 percentage points more than it otherwise would ($p < 0.001$). The effect is strongest for quarters with executed trades, although there is no statistical difference in coefficients for quarters without such trades. This is consistent with mutual funds incorporating price signals when updating valuations, even when those signals derive solely from quotes rather than executed trades.

Finally, column 4 examines whether mutual funds fully incorporate the information in secondary market prices. We focus on quarters in which funds update their marks in the absence of a VC round and test whether secondary market prices predict the gap between the fund's post-revision mark and the price in the next VC round. A positive coefficient implies that higher secondary market prices are associated with larger subsequent "gaps," indicating that funds do not fully incorporate the information in those prices. A negative coefficient would suggest overreaction. We find a positive coefficient ($p = 0.097$) that is consistent with funds partially incorporate secondary market prices when updating their marks.

Combining the estimates columns 3 and 4, we conclude that higher trade-based secondary prices are associated with larger upward revisions in the fund's current mark, but also with a larger remaining gap between that updated mark and the next VC round. Funds therefore move in the direction signaled by executed trades, but not by enough to fully incorporate the information in those prices.

Taken together, our results suggest that institutional investors respond to price signals provided by the secondary market, indicating that the market serves a role beyond liquidity provision. This role is likely to grow as mutual funds continue allocating capital to private firms, combining opaque, hard-to-value holdings with the obligation to provide daily valuations that underpin redemptions.

4. Conclusion

This paper provides the first systematic analysis of the secondary market for startup shares. Using proprietary order-level data from a leading trading platform, we show that this market helps alleviate three central frictions in private markets: access, illiquidity, and limited information. Prices in the secondary market are typically below the most recent venture capital valuation, but those discounts narrow when liquidity improves, and the resulting prices are informative about future firm value. Mutual funds also partially incorporate these signals when updating their marks, indicating that secondary markets already play a role in price discovery.

More broadly, our findings suggest that secondary markets for startup equity are evolving into an important pillar of market infrastructure for private capital. As firms remain private for longer and as more investors hold illiquid private assets, the need for timely price discovery and liquidity solutions will grow. In that environment, secondary markets may do more than provide liquidity. They may shape how employees value equity compensation and, in turn, the attractiveness of startup employment. Furthermore, well-functioning secondary markets may expand the pool of outside investors willing to allocate capital to startups. A natural question for future research is how resilient this market is in downturns, when liquidity becomes scarcer and information frictions are likely to be more severe. Another is whether the continued growth of these markets will meaningfully expand access to private investment opportunities, particularly as policymakers seek to broaden retail participation in alternative assets. Whether greater access improves market functioning or instead dilutes price informativeness remains to be seen.

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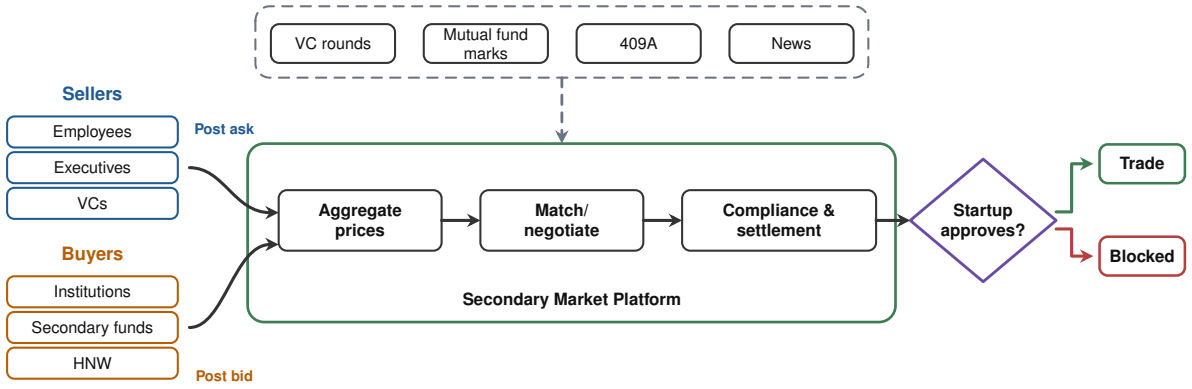
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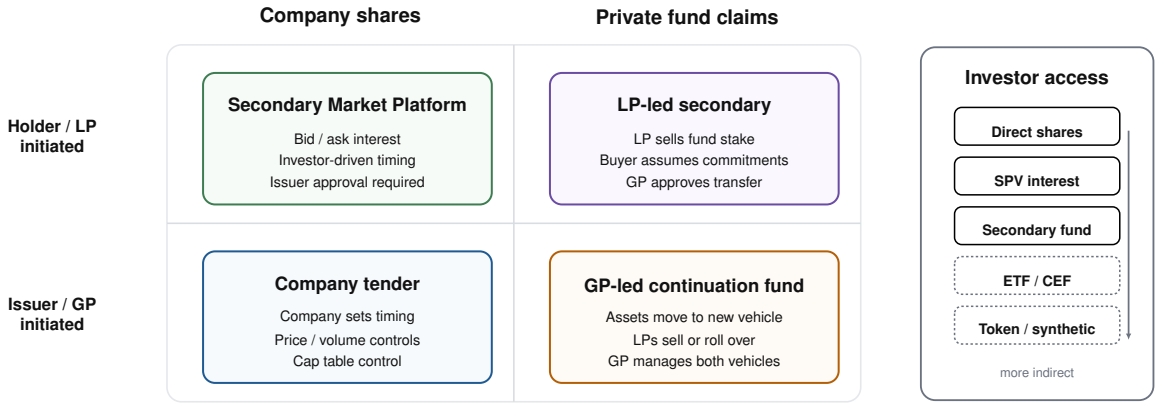
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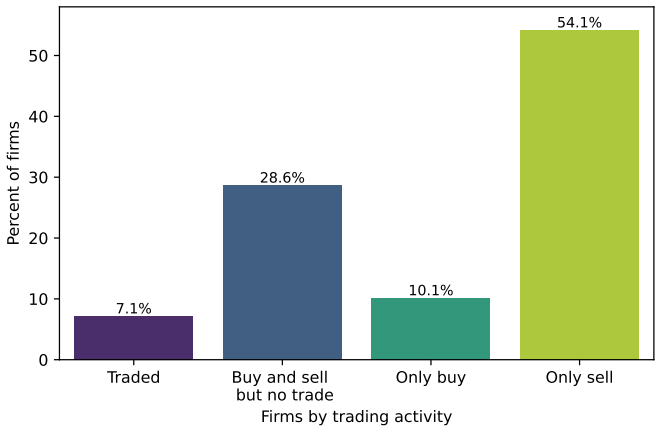
(a) The Secondary Marketplace



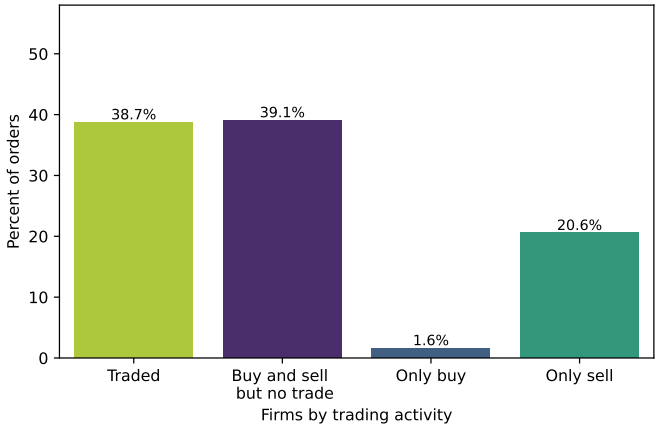
(b) The Private Secondary Landscape

Figure 1. Private Secondary Markets

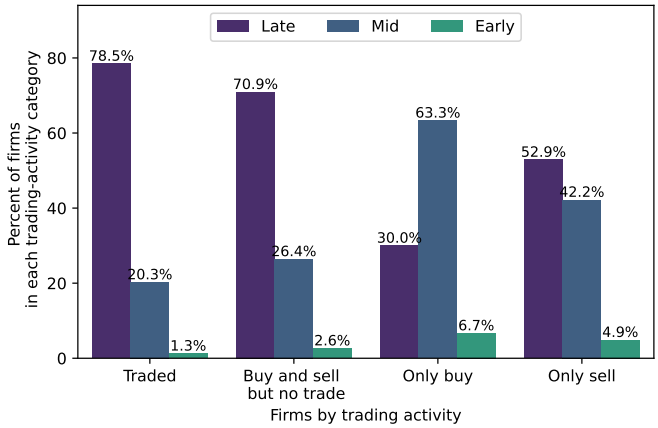
This figure illustrates the landscape for private secondary markets. Panel A shows the role of specialized broker-dealer platforms in the market for startup shares. These platforms allow potential buyers and sellers to place bid and ask orders, facilitating matching and negotiation. Once counterparties agree on a transaction, the platform assists with compliance and settlement, including issuer approval and rights-of-first-refusal procedures. The panel also summarizes the typical market participants and the limited information about private issuers that intermediaries may consolidate and provide to investors. Panel B places this market within the broader private secondary landscape, contrasting trading in startup shares on a secondary marketplace with issuer-directed tender offers and company buybacks, as well as with LP-led sales of private capital fund stakes and GP-led secondaries, in which selected fund assets are transferred to continuation vehicles.



(a) Firms by trading activity



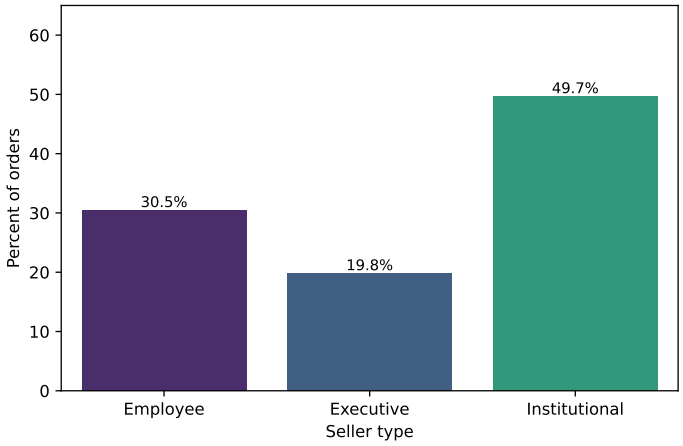
(b) Orders by firms' trading activity



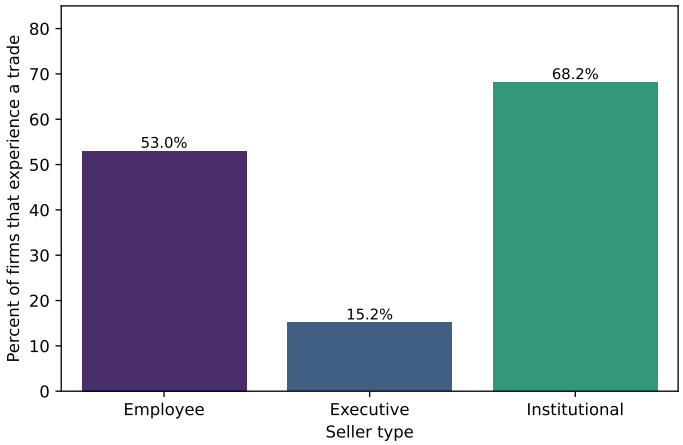
(c) Firms by trading activity and VC stage

Figure 2. Descriptive Statistics: Firms

This figure shows the share of firms across four mutually exclusive trading statuses: firms that during our sample receive only buy orders, only sell orders, both buy and sell orders without trading, and firms that have traded. Panel (a) plots these shares for unique firms. Panel (b) plots the shares for orders. Panel (c) decomposes the firms in each trading activity category by VC stage (early, mid, late) based on their most recent order. The sample in Panels (a) and (b) consists of 11,925 orders for 1,474 firms between January 2021 and December 2024. Panel (c) restricts the sample to 8,970 orders belonging to the 599 firms with VC financing information.



(a) Orders by seller type



(b) Firms with at least one trade by seller type

Figure 3. Descriptive Statistics: Seller Types

This figure splits the orders and executed trades as well as the firms with at least one trade by seller type. We infer seller type as employee, executive, or institutional investor based on the type of shares and the value of the order relative to the most recent post-money valuation. For more details, see Section 2.1. Panel (a) shows the percentage of orders by seller type, including both sells and trades. The sample consists of the 4,252 orders for 546 firms for which we can classify the seller type. Panel (b) restricts the sample to the 66 firms for which we observe an executed trade and information on VC financing.

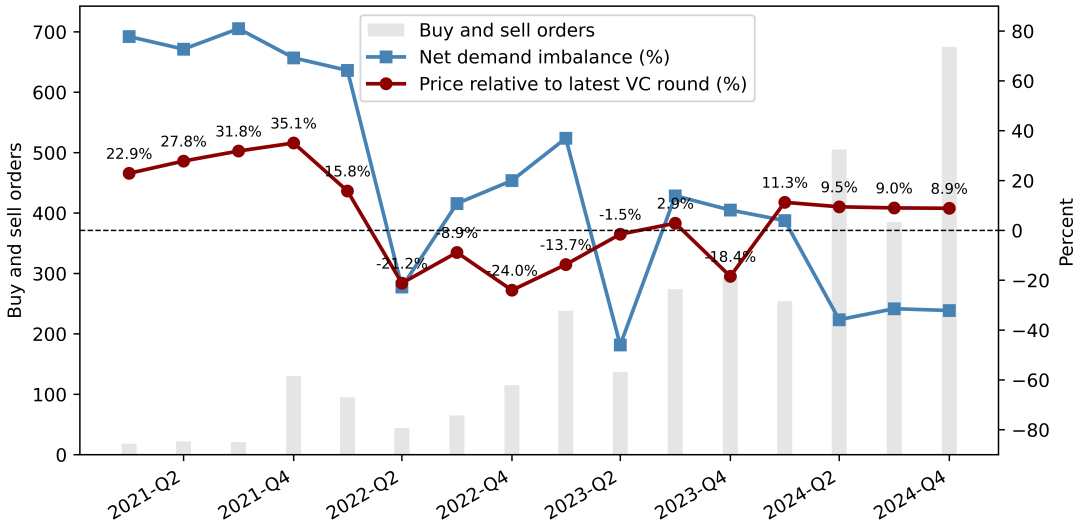
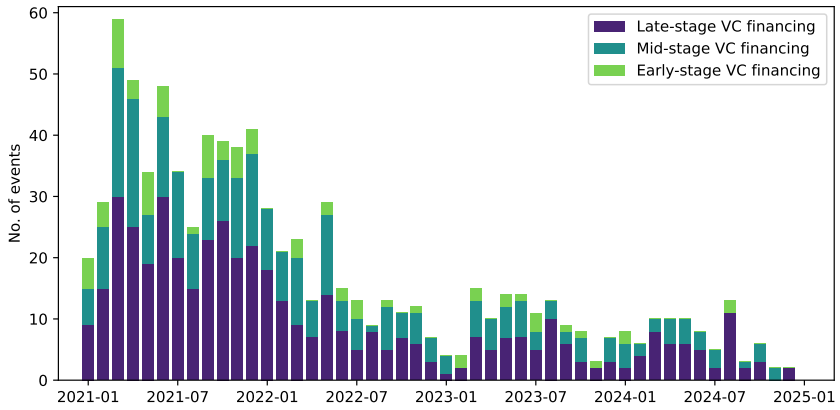
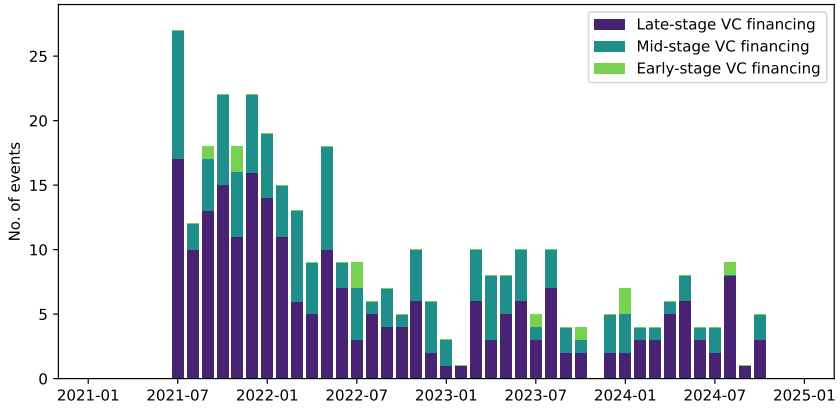


Figure 4. Orders, Demand Imbalance, and Pricing over Time

This figure shows secondary market order flow and pricing by quarter from Q1 2021 to Q4 2024. The light gray bars (depicted on the left-hand axis) indicate the total number of buy and sell orders in the quarter, while the blue line indicates the demand imbalance and the red line indicates the average discount or premium relative to the most recent VC round for orders arriving in the quarter (both depicted on the right-hand axis). The average discount or premium relative to the most recent VC round is calculated as the margins of α_t from estimating equation $\text{Price}_{oit}/\text{Price}_{VC,it} = \alpha_t + \sum_{\tau=2}^{6} \beta_\tau \mathbb{1}(\text{ Quarters since VC } = \tau) + \gamma_{Buy}\mathbb{1}(\text{Buy}) + \gamma_{Sell}\mathbb{1}(\text{Sell}) + \varepsilon_{oit}$ using OLS. o denotes the order, i the firm for which the order is placed, and t the year–quarter in which the order arrives. We estimate coefficients for year–quarter dummies α_t, the relative time from the VC round β_τ, and indicators for whether the order was a sell ($\mathbb{1}$(Sell)) or buy ($\mathbb{1}$(Buy)) order, with completed transactions ($\mathbb{1}$(Trade)) as the omitted category. We exclude the three orders arriving the same day as the VC round.



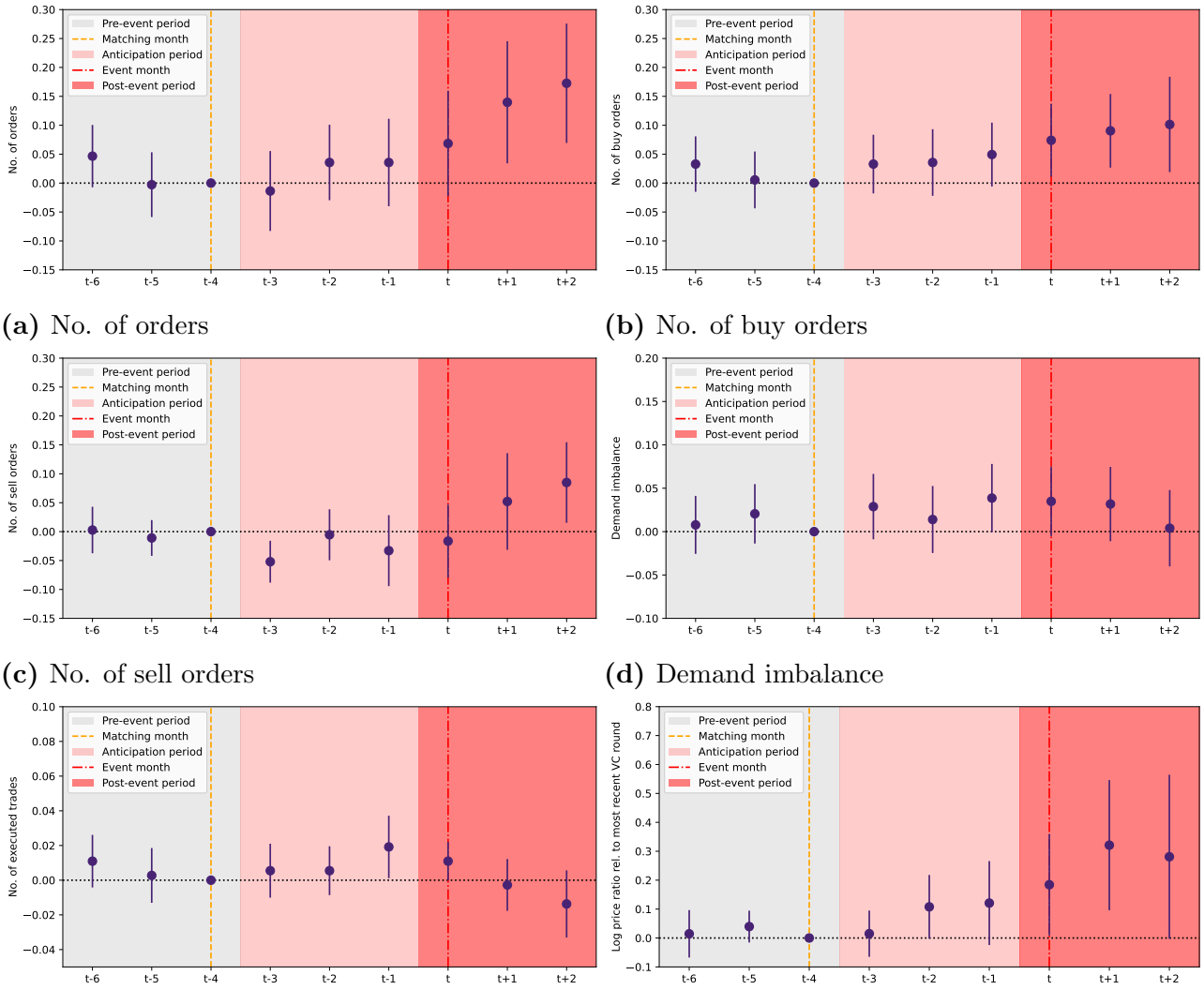
(a) All VC financing events



(b) Matched VC financing events

Figure 5. VC Financing

This figure plots the distribution of the VC financing events by month and stage. We define a VC financing event as a firm-month in which a firm raises VC funding. Panel (a) shows the 845 VC financing events between 2021 and 2024. Panel (b) shows the 365 VC financing events between July 2021 and October 2024 that satisfy clean event window requirements and that we can match to a control firm not raising VC financing but with similar characteristics to the "treated" firm four months prior to the VC financing event. For more details on the event window requirements and the matching, please see Section 3.2.1. For variable definitions and details of their construction, see Appendix A.



(a) No. of orders

(b) No. of buy orders

(c) No. of sell orders

(d) Demand imbalance

(e) No. of trades

(f) Log price ratio rel. to most recent VC round

Figure 6. VC Financing Events: Difference-in-Differences Coefficient Plots

The figure plots the difference-in-differences (DiD) estimates (equation (2)) on secondary market order flow and pricing over the 9-month window from six months before the VC financing (t–6) to two months after the VC financing (t+2) relative to matched control firms, alongside 90% confidence intervals. The matched control group consists of startups that do not raise VC financing during the window [t—6, t+2] and show no observable differences in the time since the first VC round, the VC financing stage, the total amount raised, and the trading activities of their private shares, with matching performed as of t–4. The sample in Panels (a) to (e) includes all 365 matched VC financing events, whereas Panel (f) considers only the 17 VC financing events for which we can construct the log price ratio relative to the previous VC round for both the treated firm and the control firm. The large drop in observations is due to a lack of good controls where both the treated and control firm have orders with prices in the match period. For the log price ratio, if there is no order or the order has no price, we impute missing values in the mean order price in a given month with the most recent available mean order price. We use the matching month, t–4, as the omitted reference month in the specifications. All specifications include firm-by-cohort fixed effects, calendar-month-by-cohort fixed effects, and event time indicators. For variable definitions and details of their construction, see Appendix A. Standard errors are clustered at the firm level.

Table 1. Institutional Differences: Pre-IPO Secondary Markets vs. Public Equity Markets

The table reports institutional differences in the trading of company shares between pre-IPO firms on secondary markets and publicly listed firms on public markets. We group the institutional differences into six key aspects.

Aspect	Pre-IPO shares	Publicly listed shares
Market structure	Decentralized, no public exchange. Trades arranged via brokers or dedicated platforms; company approval is often required.	Centralized exchanges (e.g., NYSE, NASDAQ) with automated trade matching; issuer involvement in secondary trades is unnecessary.
Participants	Participation is limited to accredited investors and institutional buyers. Sellers often include company insiders (employees, founders, venture capital funds), while buyers can be high-net-worth individuals, secondary-focused funds, or other specialized investors.	Open to retail and institutional investors alike. A broad pool of participants can freely buy and sell shares without special qualifications.
Liquidity	Generally very limited. Transactions often involve large blocks, feature wider bid-ask spreads, and can take weeks to settle. Market liquidity can evaporate abruptly during downturns.	Highly liquid, with continuous trading, narrower spreads, and a T+1 settlement cycle. Even in times of market volatility, buyers are typically available.
Price transparency	Pricing is opaque; there are no continuous quotes or centralized order books. Valuations frequently derive from a company's most recent funding round or ad hoc negotiations, with minimal real-time data.	Pricing is transparent, with live ticker data and deep order books reflecting current supply and demand. Prices adjust in real time to news and broader market activity.
Information	Disclosure requirements are minimal, and firms rarely provide detailed financial or operational data. Buyers often rely on private or informal information sources.	Disclosure is both comprehensive and standardized, mandated by the SEC. Analysts, media, and investor relations materials further expand public information sets.
Regulatory status	Shares are unregistered and must qualify for a registration exemption under U.S. securities laws. Contractual transfer restrictions (e.g., Right of First Refusal) can apply. Companies are not subject to SEC reporting requirements beyond antifraud provisions.	Shares are registered with the SEC and traded in fully regulated public markets. Investors benefit from mandated disclosures, insider trading prohibitions, and other protections, and no issuer permission is necessary to effect trades.

Table 2. Secondary Market Sample: Descriptive Statistics

This table provides summary statistics for the sample of secondary market orders for startups. The firm-level variables are averages as of the time of the order. Observation counts differ across rows because a statistic is shown only when its underlying variable is non-missing. All continuous variables except years since first VC financing are winsorized at the 1% level. Percentages and price ratios are multiplied by 100 for ease of interpretation. For variable definitions and details of their construction, see Appendix A.

	N	Mean	SD	Min	P25	P50	P75	Max
% Orders with price	11,925	67.8	46.7	0.0	0.0	100.0	100.0	100.0
% Orders with VC reference	11,925	75.2	43.2	0.0	100.0	100.0	100.0	100.0
% Executed trade order	11,925	3.8	19.2	0.0	0.0	0.0	0.0	100.0
% Buy order	11,925	29.4	45.5	0.0	0.0	0.0	100.0	100.0
% Sell order	11,925	66.8	47.1	0.0	0.0	100.0	100.0	100.0
Price ratio rel. to most recent VC round	6,375	88.7	89.5	7.8	42.3	66.7	100.0	598.6
Order volume (mn)	5,141	0.9	2.3	0.0	0.0	0.2	0.9	62.5
Order value (mn)	5,077	9.7	15.3	0.0	1.0	5.0	10.0	350.0
% Early stage	8,970	2.1	14.3	0.0	0.0	0.0	0.0	100.0
% Mid stage	8,970	23.6	42.5	0.0	0.0	0.0	0.0	100.0
% Late stage	8,970	74.3	43.7	0.0	0.0	100.0	100.0	100.0
No. of VC rounds	8,970	6.4	3.8	1.0	4.0	6.0	8.0	27.0
Cumulative VC capital raised (mn)	8,970	946.6	1439.2	11.8	264.6	427.6	860.7	7309.5
Years since first VC financing	8,970	8.5	3.8	0.0	5.9	8.1	10.6	23.2
Months since most recent VC round	8,970	25.3	17.4	0.4	11.0	25.0	35.5	92.7

Table 3. Mutual Fund Holdings Sample: Descriptive Statistics

This table provides summary statistics for mutual funds' quarterly holdings of pre-IPO startup shares. The sample comprises 309 mutual funds observed over 3,767 fund-quarters, with an average of 5.7 startup holdings per fund-quarter. The unit of observation is a fund-startup-quarter. Dollar values are expressed in millions. Percentages and price ratios are multiplied by 100 for ease of interpretation. Price ratios are winsorized at the 1% level. For variable definitions and details of their construction, see Appendix A.

	N	Mean	SD	Min	P25	P50	P75	Max
Fund position value (mn)	21,384	7.7	21.2	0.0	0.4	2.0	6.9	625.2
% Update of fund mark	19,729	68.7	46.4	0.0	0.0	100.0	100.0	100.0
% Change in fund mark	13,537	3.2	90.1	−99.7	−13.6	−1.7	7.9	3500.0
% Any order	21,384	43.0	49.5	0.0	0.0	0.0	100.0	100.0
% Any priced order	21,384	29.0	45.4	0.0	0.0	0.0	100.0	100.0
No. of orders	21,384	2.1	4.9	0.0	0.0	0.0	2.0	55.0
No. of executed trades	21,384	0.2	0.9	0.0	0.0	0.0	0.0	40.0
No. of buy orders	21,384	1.0	2.6	0.0	0.0	0.0	1.0	33.0
No. of sell orders	21,384	0.9	2.5	0.0	0.0	0.0	1.0	27.0
Price ratio rel. to fund mark	5,183	103.8	66.6	10.0	71.7	93.8	115.8	450.3
... only executed trades	1,793	93.8	45.3	9.1	67.0	94.3	111.3	224.3
... only buy orders	2,727	81.5	31.5	10.0	64.2	85.9	102.3	168.1
... only sell orders	4,042	110.2	77.7	10.1	75.0	95.8	122.2	509.8
% VC reference available	21,384	69.7	46.0	0.0	0.0	100.0	100.0	100.0
% VC round in quarter	14,896	8.7	28.1	0.0	0.0	0.0	0.0	100.0
% Early stage	14,896	0.6	7.4	0.0	0.0	0.0	0.0	100.0
% Mid stage	14,896	16.0	36.7	0.0	0.0	0.0	0.0	100.0
% Late stage	14,896	83.4	37.2	0.0	100.0	100.0	100.0	100.0

Table 4. Determinants of Secondary Market Discounts

The table reports OLS estimates (equation (1)) from regressions of secondary market pricing on indicators for the order type, proxies for market liquidity, valuation signals from other secondary market participants, and measures of firm momentum. The dependent variable is the log secondary market price ratio relative to the most recent VC round. The unit of observation is an individual secondary market order for shares of a startup with a non-missing price. We control for log firm age, the log cumulative VC capital raised, the log number of VC rounds raised, and indicators for firm stage (Early/Mid/Late). In addition, all specifications include firm fixed effects, year–quarter fixed effects, and fixed effects for the number of quarters since the most recent VC round. For variable definitions and details on their construction, see Appendix A. Heteroskedasticity-consistent standard errors clustered at the firm level are shown in italics underneath the coefficient estimates. ***, **, and * denote significant at the 1%, 5%, and 10% level, respectively.

	Log price ratio rel. to most recent VC round		
	(1)	(2)	(3)
𝟙(Buy order)	−0.187***	−0.189***	−0.209***
	0.015	*0.017*	*0.018*
𝟙(Executed trade)	−0.141***	−0.177***	−0.177***
	0.041	*0.034*	*0.035*
Log no. of orders over past 90 days		−0.003	−0.002
		0.016	*0.016*
Demand imbalance over past 90 days		0.039*	0.038*
		0.021	*0.021*
Log average price ratio over past 90 days		0.434***	0.438***
		0.066	*0.065*
Change in share price in the last VC round		−0.011	−0.012
		0.010	*0.010*
𝟙(Last VC round is a down round)		0.008	0.007
		0.023	*0.023*
Log order volume		−0.025***	−0.031***
		0.010	*0.010*
𝟙(Common stock)			−0.095***
			0.023
𝟙(Share class is missing)			−0.008
			0.016
Diagnostics			
R^2	84.4%	89.8%	89.9%
No. of obs.	6,176	3,216	3,216

Table 5. VC Financing Events: Difference-in-Differences Estimates

The table reports difference-in-differences (DiD) estimates (equation (2)) of the effect of VC financing rounds on secondary market order flow and pricing over the 9-month window from six months before the VC financing (t–6) to two months after the VC financing (t+2) relative to matched control firms. The matched control group consists of startups that do not raise VC financing during the window [t–6, t+2] and show no observable differences in the time since the first VC round, the VC financing stage, the total amount raised, and the trading activities of their private shares, with matching performed as of t–4. The sample in Columns 1 to 5 includes all 365 matched VC financing events, whereas Column 6 considers only the 17 VC financing events for which we can construct the log price ratio relative to the previous VC round for both the treated firm and the control firm. The large drop in observations is due to a lack of good controls where both the treated and control firm have orders with prices in the match period. We use the matching month, t–4, as the omitted reference month in the specifications. The dependent variables are indicated at the top of each column. For the log price ratio, if there is no order or the order has no price, we impute missing values in the mean order price in a given month with the most recent available mean order price. All specifications include firm-by-cohort fixed effects, calendar-month-by-cohort fixed effects, and event time indicators. For variable definitions and details on their construction, see Appendix A. Heteroskedasticity-consistent standard errors clustered at the firm level are shown in italics underneath the coefficient estimates. ***, **, and * denote significant at the 1%, 5%, and 10% level, respectively.

	Order flow and pricing					
	No. of orders (1)	No. of buy orders (2)	No. of sell orders (3)	Demand imbalance (4)	No. of trades (5)	Log price ratio (6)
Pre-event period						
𝟙(VC financing) x 𝟙([t–6,t–5])	0.022	0.019	−0.004	0.014	0.007	0.027
	0.028	*0.026*	*0.020*	*0.017*	*0.009*	*0.038*
Anticipation period						
𝟙(VC financing) x 𝟙([t–3,t–2,t–1])	0.019	0.039	−0.030	0.027	0.010	0.081
	0.033	*0.029*	*0.021*	*0.018*	*0.006*	*0.054*
Post-event period						
𝟙(VC financing) x 𝟙([t,t+1,t+2])	0.127**	0.089**	0.040	0.024	−0.002	0.262**
	0.049	*0.037*	*0.036*	*0.020*	*0.007*	*0.123*
Diagnostics						
R^2	73.1%	59.3%	64.1%	32.6%	46.3%	93.7%
No. of obs.	6,570	6,570	6,570	6,570	6,570	306

Table 6. Secondary Market Prices and Future Changes in Startup Valuations

The table reports OLS estimates from predictive regressions of startup valuation changes at the next VC round on secondary market prices. The unit of observation is a secondary market order. The sample consists of orders for firms with both a prior and a subsequent VC round. The dependent variable is the logarithm of the ratio of the price in the next VC round to the price in the most recent VC round. All specifications include year–quarter fixed effects. For variable definitions and details on their construction, see Appendix A. Heteroskedasticity-consistent standard errors clustered at the firm level are shown in italics underneath the coefficient estimates. ***, **, and * denote significant at the 1%, 5%, and 10% level, respectively.

	Log price ratio of *next* VC round to *most recent* VC round			
	(1)	(2)	(3)	(4)
Log price ratio rel. to most recent VC round	0.547***	0.506***	0.492***	0.548***
	0.087	*0.085*	*0.094*	*0.093*
. . . x 𝟙(Executed trade)			0.064	
			0.107	
. . . x 𝟙(Employee seller)				−0.227**
				0.108
𝟙(Executed trade)			0.175***	
			0.046	
𝟙(Employee seller)				−0.067
				0.067
Log of the most recent VC valuation		−0.071	−0.074	−0.060
		0.051	*0.050*	*0.051*
Log of months since that valuation		−0.038	−0.044	−0.042
		0.053	*0.052*	*0.051*
Diagnostics				
R^2	39.6%	47.9%	49.1%	48.9%
No. of obs.	668	667	667	667

Table 7. Mutual Fund Valuation Updates and Secondary Market Activity

The table reports OLS estimates that relate secondary market order flow and prices to the quarterly valuation updates of mutual funds' pre-IPO startup holdings. The unit of observation is a mutual fund-startup-quarter. We aggregate secondary market activity between the previous and current mutual fund valuation dates. The dependent variable in columns 1 and 2 is an indicator that the mutual fund revised its mark relative to the preceding quarter, and we estimate a linear probability model. The dependent variable in column 3 is the percentage change in the mutual fund's valuation, restricting the sample to mutual-fund-startup-quarters with a valuation change. The dependent variable in column 4 is the logarithm of the ratio of the price per share in the next VC round to the fund's current mark, conditional on a next round existing and no VC round occurring in the quarter. 𝟙(No executed trade) indicates that no trade takes place for a firm in a given quarter. All specifications include fixed effects for the mutual fund, company, and year–quarter. For variable definitions and details on their construction, see Appendix A. Heteroskedasticity-consistent standard errors clustered at the firm level are shown in italics underneath the coefficient estimates. ***, **, and * denote significant at the 1%, 5%, and 10% level, respectively.

	𝟙(Update of fund mark)		Perc. change in fund mark	Log ratio of next VC price to fund mark
	(1)	(2)	(3)	(4)
𝟙(Any order)	0.033			
	0.036			
Log average price ratio rel. to fund mark		0.162***	21.512***	0.308*
		0.049	*5.103*	*0.167*
. . . x 𝟙(No executed trade)		−0.211***	−4.672	−0.324
		0.071	*5.044*	*0.256*
𝟙(No executed trade)		−0.098**	−3.810**	0.135
		0.040	*1.734*	*0.111*
Log of fund's lagged position value	0.016	−0.008	−0.510	−0.007
	0.011	*0.009*	*0.404*	*0.012*
Log of the most recent VC valuation	0.082	−0.154	−26.038***	−1.678
	0.069	*0.219*	*9.664*	*1.341*
Log of months since that valuation	0.187***	0.153***	1.555	0.011
	0.031	*0.045*	*2.183*	*0.117*
Diagnostics				
R^2	36.5%	35.0%	37.9%	76.2%
No. of obs.	11,462	3,819	2,939	1,075

A. Variable Definitions

Variable	Definition
A. Order-level measures	
$\mathbb{1}$(Executed trade)	Indicator equal to 1 for an executed trade, 0 otherwise.
$\mathbb{1}$(Buy order)	Indicator equal to 1 for a submitted buy order, 0 otherwise.
$\mathbb{1}$(Sell order)	Indicator equal to 1 for a submitted sell order, 0 otherwise.
Price	Order price per share.
Price ratio rel. to most recent VC round	Order price per share divided by the most recent VC round's price per share: $\ln(P_{\text{order}}/P_{\text{VC,last}})$.
Order volume	Number of shares in the order, in millions.
Order value	Notional dollar value of the order, in millions of USD.
$\mathbb{1}$(Common stock)	Indicator equal to 1 for an order involving common stock, and 0 otherwise.
$\mathbb{1}$(Share class is missing)	Indicator equal to 1 if the order's share class is missing, and 0 otherwise.
$\mathbb{1}$(Employee seller)	Indicator equal to 1 for a sell order by an employee, and 0 otherwise. We infer seller type as employee, executive, or institutional investor based on the type of shares and the value of the order relative to the most recent post-money valuation. For more details, see Section 2.1.
$\mathbb{1}$(Executive seller)	Indicator equal to 1 for a sell order by an executive, and 0 otherwise. We infer seller type as employee, executive, or institutional investor based on the type of shares and the value of the order relative to the most recent post-money valuation. For more details, see Section 2.1.
$\mathbb{1}$(Institutional seller)	Indicator equal to 1 for a sell order by an institutional investor, and 0 otherwise. We infer seller type as employee, executive, or institutional investor based on the type of shares and the value of the order relative to the most recent post-money valuation. For more details, see Section 2.1.
B. Aggregated order flow and pricing	
No. of orders	The total number of orders over the relevant time window.
No. of buy orders	The total number of buy orders over the relevant time window.
No. of sell orders	The total number of sell orders over the relevant time window.
Demand imbalance	Net supply–demand imbalance over the relevant time window: (No. of buy orders − No. of sell orders)/(No. of buy orders + No. of sell orders).
Price ratio	Average ratio of the order price per share to the most recent VC round's price per share: $\frac{1}{N_o}\sum_{o\in\mathcal{T}}(P_{\text{order},o}/P_{\text{VC},last})$, where N_o is the number of all priced orders for the startup within the relevant time window.
C. VC financing	
$\mathbb{1}$(Firm has VC financing history)	Indicator equal to 1 if at least one VC financing round is observed for the startup in our data, and 0 otherwise.
$\mathbb{1}$(VC reference available)	Indicator equal to 1 if the startup has an observed VC financing round before the date of the observation, and 0 otherwise. For orders, the relevant date is when the order was placed. For mutual funds, it is the valuation date.

Continued on next page

Variable	Definition
Price of most recent VC round	Price per share from the most recent VC financing round.
Change in share price in last VC round	Ratio of the price per share in the most recent VC round to the price per share in the immediately preceding VC round: $\ln(P_{\text{VC,last}}/P_{\text{VC,prev}})$.
$\mathbb{1}$(Early stage)	Indicator equal to 1 if the startup's most recent VC round is Seed or Series A, and 0 otherwise.
$\mathbb{1}$(Mid stage)	Indicator equal to 1 if the startup's most recent VC round is Series B or Series C, and 0 otherwise.
$\mathbb{1}$(Late stage)	Indicator equal to 1 if the startup's most recent VC round is Series D or later, and 0 otherwise.
No. of VC rounds	Cumulative number of observed VC financing rounds raised by the startup as of the observation date.
Cumulative VC capital raised	Total capital raised across observed VC financing rounds as of the observation date, in millions of USD.
Time since first VC financing	Number of years or months since the startup's first observed VC financing round as of the observation date.
Months since most recent VC round	Number of months elapsed between the observation date and the most recent VC round date.
Price ratio of next VC round to most recent VC round	Ratio of the price per share in the startup's next VC round to the price per share in the most recent VC round: $\ln(P_{\text{VC,next}}/P_{\text{VC,last}})$.
Most recent VC valuation	Post-money valuation in the startup's most recent observed VC financing round as of the observation date.
D. Mutual-fund-holding measures	
Fund mark	The price per share at which the mutual fund values the startup at a valuation date.
$\mathbb{1}$(Update of fund mark)	Indicator equal to 1 if the mutual fund changes its mark for a holding relative to its prior valuation, and 0 otherwise. This variable is not defined for the first quarter of a holding.
Percent change in fund mark	Percentage change in the mutual fund's mark from the prior valuation.
Ratio of next VC price to fund mark	Ratio of the price per share in the startup's next VC round to the mutual fund's current mark: $(P_{\text{VC,next}}/P_{\text{MF},t})$, where $P_{\text{MF},t}$ is the fund's mark at the end of the quarter in which we measure secondary market activity.
Average price ratio rel. to fund mark	Average order price divided by the mutual fund's most recent mark: $\frac{1}{N_o}\sum_{o\in\mathcal{Q}}(P_{\text{order},o}/P_{\text{MF},t-1})$, where N_o is the number of all priced orders for the startup between the mutual fund's previous and current valuation dates.
$\mathbb{1}$(No executed trade)	Indicator equal to 1 if no executed trade occurs for the startup between the mutual fund's previous and current valuation dates, and 0 otherwise. When equal to 1, any "Average price ratio rel. to fund mark" is computed solely with buy and sell orders.
Fund position value	End-of-quarter value of the mutual fund's position in the startup, in millions of USD.

INTERNET APPENDIX

for

Secondary Markets for VC-Backed Startup Equity

(NOT INTENDED FOR PUBLICATION)

IA.1. Institutional Details

IA.1.1. Regulatory Restrictions

Under the Securities Act of 1933, any sale of securities must be registered with the SEC or qualify for an exemption. Private companies typically issue shares in unregistered private sales, relying on exemptions such as Regulation D or through the limited disclosure framework provided by Section 4(a)(2). In these transactions, the shares are designated as *restricted securities* using a legend on the stock certificate.[8] Restricted securities cannot be resold to the public unless registered or unless the resale satisfies conditions for an exemption from registration.

The most common exemption for individual sellers is Rule 144, which provides a safe harbor that allows holders of restricted stock to resell without registration by establishing the conditions that enable a sale without triggering a registration requirement. For non-affiliates, the main requirement for selling restricted shares in private (non-reporting) companies is having held the security for at least a year. Affiliates face additional restrictions under Rule 144 even after the holding period—including volume limits on how much stock can be sold in any three-month period, manner-of-sale requirements (sale through brokers or market-makers), and the need for adequate current information about the issuer.[9,10]

Prior to actually selling a security to the public under Rule 144, the restrictive legend needs to be removed from the security certificate. This process is complex, as only a transfer agent can remove the legend, and doing so requires a legal opinion letter citing the rule and facts justifying its removal, as well as issuer consent.[11] Note that while removing the legend takes

[8] A related concept is "control securities", which are securities held by an "affiliate" (insider). If an investor buys such securities they also become restricted, even if they were not restricted when held by the affiliate.

[9] An affiliate cannot sell more than 1% of outstanding shares of a given class within a three-month period. Additionally, an affiliate must file a notice with the SEC on Form 144 if the aggregate sale within any three-month period exceeds 5,000 shares or $50,000.

[10] According to the SEC, "an affiliate is a person, such as an executive officer, a director or large shareholder, in a relationship of control with the issuer. Control means the power to direct the management and policies of the company in question, whether through the ownership of voting securities, by contract, or otherwise."

[11] The "transfer agent" is responsible for updating the official share register. This might be the startup itself or a service provider such as Nasdaq Private Markets or Carta acting in that capacity.

away limitations under the securities laws, company-specific restrictions may still limit the ease of future sales.[12]

While Rule 144 is often used by insiders or early investors after a holding period, Rule 144A provides a different exemption aimed at large, institutional resales. Rule 144A allows the resale of restricted securities without any holding period if the sale is made exclusively to Qualified Institutional Buyers (QIBs)—generally institutions managing at least $100 million in securities. This rule is typically used to create a private market among institutions and does not permit general public sales.

Sellers may also rely on Section 4(a)(7), which Congress codified in the 2015 FAST Act and which formalized what practitioners previously referred to as the "Section 4(a)(1$\frac{1}{2}$)" exemption. Under Section 4(a)(7), the resale of securities by a person other than the issuer is exempt from registration, provided:

1. the purchaser is an accredited investor,
2. no general solicitation is used,
3. the issuer is not in bankruptcy or a shell company, and
4. certain basic information (including financial statements if the issuer is not an SEC-reporting entity) is made available.

Note that in sales relying on Rule 144A and Section 4(a)(7), the security remains restricted and the buyer would have to rely on their own exemption for any future sale.

For non-affiliates wishing to sell a relatively small position, Section 4(a)(1) of the Securities Act (exempting "transactions by any person other than an issuer, underwriter, or dealer") can apply if the sale does not resemble a broader distribution. Rule 144 effectively functions as a *safe harbor* to ensure the seller is not viewed as an underwriter, but sellers sometimes

[12]The "restricted" legend is also removed following registration of the securities with the SEC. This is what happened when Facebook was forced to go public after it crossed the former threshold of 500 shareholders. The JOBS Act increased this threshold to 2,000 shareholders, while also allowing employees who received shares via compensation plans and certain institutional custodians to be excluded from the count. de Fontenay (2017) argues that this regulatory change contributes to allowing firms to stay private for longer. A Financial Times article argued in 2021 that the Facebook case led to a host of new restrictions on company shares to manage the shareholder base. Companies such as EquityZen offer SPVs to pool investors into a single shareholder on the books, assisting companies in staying below the limit.

structure private, one-off sales in reliance on Section 4(a)(1) alone, coupled with strict investor qualification. Although used less frequently on its own—especially where standard practice is to rely on Rule 144—Section 4(a)(1) remains an underlying statutory basis for non-issuer transactions in the private market.

IA.1.2. Contractual and Internal Governance Restrictions

Complementing federal securities law are a variety of company-imposed contractual restrictions that govern the transfer of private shares. Although these provisions vary by company, common ones include:

- **Right of First Refusal (ROFR):** Before any shareholder may sell shares to an external party, the shares must first be offered to the company or its existing investors on identical terms.
- **Co-Sale (Tag-Along) Rights:** In tandem with ROFR, co-sale rights ensure that if a major shareholder opts to sell, minority shareholders have the right to participate on a pro rata basis.
- **Transfer Consent and Lock-Up Provisions:** In many companies, any transfer of shares requires board approval to prevent unwanted ownership changes. Lock-up agreements further restrict the sale of shares for predetermined periods and are especially prevalent around liquidity events like an IPO.

IA.1.3. Market Structure and Trading Infrastructure

Unlike public markets that operate on centralized exchanges with continuous trading, the secondary market for private shares is inherently fragmented and over-the-counter. Key features of this institutional structure include:

- **Decentralized Trading:** Secondary transactions are primarily executed through negotiated, bilateral deals rather than through a public order book. This results in markedly

lower trading frequencies and longer settlement times, often spanning several weeks due to the necessity of obtaining company consents and completing bespoke documentation.

- **Limited Transparency and Price Discovery:** In the absence of mandated public disclosure for private companies, pricing is typically inferred from the latest funding rounds or sporadic secondary market data. Consequently, buyers generally demand a liquidity discount to account for risks arising from information asymmetry and illiquidity.
- **Restricted Investor Base:** Both primary and secondary sales are largely confined to accredited investors and qualified institutional buyers. This limitation is inherent to the regulatory framework and is further enforced by contractual agreements, which together restrict market participation to financially sophisticated parties.

IA.1.4. Intermediaries and Platforms for Secondary Liquidity

A host of specialized intermediaries have emerged to bridge the liquidity gap in private share trading. These entities provide essential services that range from matching buyers and sellers to navigating the intricate legal requirements of each transaction. They may also provide information that enables price discovery, closing the information gap between potential buyers and sellers. Prominent among these are:

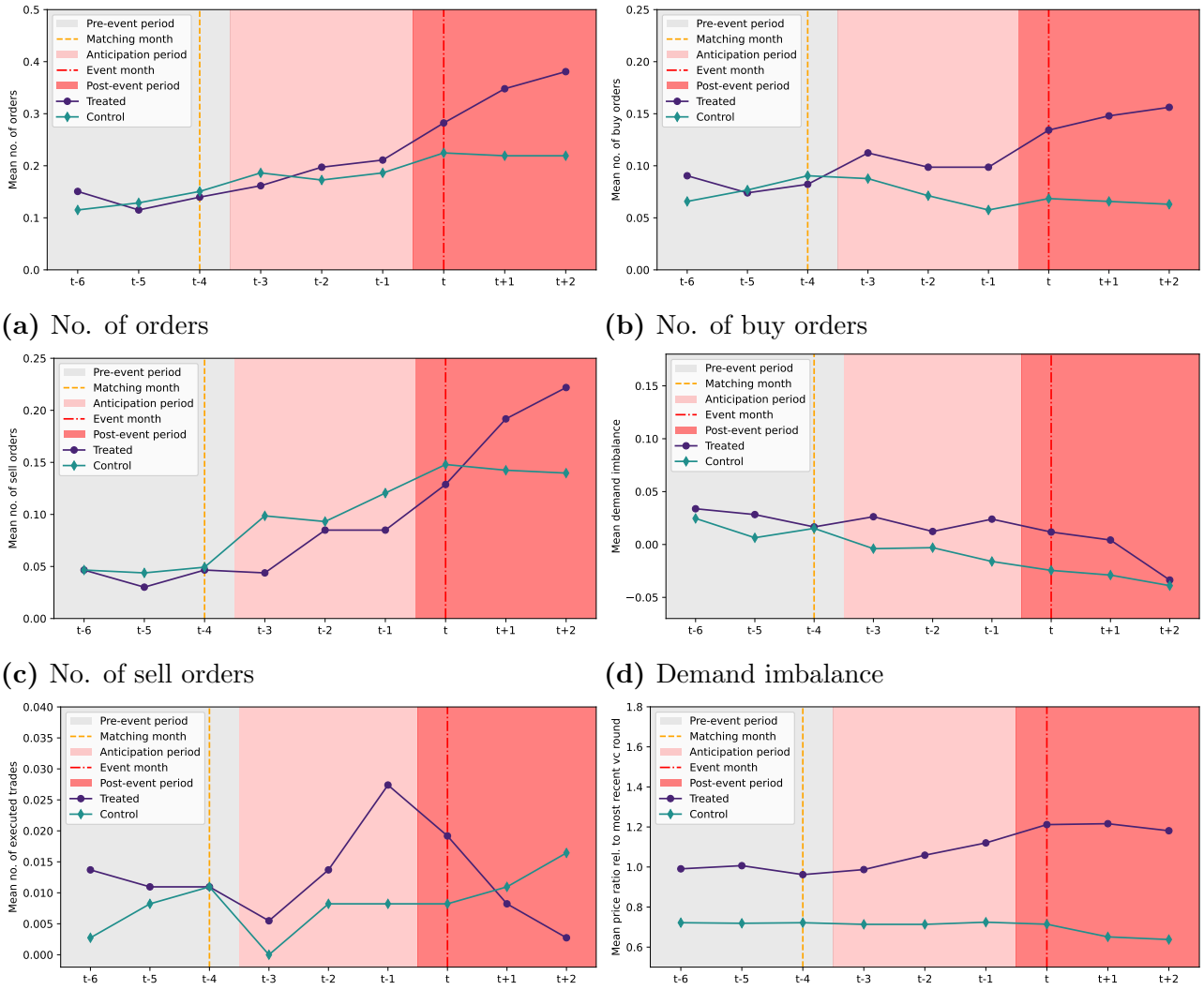
- **Broker-Dealer Platforms:** Firms such as Forge Global and EquityZen operate as SEC-registered broker-dealers, offering electronic marketplaces where private shares can be listed and negotiated. These platforms often facilitate transactions using special purpose vehicles (SPVs) to aggregate interest while maintaining a streamlined cap table.
- **Company-Sanctioned Marketplaces:** Nasdaq Private Market is an example of a technology and brokerage service that enables formal, company-led liquidity programs. Such platforms are frequently used to conduct structured tender offers or buybacks, providing a controlled environment for secondary sales.

These intermediaries effectively reduce the frictions inherent in a decentralized market by providing pricing guidance and legal coordination, and supporting regulatory compliance. In do-

ing so, they contribute to an evolving infrastructure that increasingly resembles an exchange—albeit one restricted to qualified investors and governed by strict securities exemptions.

IA.2. Additional Tests

This section presents additional tests and robustness checks.



(a) No. of orders

(b) No. of buy orders

(c) No. of sell orders

(d) Demand imbalance

(e) No. of trades

(f) Price ratio rel. to most recent VC round

Figure IA.1. VC Financing Events: Descriptive Statistics

The figure shows six measures of secondary market order flow and pricing for the 365 matched VC financing events and their 365 matched control firms over the 9-month window from six months before the VC financing (t–6) to two months after the VC financing (t+2). The matched control group consists of startups that do not raise VC financing during the window [t—6, t+2] and show no observable differences in the time since the first VC round, the VC financing stage, the total amount raised, and the trading activities of their private shares, with matching performed as of t–4. The sample in Panels (a) to (e) includes all 365 matched VC financing events, whereas Panel (f) considers only the 17 VC financing events for which we can construct the log price ratio relative to the previous VC round for both the treated firm and the control firm. For the log price ratio, if there is no order or the order has no price, we impute missing values in the mean order price in a given month with the most recent available mean order price. The large drop in observations is due to a lack of good controls where both the treated and control firm have orders with prices in the match period. We use the matching month, t–4, as the omitted reference month in the specifications. For variable definitions and details of their construction, see Appendix A.

Table IA.1. VC Financing Events: Matching Statistics

The table reports summary statistics for the 365 matched VC financing events and the 365 matched control firms four months before the VC financing (t–4). The matched control group consists of startups that do not raise VC financing during the window [t–6, t+2] and show no observable differences in the time since the first VC round, the VC financing stage, the total amount raised, and the trading activities of their private shares, with matching performed as of t–4. For variable definitions and details on their construction, see Appendix A. To test whether treated and matched control firms differ on observables, we use a t-test of equal means and the normalized difference developed by Imbens and Wooldridge (2009). For the t-test, we report the t-statistic based on standard errors clustered at the firm level.

	Treated firms			Control firms			Differences	
	Mean	SD	P50	Mean	SD	P50	t-Test of equal means	Imbens-Woold. Test
𝟙(Early stage)	0.121	0.326	0.000	0.121	0.326	0.000	0.000	0.000
𝟙(Mid stage)	0.452	0.498	0.000	0.452	0.498	0.000	0.000	0.000
𝟙(Late stage)	0.427	0.495	0.000	0.427	0.495	0.000	0.000	0.000
𝟙(Prior buy order)	0.216	0.412	0.000	0.216	0.412	0.000	0.000	0.000
𝟙(Prior sell order)	0.107	0.309	0.000	0.107	0.309	0.000	0.000	0.000
𝟙(Buy order)	0.047	0.211	0.000	0.047	0.211	0.000	0.000	0.000
𝟙(Sell order)	0.030	0.171	0.000	0.030	0.171	0.000	0.000	0.000
Years since first VC financing	5.227	3.157	4.917	5.302	2.899	4.833	−0.025	−0.337
Log VC funding raised	5.023	1.121	5.129	5.022	1.082	5.166	0.001	0.013
Cumulative no. of buy orders	0.836	3.336	0.000	0.784	3.061	0.000	0.016	0.223
Cumulative no. of sell orders	0.408	1.965	0.000	0.458	2.369	0.000	−0.023	−0.314
No. of buy orders	0.082	0.518	0.000	0.090	0.514	0.000	−0.016	−0.225
No. of sell orders	0.047	0.307	0.000	0.049	0.328	0.000	−0.009	−0.115

Table IA.2. VC Financing Events: Difference-in-Differences Estimates using Poisson Models

The table reports difference-in-differences (DiD) estimates (equation (2)) of the effect of VC financing rounds on secondary market order flow over the 9-month window from six months before the VC financing (t–6) to two months after the VC financing (t+2) relative to matched control firms, using Poisson regressions. The matched control group consists of startups that do not raise VC financing during the window [t–6, t+2] and show no observable differences in the time since the first VC round, the VC financing stage, the total amount raised, and the trading activities of their private shares, with matching performed as of t–4. We use the matching month, t–4, as the omitted reference month in the specifications. The dependent variables are indicated at the top of each column. All specifications include firm-by-cohort fixed effects, calendar-month-by-cohort fixed effects, and event time indicators. For variable definitions and details on their construction, see Appendix A. Heteroskedasticity-consistent standard errors clustered at the firm level are shown in italics underneath the coefficient estimates. ***, **, and * denote significant at the 1%, 5%, and 10% level, respectively.

	Order flow		
	No. of orders (1)	No. of buy orders (2)	No. of sell orders (3)
Pre-event period			
$\mathbb{1}$(VC financing) x $\mathbb{1}$([t–6,t–5])	0.057	0.126	−0.314
	0.213	*0.270*	*0.352*
Anticipation period			
$\mathbb{1}$(VC financing) x $\mathbb{1}$([t–3,t–2,t–1])	0.232	0.481*	−0.159
	0.205	*0.264*	*0.325*
Post-event period			
$\mathbb{1}$(VC financing) x $\mathbb{1}$([t,t+1,t+2])	0.483*	0.774***	0.410
	0.277	*0.290*	*0.386*
Diagnostics			
Pseudo R^2	68.3%	67.0%	71.4%
No. of obs.	6,570	6,570	6,570

Table IA.3. Secondary Market Prices and Future Changes in Startup Valuations: Excluding Orders Within 90 Days of Next VC Round

The table reports OLS estimates from predictive regressions of startup valuation changes at the next VC round on secondary market prices, excluding all secondary market orders during the 90 days before the next VC round. The unit of observation is a secondary market order. The sample consists of orders for firms with both a prior and a subsequent VC round. The dependent variable is the logarithm of the ratio of the price in the next VC round to the price in the most recent VC round. All specifications include year–quarter fixed effects. For variable definitions and details on their construction, see Appendix A. Heteroskedasticity-consistent standard errors clustered at the firm level are shown in italics underneath the coefficient estimates. ***, **, and * denote significant at the 1%, 5%, and 10% level, respectively.

	Log price ratio of *next* VC round to *most recent* VC round			
	(1)	(2)	(3)	(4)
Log price ratio rel. to most recent VC round	0.497***	0.501***	0.471***	0.541***
	0.113	*0.086*	*0.104*	*0.091*
. . . x 𝟙(Executed trade)			0.122	
			0.146	
. . . x 𝟙(Employee seller)				−0.209
				0.138
𝟙(Executed trade)			0.229***	
			0.059	
𝟙(Employee seller)				−0.119*
				0.063
Log of the most recent VC valuation		−0.044	−0.047	−0.033
		0.059	*0.055*	*0.058*
Log of months since that valuation		−0.030	−0.035	−0.031
		0.061	*0.056*	*0.060*
Diagnostics				
R^2	30.9%	40.8%	43.1%	41.7%
No. of obs.	367	366	366	366