Term Sheets or Term Loans? How Valuations Shape Financing of Venture-Backed Firms

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Abstract

This paper examines how valuation shapes the decision between debt and equity in firms backed by venture capital (VC). Building on market-timing theories from corporate finance, the analysis contrasts a "market-timing" hypothesis—higher valuations increase the likelihood of equity rounds—with a "VC-demand" hypothesis—higher valuations increase the likelihood of debt rounds because VC investors prefer low entry prices. Using PitchBook data on roughly 130,000 financing rounds in more than 50,000 companies between 1996 and 2023, the paper finds that higher valuations are associated with a lower propensity to obtain venture debt rather than venture capital, consistent with the view that venture debt allows entrepreneurial firms to postpone equity pricing when prevailing valuations are unattractive. The study further shows that this market-timing effect weakens with greater VC bargaining power and differs between insider and outsider equity rounds. The paper addresses endogeneity in valuations using an instrument based on mutual fund forced sales.

Keywords: Venture debt, venture capital, borrowing cost, valuation

JEL classifications: G24, G32

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1 Introduction

Corporate finance literature on market timing (e.g., Baker and Wurgler, 2002, Dong et al., 2012) argues that firms prefer equity over debt financing when valuations are high. While firms have incentives to raise equity at high valuations, investors generally prefer to purchase equity when valuations are low. Existing market-timing studies, as well as traditional capital structure theories such as the trade-off and pecking-order theories, typically model capital structure as a firm decision and do not explicitly incorporate investor preferences.

In contrast, much of the entrepreneurial finance literature on "timing" focuses on investors' entry and exit decisions rather than on entrepreneurs' financing choices. Compared to established firms, start-ups and young firms are typically more financially constrained and therefore more dependent on external investors' willingness to supply capital. As a result, one of their primary challenges is securing an investor willing to provide the necessary financing (e.g., Hall and Lerner, 2010). From the perspective of equity investors such as venture capitalists (VCs), low entry valuations are generally preferable because they are associated with higher expected returns. According to Gompers et al. (2020), 56% of VCs consider valuation to be an important or the most important criterion when deciding whether to invest; for late-stage deals, this share increases to 74%. The key question is whose preferences dominate the financing outcome. The answer likely depends on the relative bargaining power of entrepreneurial firms and VCs.

Our paper examines how industry valuations shape the financing outcomes of entrepreneurial firms. Under the market-timing hypothesis, entrepreneurial firms are more likely to raise venture capital when valuations are high and to rely on debt financing when valuations are low. In contrast, the VC-demand hypothesis predicts the opposite pattern: venture capitalists are more willing

to supply equity capital when valuations are low, increasing the likelihood of equity financing relative to debt financing. We first examine whether higher industry valuations are associated with a greater likelihood of equity rounds (consistent with the market-timing hypothesis) or debt rounds (consistent with the VC-demand hypothesis). We then investigate whether this relationship varies with the relative bargaining power of entrepreneurial firms and venture capitalists. Because valuation data are often unavailable for individual VC-backed firms, particularly at debt-financing rounds, we use industry-level valuations as a proxy for financing conditions. This approach is consistent with Imbierowicz and Rauch (2024), who show that valuations of VC-backed firms are driven more by peer valuations than by firm-specific fundamentals.

To this end, we use a dataset of almost 130,000 financing rounds in more than 50,000 companies between 1996 and 2023 from Pitchbook. We find that debt is less likely when industry valuations are high. This pattern suggests that, when industry valuations are elevated, founders prefer to lock in high prices by raising equity rather than taking on debt, even though investors would like to enter at lower valuations. In other words, despite the prominent role of investors in entrepreneurial finance, the timing of security choice in venture-backed firms remains largely driven by the issuing firm's incentives, echoing the traditional corporate finance view. Our result is thus consistent with the market-timing hypothesis rather than the VC-demand hypothesis. However, this effect becomes weaker as VC bargaining power increases. When VCs hold more bargaining power, they can more credibly refuse to invest at inflated equity valuations and instead steer founders toward debt-like instruments or postpone equity financing.

The entrepreneur–VC conflict described above becomes more nuanced once we account for the staged nature of venture capital financing (e.g., Gompers, 1995). Because VC-backed firms typically raise capital through multiple financing rounds, investors' incentives depend on whether

they are incumbent shareholders or prospective new investors. While new investors generally prefer low entry valuations to obtain more favorable investment terms, incumbent investors may benefit from higher valuations because they reduce dilution when new capital is raised. This distinction is particularly pronounced when incumbents do not participate in the follow-on round. In that case, incumbents' interests are closely aligned with those of entrepreneurs, as both benefit from high valuations that attract new equity capital while minimizing dilution. Consequently, the effect of valuations on financing outcomes will also depend on the composition of the investor syndicate. We therefore examine whether the relationship between valuations and financing outcomes differs between rounds involving primarily incumbent investors and rounds involving new investors.

An obvious challenge in our setting is endogeneity. Aggregate industry valuations and firms' financing outcomes might be driven by unobserved factors. For example, unobserved shocks to industry growth opportunities could simultaneously inflate aggregate valuations and alter a firm's propensity to raise equity over debt. To address this concern, we employ an instrumental variable approach. Following Liu and Tian (2022), we construct our instrument as the industry-average frequency of hypothetical mutual fund forced sales driven by fund outflows over the year. This instrument generates plausibly exogenous variation in aggregate industry valuations that is rooted in non-fundamental investor redemptions rather than underlying startup financing conditions.

The exclusion restriction requires that these hypothetical outflows affect an individual firm's security choices exclusively through their impact on industry valuations. This assumption is highly plausible because our instrument is not constructed from actual, discretionary mutual fund transactions, which could reflect managers' private information about industry prospects. Rather, following Edmans et al. (2012), it captures purely mechanical, hypothetical selling pressure. Because these simulated flows are triggered by random, liquidity-driven redemptions at the fund

level, they create severe price pressure for non-fundamental reasons, safely isolating market-driven valuation shocks from fundamental business changes.

This paper contributes to several strands of the literature by bringing a classic corporate finance question—security choice and market timing—into the context of venture-backed firms and staged entrepreneurial finance. First, the paper extends the market timing literature (e.g., Baker and Wurgler, 2002, Graham and Harvey, 2001) by showing that valuations shape the debt-versus-equity financing in entrepreneurial firms in a way that is consistent with evidence for public firms. While existing work focuses on seasoned equity offerings and aggregate capital structure dynamics of listed firms, this paper documents that high industry valuations are associated with a greater use of equity over debt in venture-backed firms, consistent with a market-timing interpretation in an entrepreneurial setting.

Second, the paper contributes to the entrepreneurial finance literature on bargaining power and financing terms by relating security choice to the relative bargaining strength of founders and VCs. Prior work emphasizes how bargaining power and negotiation structure shape contract design, ownership allocation, and the likelihood of obtaining financing (e.g., Hsu, 2004, Kaplan and Strömberg, 2003). This paper suggests that when VCs' bargaining power is stronger, they can resist founders' incentives to time equity issuance during periods of high valuations, instead steering financing deals toward debt-like instruments or delaying equity rounds.

Third, the analysis adds to research on staged financing and insider versus outsider rounds by highlighting how industry-level valuations interact with insider participation incentives. Existing work studies whether incumbent VCs use inside rounds opportunistically, for example, to dilute founders at low valuations or to provide backstop financing when external capital is scarce (e.g., Broughman and Fried, 2012). This paper complements that literature by showing that the aggre-

gate pattern of debt versus equity across rounds is systematically related to valuation conditions, and that this relationship depends on the effective bargaining position of insiders, thereby linking macro valuation cycles to micro contract outcomes in staged VC financing.

Finally, the paper speaks to the emerging literature on venture debt and the supply of non-equity financing to start-ups, which has largely treated venture debt as a specialized product with distinct contracting features rather than as an outcome of valuation conditions (Davis et al., 2020, De Rassenfosse and Fischer, 2016, González-Uribe and Mann, 2024, Tykvová, 2017). Debt can play a meaningful role in start-up financing and subsequent performance (Chava et al., 2017, Cole and Sokolyk, 2018). Start-up firms with stronger performance prospects are more likely to obtain business debt rather than relying solely on equity, and such business debt is associated with higher survival probabilities and revenue growth (Cole and Sokolyk, 2018). By documenting that the propensity to use debt versus equity in venture-backed firms varies systematically with industry valuations, the paper supports the view that venture debt is an important source of financing for entrepreneurial firms, rather than merely a niche add-on to equity financing.

The remainder of the paper is organized as follows. Section 2 reviews related literature and develops testable hypotheses. In Section 3, we provide data sources and variable descriptions. We report and discuss the empirical results on the relation between valuation and financing choice in venture-backed firms in Section 4. Section 5 offers concluding remarks.

2 Background and hypotheses development

2.1 Market timing and security choice

Market timing theories argue that firms exploit temporary mispricing by issuing equity when valuations are high and repurchasing or relying more on debt when valuations are low (Baker and Wurgler, 2002). This view complements traditional trade-off and pecking-order theories by emphasizing time variation in financing costs and issuance behavior at the aggregate level (Graham and Harvey, 2001). In public markets, empirical work links high market-to-book ratios and favorable equity conditions to increased equity issuance and persistent effects on capital structure, suggesting that security choice is partly driven by managers' attempts to time equity markets (Baker and Wurgler, 2002).

In entrepreneurial finance, a similar trade-off arises, but the relevant "market" is the private venture market and the key margin is the choice between equity-like and debt-like securities in each financing round. In our setting, "debt" predominantly takes the form of venture debt, that is, non-equity financing provided to young, often VC-backed firms and tailored to high-growth, intangible-asset-intensive businesses. Existing work emphasizes how venture debt lenders rely on VC backing, collateral such as intellectual property, and covenants to mitigate risk, often treating venture debt as a specialized product in a segmented market (Davis et al., 2020, De Rassenfosse and Fischer, 2016, González-Uribe and Mann, 2024, Hochberg et al., 2018, Tykvová, 2017). From a market-timing perspective, however, venture debt is an alternative to equity that is less sensitive to current equity prices.

When industry-level valuations are high, entrepreneurs face a strong incentive to raise equity and lock in favorable prices, whereas VCs may prefer to wait for lower entry valuations or to

structure investments using less valuation-sensitive instruments such as venture debt or other debt-like claims. If founders' timing motives dominate, high valuations should tilt the security choice toward equity rather than debt. This leads to the following baseline hypothesis:

Hypothesis 1 (Market-timing hypothesis) *The likelihood that a financing round is structured as equity rather than debt increases with industry-level valuations, reflecting firm preferences to raise equity when valuations are high.*

2.2 VC demand and security choice

An alternative perspective emphasizes that investors, rather than entrepreneurs, may primarily drive security choice. From this "VC-demand" view, VCs prefer to enter at low valuations, which increase their expected returns and ownership stakes, and may therefore be unwilling to provide new equity capital when industry-level valuations are elevated. Instead, they can respond to what they perceive as overpriced equity by rationing equity capital, postponing equity rounds, or favoring less valuation-sensitive instruments such as venture debt or other debt-like claims.

In entrepreneurial finance, this investor-driven margin is particularly salient because start-ups are financially constrained and depend on the willingness of outside investors to supply capital. If VCs hold substantial bargaining power, they can resist founders' attempts to time high valuations by refusing to invest on equity terms they deem unattractive and by steering financing toward debt-like instruments that limit their exposure to valuation risk while maintaining optionality for future equity participation at more favorable prices. Under this view, high industry-level valuations should be associated with a relative shift away from equity and toward debt, reflecting investors' demand for securities that are less directly tied to elevated equity prices.

Hypothesis 2 (VC-demand hypothesis) *Higher industry-level valuations are associated with a higher likelihood that a financing round is structured as debt rather than equity, reflecting investors' reluctance to supply new equity at elevated valuations.*

2.3 Relative bargaining power

In entrepreneurial settings, security choice is not determined unilaterally by the firm but arises from bargaining between founders and investors. Bargaining models and empirical work show that the allocation of cash flow and control rights, as well as pricing, depends on the relative outside options and reputational capital of the parties (e.g. Hsu, 2004, Kaplan and Strömberg, 2003). When founders have strong outside options or when competition among investors is intense, founders obtain higher valuations and more founder-friendly security terms; conversely, powerful investors can push for investor-friendly contracts and lower valuations (Hsu, 2004).

Applied to market timing, this framework implies that the extent to which high valuations translate into equity issuance should depend on VC bargaining power. If VCs are weak, founders can exploit favorable valuation conditions by issuing equity at high prices and limiting the use of venture debt. If VCs are strong, they can resist such timing by insisting on debt-like or hybrid securities, or by postponing equity issuance until valuations are less extreme. In particular, powerful insiders may prefer to use venture debt or inside rounds at lower valuations to increase their stake on more favorable terms. This leads to our third hypothesis:

Hypothesis 3 (Bargaining-power hypothesis) *Entrepreneurial bargaining power strengthens the positive relationship between industry-level valuations and the likelihood of equity (vs. debt) financing.*

2.4 Insider versus outsider rounds

Staged capital commitment is fundamental to venture capital governance, serving to mitigate agency and information frictions between founders and investors (Gompers, 1995, Sahlman, 1990). The staged approach grants investors discretion to exit underperforming ventures and renegotiate deal terms as additional information materializes (Gompers, 1995). This structure naturally gives rise to heterogeneous follow-on rounds: some are led by new external investors, while others involve predominantly or exclusively incumbent VCs.

The composition of investors in a round has important implications for how valuation matters. When fresh capital from outside investors dominates, both founders and existing shareholders benefit from elevated valuations, as they reduce ownership dilution for all incumbents. Conversely, when existing VCs drive the round as primary participants, they acquire incremental ownership at the prevailing valuation, making lower prices advantageous for stake expansion and improved terms. This divergence in preferences creates a natural sorting mechanism: at high valuations, insiders may prefer to sit out and allow outsiders to enter at inflated prices; at low valuations, insiders may step in to increase their stake on favorable terms. Prior research documents that insider-dominated rounds can serve as a strategic tool for VCs to consolidate control when their bargaining position strengthens (Broughman and Fried, 2012), suggesting that the insider/outsider composition is endogenous to valuation conditions and the underlying balance of power in the relationship.

Hypothesis 4 (Outsider round hypothesis) *The positive relation between industry-level valuations and the likelihood of equity financing is stronger for outsider rounds.*

3 Data and variable description

The main data for our analysis comes from Pitchbook (North America) and contains 129,965 financing rounds, including both debt and equity, for more than 50,000 venture-backed companies between 1996 and 2023. We first identify all completed equity rounds for companies founded in or after 1996 from PitchBook. We require that all equity deals are classified as "Venture Capital", and the detail types are either early stage, later stage, or seed stage. The number of equity deals equal 158,763. We also redefine an equity deal as a debt deal if the ratio of debt associated with the equity deal is greater than zero. Of 158,763 equity deals, 10,386 deals are reclassified as hybrid deals, and 148,377 deals are financed entirely by equity. We also calculate the proportion of debt associated with each equity deal.

Similarly, we identify all completed deals classified as "Debt" from Pitchbook. Only debt rounds with particular purposes as convertible debt, merger & acquisition, general, PPP, debt conversion, refinancing, repayment, leveraged recapitalization and mezzanine are selected. The sample of debt transactions has 68,557 observations.

Combining equity, hybrid, and debt deals leads to a full sample of 227,320 observations. We then only consider companies that receive VC financing. We select only deals completed between 1996 and 2023 with available information needed for our baseline regression, such as company data from the year prior to each financing deal. The final sample has 9,492 debt, 112,017 equity and 8,456 hybrid rounds, which represents 7.3%, 86.2% and 6.5% of our sample. Finally, we combine 9,492 deals financed entirely by debt and 8,456 hybrid deals into 17,948 debt deals (13.81%), i.e., deals with debt financing component. Details of the data construction steps can be found in Table A.2.

Because firm-level valuation data at each financing round, particularly for debt rounds, are largely unavailable for individual VC-backed firms, we rely on industry-level valuation measures. This approach aligns with Imbierowicz and Rauch (2024), who show that valuations of VC-backed companies are driven by their peer valuations rather than their fundamentals. Specifically, we measure *Valuation sales multiple* as the median valuation sales multiple of IPO and M&A deals for each Pitchbook-defined industry sector in a given quarter. We require at least 10 valuation observations in a quarter for each industry sector to calculate the median value. We then match each financing round to the *Valuation sales multiple* of the portfolio company's industry sector in the previous quarter. For each financing round, we construct a dummy variable *Debt round* indicating whether the company raises debt, and a continuous variable *Debt ratio* reflecting the proportion of debt raised in that round. By construction, *Debt ratio* ranges between 0 and 1.

We employ the following variables to control for portfolio companies' characteristics: (i) *Log(Total equity raised)*, the natural logarithm of one plus the total amount of equity capital raised in the prior deal, (ii) *Firm age* >= 5 equals one if firm age is at least five years, and zero otherwise, and (iii) *Generating revenue*, a dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise.

Table 1 presents summary statistics of our main variables. In Panel A, we report the statistics for variables used in our baseline analysis. Debt financing is relatively infrequent: *Debt round* has a mean of 0.138, indicating that 13.8% of rounds involve debt. Debt intensity is modest with an average *Debt ratio* of 0.112. The mean and median of *Valuation sales multiple* are 4.828 and 3.729, respectively, suggesting a right-skewed valuation distribution. Firms raise an average $5.952 million in equity in the prior financing round. In terms of firm characteristics, 73.8% of portfolio companies generate revenue, and 42.2% are at least 5 years old at the time of the financing round.

Panel B of Table 1 presents the year-by-year distribution of our main dependent variables. Consistent with a known feature of Pitchbook data, our sample coverage increases over time. In 2020, debt financing peaks: debt rounds account for 37.86% of the 12,661 financing rounds observed in that year, and the average *Debt ratio* rises to 34.69%. To mitigate concerns about time-varying coverage and changing market liquidity conditions, all empirical specifications include time fixed effects. To account for the exceptional financing environment during the COVID-19 pandemic in particular, we conduct robustness tests excluding 2020 financing rounds and find that our results remain qualitatively unchanged.

4 Empirical results

4.1 Valuations and venture-backed firms financing

4.1.1 Baseline regression results

Table 2 reports the results of our baseline regressions on the relation between industry valuations and VC-backed firms' financing. Columns (1) and (2) examine the likelihood that a financing round includes debt, whereas Columns (3) and (4) explore the proportion of debt within a financing round.[1] Across all specifications, the *Valuation sales multiple* is negative and statistically significant at at least the 5% level, suggesting that debt financing is negatively associated with aggregate industry valuations, supporting the market-timing hypothesis. When industry valuations increase, entrepreneurial firms are less likely to receive debt financing and rely less heavily on debt when they do. The magnitudes are economically significant. Given a standard deviation of *Valuation sales multiple* of 3.759, a one-standard-deviation increase in the *Valuation sales multiple*

[1] In the first two regressions, we use OLS, but the results are similar with probit.

is associated with a 0.49% (= 3.759 × 0.13%) reduction in the probability of a debt round and a 0.38% (= 3.759 × 0.10%) decrease in *Debt ratio*. Relative to the sample mean of *Debt round* (*Debt ratio*) of 13.8% (11.2%), these effects correspond to an approximate 3.6% (3.4%) reduction, indicating that industry valuations play an important role in VC-backed firms' financing outcomes. In terms of the control variables, debt is more likely for older firms and for firms with more equity raised in the prior round(s).

4.1.2 Identification

The relation documented in the previous section could be subject to endogeneity.

Our baseline specifications include quarter-year fixed effects, which absorb aggregate liquidity conditions, economy-wide investor risk appetite, and common fluctuations in the supply of venture capital. Therefore, the valuation coefficient is not identified from broad financing booms or busts affecting all firms simultaneously. Instead, identification comes from variation in industry-level valuation multiples across industries within the same quarter, conditional on persistent industry differences. The remaining concern is that industry-specific conditions may simultaneously change the valuation multiples and affect the debt-equity choice. For example, unobserved shocks to industry-level growth opportunities can simultaneously raise valuation multiples and increase firms' propensity to issue equity (rather than debt).

To mitigate these endogeneity concerns, we employ an instrumental variable (IV) framework that exploits exogenous shifts in industry-level valuations. Following the mutual fund forced-selling framework pioneered by Edmans et al. (2012) and extended by Liu and Tian (2022), we construct our instrument by isolating hypothetical, proportional stock liquidations triggered by extreme investor redemption events. This approach effectively uncouples market-driven price shocks from

a firm's fundamental business value by capturing pure, non-fundamental fire-sale pressure.

We construct our instrument by merging quarterly mutual fund holdings data from the Thomson Reuters Mutual Fund database with fund-level flow data from CRSP. Fund outflows are defined as negative net inflows scaled by lagged total net assets. Crucially, to isolate forced liquidations from strategic trading decisions, we focus exclusively on funds experiencing severe distress, defined as a quarterly net outflow of at least 5% of total net assets (Edmans et al., 2012). We then calculate a stock-level hypothetical selling pressure measure by assuming fund managers liquidate their portfolios perfectly proportionally. For each stock, we aggregate these fund-level outflows—weighted by the respective fund's portfolio allocation in the stock—and normalize the total by the stock's trading volume. Finally, we aggregate these stock-level shocks at the quarter and four-digit SIC industry level to align with our aggregate industry setting. To capture different dimensions of this non-fundamental price pressure, we employ two alternative instruments aggregated at the annual level: *Average MF sales number*, which measures the frequency of these forced selling events, and *Average MF sales volume*, which captures their overall intensity.

As argued by Edmans et al. (2012), these massive, coordinated liquidations generate severe, non-fundamental downward pressure on market prices. Consequently, our empirical strategy exploits variation in aggregate industry valuations driven mechanically by investor liquidity shocks. These simulated flows provide a plausibly exogenous source of variation that alters our primary explanatory variable (industry valuations) but satisfies the exclusion restriction; they should be orthogonal to an individual startup's security choices, influencing the capital structure decision exclusively through their direct impact on industry price levels.

In Table 3, we explore the IV regressions with the two alternative instruments. The first stage supports the relevance of our instruments. The coefficient is negative and highly statistically

significant, suggesting that higher mutual fund forced sales are associated with lower industry valuations. The F-statistics (717.71 and 129.29) suggest that both instruments are strong. The second stage confirms the results from the baseline regressions shown in Table 2.

These results suggest that elevated industry valuations are associated with a higher propensity to receive a VC rather than a venture debt round, indicating that security choice timing is primarily driven by firms' incentives even in entrepreneurial settings. We thus find support for the market-timing hypothesis, but not for the VC-demand hypothesis.

4.2 Bargaining power and the choice of financing

Security choice timing in entrepreneurial settings appears to be driven primarily by firms' own incentives rather than by venture capitalists' preferences. In this section, the focus shifts to how this effect varies with the relative bargaining power of entrepreneurial firms and VCs. Bargaining power is proxied in several ways for both sides of the market.

Tables 4 and 5 investigate how financing choice relates to the firm's and entrepreneur's bargaining positions. We proxy firm's bargaining power using *Log(Total equity raised)*, *Firm age*, and *Generating revenue*. The interaction terms between *Valuation sales multiple* and the proxies for firm's bargaining power in Table 4 indicate that the negative effect of valuations on the likelihood of choosing debt becomes more pronounced as firms grow larger. As for the entrepreneur's bargaining position, Table 5 considers the size of the founding team, indicators for PhD and MBA, as well as the founders' prior work experience. The interaction terms between *Valuation sales multiple* and the proxies for entrepreneur's bargaining power indicate that the market-timing effect becomes stronger as the entrepreneur's bargaining power rises, except for the PhD dummy.

The analysis then turns to VC bargaining power and financing choice. In Table 6, Panel A uses several proxies for the availability of VC—recent VC commitments, recent VC investments, the number of active funds, and VC dry powder—as indicators of the relative strength of entrepreneurs over VCs. When VC capital is more abundant, entrepreneurs should have greater bargaining power, implying a stronger negative relationship between valuations and venture debt usage. The results are consistent with this prediction: all interaction terms are negative and highly statistically significant. Panel B adds two proxies for regulatory shifts positively affecting VC supply. *Pension Protection Act* captures the 2006 Pension Protection Act, which relaxed investment constraints for public pension plans and facilitated capital raising by VC funds, while *Volcker Rule & 401(k)* reflects two 2020 policy changes: the easing of Volcker Rule restrictions on VC investments by banks and the Department of Labor's decision permitting 401(k) and other nongovernmental defined contribution plans to include private equity components. The interaction terms are strongly negative and statistically significant, suggesting that the negative effect is mainly driven by more recent periods when VC supply has become less constrained.

Finally, following evidence that the bargaining power balance has shifted toward entrepreneurs over the past two decades (Ewens and Farre-Mensa, 2022), we split the sample into three subperiods: 1996–2005, 2006–2015, and 2016–2023. Industry valuations are interacted with dummies for the first two periods, and Table 7 reports the results. Taken together, the evidence indicates that in the early sample period, when VC bargaining power was strongest, the VC-demand hypothesis is supported; in the middle period, the two effects are about the same (no significant difference); and in the most recent period, the patterns are consistent with the market-timing hypothesis as entrepreneurial relative bargaining power is the strongest.

4.3 Insider versus outsider VC rounds

Incentives of incumbent VCs with respect to valuations depend critically on the type of financing rounds. Existing VCs benefit from high valuations in outsider rounds, as higher prices reduce the dilution of their exiting equity stakes. In contrast, when existing VCs seek to increase their ownership stake (insider rounds), lower valuations allow them to acquire additional shares at more favorable terms.

In this section, we explore how the relation between VC-backed firms' financing and industry valuations differs across insider and outsider rounds. To do so, we classify each financing round into one of the four following categories: (1) pure debt round, (2) hybrid round, (3) pure equity round with existing equity investors only, and (4) pure equity round with a new investor.

Table 8 reports the estimation results from the multinomial probit model of financing outcome as a function of industry valuation. The reported coefficients capture the relation between industry valuation and the likelihood of each deal type, relative to the base category of equity rounds that include at least one new investor.[2]

The results indicate that, at higher industry valuations, debt rounds, hybrid rounds, and equity rounds without new VC investors are all significantly less likely than equity rounds with at least one new VC investor. Moreover, the magnitude of this effect decreases monotonically across these financing types, which suggests that incumbent VC investors prefer to raise equity from new investors when valuations are high, thereby minimizing dilution of their existing stakes.

Together with the IV results, these patterns provide further evidence that is difficult to reconcile with the alternative explanation that the debt-equity choice is driven primarily by industry-level

[2]To assess the sensitivity of our results to the classification of hybrid rounds, we re-classify hybrid rounds as debt rounds and, alternatively, as equity rounds. The results, reported in Panel A and Panel B of the Appendix Table A.3, suggest that our findings are robust and not driven by how hybrid rounds are categorized.

financing conditions or sector-specific capital supply shocks. While abundant sector-level capital supply could increase equity financing generally, it does not naturally predict differential responses between insider and outsider rounds. Instead, the stronger sensitivity of outsider rounds to valuation conditions is more consistent with valuation-sensitive dilution incentives among incumbent investors and founders.

4.4 Loan spreads

Next, we examine the relation between valuations and loan spreads. Conditioning on the baseline result that higher valuations are associated with a lower probability of debt, the sign of this relationship is ambiguous. On the demand side, when valuations are high and firms tilt toward equity, the subset of ventures that still take debt may be relatively safer or higher quality (those for whom debt remains attractive), which would predict lower spreads at higher valuations. Alternatively, relatively riskier firms might be pushed into debt because they cannot raise equity at the going terms, which would predict higher spreads. On the supply side, if high industry valuations coincide with "good times" and loose credit conditions, spreads tend to compress; in downturns they widen (Gilchrist and Zakrajšek, 2012, Greenwood et al., 2010). That logic suggests higher valuations should be associated with lower loan spreads through aggregate risk-premium and competition effects. Out of 9,492 debt deals in our sample, we obtained data on loan spread for 1,420 facilities across 1,332 deals.

Table 9 documents a negative relation between loan spreads and industry valuations. This finding complements our baseline results showing that, when valuations are high, VC-backed firms are less likely to access debt financing. Conditional on borrowing, however, firms obtain

credit at more favorable terms. In other words, higher industry valuations are associated not only with lower debt financing but also with cheaper debt when it is used. This result is consistent with both the supply-side effect and the quality effect.

4.5 Robustness checks

We run a set of additional tests and display the results in Table 10. In Panels A and B, we replicate our baseline specifications using alternative proxies for industry valuations. In Panel A, we construct industry valuation measures using all deals recorded in Pitchbook, rather than IPO and M&A deals. In Panel B, we use *Enterprise value sales multiple* as a proxy for industry valuation, where *Enterprise value sales multiples* is the median value of valuation sales multiples of all companies in the portfolio company's industry sector in the previous quarter. In Panel C, we augment the baseline regression with additional firm-level control variables including *Log(Revenue)*, measured as the natural logarithm of the company's revenue in the current financing round, and *Log(Prior valuation)*, defined as the natural logarithm of the portfolio company's valuation in the prior financing round. Panel D excludes financing deals occurring in the year 2020, a year characterized by an extraordinarily large proportion of debt deals. Across all specifications, our main results remain qualitative unchanged, confirming the robustness of our findings.

5 Conclusion

This paper examines how industry-level valuations shape the choice between debt and equity in venture-backed firms. We find that higher valuations are associated with a greater propensity to raise equity rather than venture debt, supporting the market-timing hypothesis and indicating that

security choice is primarily driven by firms' incentives rather than investor preferences. Venture debt allows firms to postpone equity pricing when current valuations are unattractive. However, this effect weakens significantly when VC bargaining power is stronger, suggesting that powerful investors can resist founders' attempts to time equity issuance at high valuations. The relative importance of these two hypotheses has evolved over time, with the VC-demand hypothesis more relevant when VC bargaining power was stronger and the market-timing hypothesis dominant in recent years. We also document that equity rounds without new investors are more likely at lower valuations than rounds with outsiders.

Our results have broader implications for understanding entrepreneurial finance and the mechanisms through which market conditions shape the allocation of capital. By documenting systematic patterns in security choice driven by valuation cycles and bargaining dynamics, the paper reveals how macroeconomic conditions influence the microstructure of venture financing. This extends beyond prior understanding of how valuations affect financing decisions in staged, private capital markets by showing how bargaining power and the availability of alternative capital sources mediate these relationships. The analysis also reframes venture debt not as a specialized niche product but as an endogenous outcome of valuation conditions and investor bargaining power. Future research could examine how valuation conditions affect venture debt pricing and covenants, explore the real effects of valuation-driven financing on firm growth and survival, extend the analysis to other entrepreneurial financing contexts, and investigate how macroeconomic policy interventions shift bargaining power between entrepreneurs and investors.

Our findings have implications for practitioners as well. Entrepreneurs should recognize that market conditions significantly influence financing options, and that their experience and know-how strengthen their bargaining power and the ability to time equity issuance. For VCs, the

evidence underscores that influence over security choice may depend on relative bargaining position and the overall availability of venture capital. For policymakers, the results suggest that regulations affecting capital supply have real effects on entrepreneurial financing patterns.

Overall, this paper suggests that despite the unique features of venture capital markets, fundamental corporate finance principles such as market timing remain relevant. The interplay between firm incentives, investor preferences, and bargaining power creates a rich environment where security choice reflects both macroeconomic conditions and microeconomic negotiations.

Table A.1: **Variable Definitions**

Variable	**Description**	**Data Sources**
Debt round	A dummy variable equal to one if the current financing deal has debt, and zero otherwise.	Pitchbook
Debt ratio	The proportion of debt in the current financing deal.	Pitchbook
Valuation sales multiple	The median value of valuation sales multiples of IPO and M&A deals of the portfolio company's industry sector in the previous quarter.	Pitchbook
Value sales multiple (all)	The median value of valuation sales multiples of all deals in the portfolio company's industry sector in the previous quarter.	Pitchbook
Enterprise value sales multiple	The median value of valuation sales multiples of all companies in the portfolio company's industry sector in the previous quarter.	Pitchbook
Total equity raised	The total amount of equity capital raised in the prior deal (in $million).	Pitchbook
Firm age >= 5	A dummy variable equal to one if the age of the company is at least 5 years, and zero otherwise.	Pitchbook
Generating revenue	A dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise.	Pitchbook
Average MF sales number	The industry average of the volume of mutual fund hypothetical sales, where the industry is defined by the company's SIC4 code.	CRSP Mutual Fund; Compustat
Log(Average MF sales volume)	The natural logarithm of the industry average magnitude of mutual fund hypothetical sales.	CRSP Mutual Fund; Compustat
Log(Number of founders)	The natural logarithm of the number of founders of a portfolio company.	Crunchbase
PhD founder dummy	A dummy variable equal to one if at least one founder of a portfolio company holds a PhD, and zero otherwise.	Crunchbase

Variable	Description	Data Sources
MBA founder dummy	A dummy variable equal to one if at least one founder of a portfolio company holds an MBA degree.	Crunchbase
Log(Founder's work experience	The natural logarithm of one plus the average number of years of work experience across a portfolio company's founders.	Crunchbase
Total VC commitment	The total capital commitments to VC funds listed in the previous year.	Pitchbook
U.S. VC fund raised	The total venture capital fund raised in the current year (NVCA).	NVCA
Number of VC funds	The total number of VC funds in the current year (NVCA).	NVCA
VC dry powder	The VC dry powder in the current year.	Preqin
Pension Protection Act	A dummy variable that indicates the period after 2006, i.e., the year of the Pension Protection Act, which eased investment restrictions for public pension plans and facilitated capital raising by PE/VC funds.	Pitchbook
Volcker Rule & 401(k)	A dummy variable indicating the period after 2020. This year captures two major policies that potentially improved the supply of capital to PE/VC funds: (i) The rollback of the Volcker Rule's restrictions on VC investments by banks; and (ii) The Department of Labor's June 2020 decision allowing 401(k) and other nongovernmental defined contribution pension plans to offer investment with a private equity component.	Pitchbook
1996-2005 period	A dummy variable equal to one if the transaction year is between 1996 and 2005, and zero otherwise.	Preqin
2006-2015 period	A dummy variable equal to one if the transaction year is between 2006 and 2015, and zero otherwise.	Preqin

Variable	Description	Data Sources
VC ownership	The median VC equity stake, i.e., the ratio of capital invested by VCs to post-money valuation, across Angel, Seed A, and Seed B rounds of all firms in the company's industry in the prior year.	Pitchbook
Revenue	The company's revenue in the current financing round.	Pitchbook
Prior valuation	The portfolio company's valuation in the prior financing round.	Pitchbook
Spread	The static portion of the interest rate multiplied by 100. For floating-rate loans, it measures the interest rate margin over the base rate. For fixed-rate loans, it measures the whole interest rate.	Pitchbook
Debt size	The debt amount (in $million).	Pitchbook
Maturity	The loan maturity.	Pitchbook
Syndicated	A dummy variable that takes a value of 1 if the loan is a syndicated loan, and zero otherwise.	Pitchbook.

Table A.2: **Sample construction and data steps**

	Data steps	**Number of observations**
1	All VC-classified equity deals. Of these, 10,386 are reclassified as hybrid deals and 148,377 are fully equity-financed. Startups are founded in 1995 or later	158,763
2	All debt deals to borrowers founded in 1995 or later	68,557
3	Combine equity, hybrid, and debt deals collected above	227,320
4	Restrict to VC-backed startups	171,444
5	Keep financing rounds between 1996 and 2023	163,758
6	Drop observations with missing information and obtain a sample of 9,492 debt, 112,017 equity, and 8,456 hybrid deals	129,965
7	Combine 9,492 fully debt-financed deals and 8,456 hybrid deals into 17,948 debt deals. Final sample: 17,948 debt deals and 112,017 equity deals	129,965

Table A.3: **Robustness test: Multinomial probit regression**

Panel A. Hybrid deals are classified as debt deals

	P(Debt round)	*P(Equity – No new investor)*
Valuation sales multiple	-0.0121***	-0.0070**
	(0.0036)	(0.0030)
Log(Total equity raised)	0.0986***	-0.0397***
	(0.0095)	(0.0077)
Firm age >= 5	0.5926***	0.4640***
	(0.0292)	(0.0129)
Generating revenue	0.0115	-0.1264***
	(0.0235)	(0.0163)
Quarter-Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	129,588	129,588

Panel B. Hybrid deals are classified as equity deals

	P(Debt round)	*P(Equity round – No New investors)*
Valuation sales multiple	-0.0160***	-0.0071**
	(0.0060)	(0.0029)
Log(Total equity raised)	0.1683***	-0.0499***
	(0.0107)	(0.0079)
Firm age >= 5	0.7864***	0.4818***
	(0.0429)	(0.0127)
Generating revenue	-0.0467	-0.1265***
	(0.0366)	(0.0163)
Quarter-Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	129,588	129,588

This table provides regression results of the multinomial probit model of financing outcomes. The financing outcome equals 1 if it is a purely debt round, 2 if it is an equity round with all existing equity investors, and 3 if it is an equity round with a new investor. The base outcome is 3. In panel A, hybrid deals are classified as debt deals, whereas they are classified as equity deals in panel B. Robust standard errors clustered at the industry x year-quarter level are reported in parentheses. The independent variable *Valuation sales multiple* is defined as the median valuation-to-sales multiple of IPO and M&A deals in the company's industry sector in the previous quarter. *Log(Total equity raised)* is the natural logarithm of one plus the total amount of equity capital raised in the prior deal. *Firm age >= 5* equals one if firm age is at least five years, and zero otherwise. *Generating revenue* is a dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

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Table 1: **Summary Statistics**

Panel A. Overall sample

Variable	Count	Mean	SD	P25	P50	P75	P95
Debt round	129,965	0.138	0.345	0.000	0.000	0.000	1.000
Debt ratio	129,965	0.112	0.305	0.000	0.000	0.000	1.000
Valuation sales multiple	129,965	4.828	3.759	2.213	3.729	5.883	12.570
Total equity raised	129,965	5.952	15.130	0.000	0.600	5.000	28.300
Firm age $>= 5$	129,965	0.422	0.494	0.000	0.000	1.000	1.000
Generating revenue	129,965	0.738	0.440	0.000	1.000	1.000	1.000

Panel B. Year-by-year distribution

Year	*Observations*	*Debt round*	*Debt ratio*
1996	24	0.0000	0.0000
1997	89	0.0112	0.0014
1998	264	0.0152	0.0080
1999	544	0.0313	0.0252
2000	1693	0.0254	0.0196
2001	860	0.0442	0.0301
2002	785	0.0650	0.0510
2003	242	0.0579	0.0530
2004	1866	0.0788	0.0609
2005	2341	0.0961	0.0795
2006	2457	0.0867	0.0706
2007	3272	0.0926	0.0778
2008	3422	0.0999	0.0844
2009	1159	0.1001	0.0834
2010	3640	0.0989	0.0883
2011	4208	0.0891	0.0751
2012	4843	0.1039	0.0887
2013	6011	0.0942	0.0766
2014	7053	0.1073	0.0851
2015	7413	0.1105	0.0851
2016	7194	0.1166	0.0883
2017	8004	0.1032	0.0773
2018	8920	0.1187	0.0879
2019	9606	0.1326	0.0977
2020	12 661	0.3786	0.3469
2021	13 623	0.1357	0.0926
2022	12 419	0.1327	0.0986
2023	5352	0.1433	0.1218
Total	**129,965**	**0.1381**	**0.1116**

This table presents summary statistics. Panel A reports summary statistics of of variables used in the baseline regression of this study. *Debt round* is a dummy variable equal to one if the current financing deal has debt, and zero otherwise. *Debt ratio* is the proportion of debt in the current financing deal. *Valuation sales multiple* is defined as the median valuation-to-sales multiple of IPO and M&A deals in the company's industry sector in the previous quarter. *Log(Total equity raised)* is the natural logarithm of one plus the total amount of equity capital raised in the prior deal. *Firm age >= 5* equals one if firm age is at least five years, and zero otherwise. *Generating revenue* is a dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise. Panel B reports the year-by-year distribution of *Debt round* and *Debt ratio*.

Table 2: **Industry valuation and the use of debt financing**

	(1) *Debt round*	(2) *Debt round*	(3) *Debt ratio*	(4) *Debt ratio*
Valuation sales multiple	-0.0015***	-0.0013***	-0.0012**	-0.0010**
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Log(Total equity raised)		0.0188***		0.0139***
		(0.0019)		(0.0020)
Firm age >= 5		0.0696***		0.0683***
		(0.0063)		(0.0066)
Generating revenue		0.0034		0.0009
		(0.0033)		(0.0030)
Quarter-Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	129,965	129,965	129,965	129,965
Adjusted R^2	0.113	0.130	0.146	0.164

This table reports baseline regression results on the effect of industry valuation on a company's use of debt financing. The dependent variables are *Debt round* and *Debt ratio*, where *Debt round* is a dummy variable equal to one if the current financing deal has debt, and zero otherwise, and *Debt ratio* is the proportion of debt in the current financing deal. The independent variable *Valuation sales multiple* is defined as the median valuation-to-sales multiple of IPO and M&A deals in the company's industry sector in the previous quarter. *Log(Total equity raised)* is the natural logarithm of one plus the total amount of equity capital raised in the prior deal. *Firm age >= 5* equals one if firm age is at least five years, and zero otherwise. *Generating revenue* is a dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise. Robust standard errors clustered by industry × year-quarter are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 3: **Instrumented regressions**

	(1) *First stage* Valuation sales multiple	(2) *Second stage* Debt round	(3) *Second stage* Debt ratio	(4) *First stage* Valuation sales multiple	(5) *Second stage* Debt round	(6) *Second stage* Debt ratio
Average MF sales number	-0.1468***					
	(0.0055)					
Log(Average MF sales volume)				-0.5177***		
				(0.0455)		
Valuation sales multiple		-0.0111**	-0.0123***		-0.0228**	-0.0192**
		(0.0050)	(0.0044)		(0.0105)	(0.0092)
Observations	129,965	129,965	129,965	129,965	129,965	129,965
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
F-statistics	717.71			129.29		
p-value	0.0000			0.0000		

This table reports the instrumented regression results on the effect of industry valuation on a company's use of debt financing, where the instrumental variables are constructed based on mutual fund forced sales. The dependent variables are *Debt round* and *Debt ratio*, where *Debt round* is a dummy variable equal to one if the current financing deal has debt, and zero otherwise, and *Debt ratio* is the proportion of debt in the current financing deal. The two instruments are constructed following Liu and Tian (2022): *Average MF sales number*, the industry average number of mutual fund hypothetical sales, and *Log(Average MF sales volume)*, the natural logarithm the industry average magnitude of mutual fund hypothetical sales. A company's industry is defined using the SIC4 code. Control variables include *Log(Total equity raised)*, *Firm age* >= 5 and *Generating revenue*. *Log(Total equity raised)* is the natural logarithm of one plus the total amount of equity capital raised in the prior deal. *Firm age* >= 5 equals one if firm age is at least five years, and zero otherwise. *Generating revenue* is a dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4: **Firm's bargaining power and the valuation-debt financing relation**

	(1) *Debt round*	(2) *Debt round*	(3) *Debt round*	(4) *Debt ratio*	(5) *Debt ratio*	(6) *Debt ratio*
Valuation sales multiple	-0.0002	-0.0011	-0.0028***	0.0002	-0.0006	-0.0022***
	(0.0007)	(0.0008)	(0.0007)	(0.0007)	(0.0008)	(0.0006)
... × *Log(Total equity raised)*	-0.0011**			-0.0011**		
	(0.0004)			(0.0005)		
... × *Firm age >= 5*		-0.0006			-0.0009	
		(0.0013)			(0.0014)	
... × *Generating revenue*			0.0020***			0.0017***
			(0.0006)			(0.0006)
Log(Total equity raised)	0.0243***	0.0188***	0.0188***	0.0199***	0.0139***	0.0140***
	(0.0037)	(0.0019)	(0.0019)	(0.0040)	(0.0020)	(0.0020)
Firm age >= 5	0.0693***	0.0725***	0.0700***	0.0680***	0.0726***	0.0687***
	(0.0063)	(0.0118)	(0.0063)	(0.0065)	(0.0124)	(0.0066)
Generating revenue	0.0028	0.0033	-0.0067	0.0002	0.0006	-0.0078*
	(0.0033)	(0.0034)	(0.0044)	(0.0031)	(0.0032)	(0.0041)
Quarter-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	129,965	129,965	129,965	129,965	129,965	129,965
Adjusted R-squared	0.131	0.130	0.130	0.165	0.164	0.164

This table reports regression results examining the interaction between industry valuation and firm's bargaining power in explaining debt financing. The dependent variables are *Debt round* and *Debt ratio*, where *Debt round* is a dummy variable equal to one if the current financing deal has debt, and zero otherwise, and *Debt ratio* is the proportion of debt in the current financing deal. The independent variable, *Valuation sales multiple*, is defined as the median valuation-to-sales multiple of IPO and M&A deals in the company's industry sector in the previous quarter. *Log(Total equity raised)* is the natural logarithm of one plus the total amount of equity capital raised in the prior deal. *Firm age >= 5* equals one if firm age is at least five years, and zero otherwise. *Generating revenue* is a dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise. Robust standard errors clustered at the industry × year-quarter level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 5: **Founder characteristics and the valuation–debt financing relation**

	(1) *Debt round*	(2) *Debt round*	(3) *Debt round*	(4) *Debt round*	(5) *Debt ratio*	(6) *Debt ratio*	(7) *Debt ratio*	(8) *Debt ratio*
Valuation sales multiple	-0.0006	-0.0013	-0.0013	0.0036	-0.0005	-0.0013	-0.0015	0.0024
	(0.0011)	(0.0010)	(0.0010)	(0.0027)	(0.0010)	(0.0009)	(0.0009)	(0.0025)
... × *Log(Number of founders)*	-0.0028**				-0.0035***			
	(0.0014)				(0.0011)			
... × *PhD founder dummy*		-0.0020				-0.0029**		
		(0.0019)				(0.0014)		
... × *MBA founder dummy*			-0.0037*				-0.0032*	
			(0.0020)				(0.0018)	
... × *Log(Founder's work experience)*				-0.0031***				-0.0021**
				(0.0011)				(0.0010)
Log(Number of founders)	0.0140**				0.0080			
	(0.0067)				(0.0052)			
PhD founder dummy		-0.0006				0.0023		
		(0.0098)				(0.0078)		
MBA founder dummy			0.0227**				0.0204***	
			(0.0092)				(0.0079)	
Log(Founder's work experience)				0.0136**				0.0111*
				(0.0067)				(0.0063)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	38,145	38,145	38,145	16,868	38,145	38,145	38,145	16,868
Adjusted R-squared	0.201	0.201	0.201	0.192	0.255	0.255	0.255	0.250

This table reports regression results examining how founder characteristics moderate the relation between industry valuation and debt financing. The dependent variables are *Debt round* and *Debt ratio*, where *Debt round* is a dummy variable equal to one if the current financing deal has debt, and zero otherwise, and *Debt ratio* is the proportion of debt in the current financing deal. The independent variable, *Valuation sales multiple*, is defined as the median valuation-to-sales multiple of IPO and M&A deals in the company's industry sector in the previous quarter. Founder characteristics include (i) *Log(Number of founders)*, the natural logarithm of the number of founders, (ii) *PhD founder dummy*, an indicator of at least one founder holding a PhD degree, (iii) *MBA founder fummy*, an indicator of at least one founder holding an MBA degree, and (iv) *Log(Founder's work experience)*, the natural logarithm of one plus the average number of years of work experience across a portfolio company's founders. Control variables include *Log(Total equity raised)*, *Firm age >= 5* and *Generating revenue*. *Log(Total equity raised)* is the natural logarithm of one plus the total amount of equity capital raised in the prior deal. *Firm age >= 5* equals one if firm age is at least five years, and zero otherwise. *Generating revenue* is a dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise. Robust standard errors clustered at the industry × year-quarter level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 6: **VC capital supply and the valuation–debt financing relation**

Panel A. When VC capital supply is proxied by VC commitment

	(1) *Debt round*	(2) *Debt round*	(3) *Debt round*	(4) *Debt round*	(5) *Debt ratio*	(6) *Debt ratio*	(7) *Debt ratio*	(8) *Debt ratio*
Valuation sales multiple	0.0069	0.0070***	0.0141***	0.0098***	0.0093*	0.0060***	0.0135***	0.0088***
	(0.0050)	(0.0020)	(0.0033)	(0.0023)	(0.0047)	(0.0020)	(0.0033)	(0.0023)
... × *Log(Total VC commitments)*	-0.0009*				-0.0011**			
	(0.0005)				(0.0005)			
... × *Log(U.S. VC fund raised)*		-0.0019***				-0.0016***		
		(0.0004)				(0.0004)		
... × *Log(Number of VC funds)*			-0.0020***				-0.0018***	
			(0.0004)				(0.0004)	
... × *Log(VC dry powder)*				-0.0027***				-0.0023***
				(0.0005)				(0.0005)
Log(Total equity raised)	0.0188***	0.0190***	0.0190***	0.0189***	0.0140***	0.0140***	0.0140***	0.0140***
	(0.0019)	(0.0020)	(0.0020)	(0.0019)	(0.0020)	(0.0021)	(0.0021)	(0.0020)
Firm age >= 5	0.0695***	0.0700***	0.0700***	0.0694***	0.0683***	0.0689***	0.0690***	0.0681***
	(0.0063)	(0.0064)	(0.0064)	(0.0063)	(0.0066)	(0.0066)	(0.0066)	(0.0066)
Generating revenue	0.0033	0.0039	0.0039	0.0034	0.0007	0.0012	0.0011	0.0008
	(0.0032)	(0.0034)	(0.0034)	(0.0033)	(0.0030)	(0.0031)	(0.0031)	(0.0030)
Quarter-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	129,965	125,464	125,464	129,044	129,965	125,464	125,464	129,044
Adjusted R^2	0.130	0.129	0.129	0.130	0.164	0.164	0.164	0.164

Panel B. When VC capital supply is affected by regulations

	(1) *Debt round*	(2) *Debt round*	(3) *Debt ratio*	(4) *Debt ratio*
Valuation sales multiple	0.0015*	-0.0004	0.0017**	-0.0004
	(0.0008)	(0.0006)	(0.0007)	(0.0005)
... × *Pension Protection Act*	-0.0030***		-0.0029***	
	(0.0008)		(0.0007)	
... × *Volcker Rule & 401(k)*		-0.0018***		-0.0012**
		(0.0006)		(0.0006)
Log(Total equity raised)	0.0188***	0.0188***	0.0140***	0.0140***
	(0.0019)	(0.0019)	(0.0020)	(0.0020)
Firm age >= 5	0.0696***	0.0696***	0.0683***	0.0683***
	(0.0063)	(0.0064)	(0.0066)	(0.0066)
Generating revenue	0.0033	0.0033	0.0008	0.0008
	(0.0033)	(0.0033)	(0.0030)	(0.0030)
Quarter-Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	129,965	129,965	129,965	129,965
Adjusted R^2	0.130	0.130	0.164	0.164

This table reports regression results on how VC capital supply affects the relation between industry valuation and debt financing. The dependent variables are *Debt round* and *Debt ratio*, where *Debt round* is a dummy variable equal to one if the current financing deal has debt, and zero otherwise, and *Debt ratio* is the proportion of debt in the current financing deal. The independent variable *Valuation sales multiple* is defined as the median valuation-to-sales multiple of IPO and M&A deals in the company's industry sector in the previous quarter. *Log(Total VC commitments)* is the natural logarithm of the total capital commitments to VC funds listed in the previous year (Pitchbook). *Log(U.S. VC fund raised)* is the natural logarithm of the total venture capital fund raised in the current year (NVCA). *Log(Number of VC funds)* is the natural logarithm of the total number of VC funds in the current year (NVCA). *Pension Protection Act* is a dummy variable indicating the period after 2006. This is the year of the Pension Protection Act, which eased investment restrictions for public pension plans and facilitated capital raising by PE/VC funds. *Volcker Rule & 401(k)* is a dummy variable indicating the period after 2020. This year captures two major policies that potentially improved the supply of capital to PE/VC funds: (i) The rollback of the Volcker Rule's restrictions on VC investments by banks; and (ii) The Department of Labor's June 2020 decision allowing 401(k) and other nongovernmental defined contribution pension plans to offer investment with a private equity component. *Log(VC dry powder)* is the natural logarithm of the VC dry powder in the current year (Preqin). Other control variables include *Log(Total equity raised)*, *Firm age >= 5* and *Generating revenue*. *Log(Total equity raised)* is the natural logarithm of one plus the total amount of equity capital raised in the prior deal. *Firm age >= 5* equals one if firm age is at least five years, and zero otherwise. *Generating revenue* is a dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise. Robust standard errors clustered at the industry × year-quarter level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

Table 7: **VC control and the valuation–debt financing relation**

	(1) *Debt round*	(2) *Debt ratio*	(3) *Debt round*	(4) *Debt ratio*
Valuation sales multiple	-0.0020***	-0.0017***	-0.0078***	-0.0073***
	(0.0005)	(0.0005)	(0.0030)	(0.0027)
... × *1996-2005 period*	0.0039***	0.0037***		
	(0.0008)	(0.0007)		
... × *2006-2015 period*	0.0025***	0.0026***		
	(0.0007)	(0.0007)		
... × *VC ownership*			0.0231**	0.0228**
			(0.0108)	(0.0099)
VC ownership			-0.2831***	-0.1424
			(0.1019)	(0.0922)
Log(Total equity raised)	0.0188***	0.0140***	0.0188***	0.0140***
	(0.0019)	(0.0020)	(0.0019)	(0.0020)
Firm age >= 5	0.0695***	0.0682***	0.0696***	0.0683***
	(0.0063)	(0.0066)	(0.0063)	(0.0066)
Generating revenue	0.0031	0.0005	0.0035	0.0009
	(0.0032)	(0.0030)	(0.0033)	(0.0030)
Quarter-Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	129,965	129,965	129,965	129,965
Adjusted R^2	0.130	0.164	0.130	0.164

This table examines how VC control moderates the relation between industry valuation and the use of debt financing. The dependent variables are *Debt round* and *Debt ratio*, where *Debt round* is a dummy variable equal to one if the current financing deal has debt, and zero otherwise, and *Debt ratio* is the proportion of debt in the current financing deal. The independent variable, *Valuation sales multiple*, is defined as the median valuation-to-sales multiple of IPO and M&A deals in the company's industry sector in the previous quarter. In columns (1) and (2), *1996-2005 period* is a dummy variable equal to one if the transaction year is between 1996 and 2005, and zero otherwise, and *2006-2015 period* is a dummy variable equal to one if the transaction year is between 2006 and 2015, and zero otherwise. In columns (3) and (4), we augment the baseline regression using *VC ownership*, and its interaction with *Valuation sales multiple*. In the spirit of the industry equity stake proxy of Ewens and Malenko (ming), we measure *VC ownership* as the median VC equity stake, i.e., the ratio of capital invested by VCs to post-money valuation, across Angel, Seed A, and Seed B rounds of all firms in the company's industry in the prior year. Control variables include *Log(Total equity raised)*, *Firm age >= 5*, and *Generating revenue*. *Log(Total equity raised)* is the natural logarithm of one plus the total amount of equity capital raised in the prior deal. *Firm age >= 5* equals one if firm age is at least five years, and zero otherwise. *Generating revenue* is a dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise. Robust standard errors clustered at the industry × year-quarter level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 8: **Multinomial probit regression of firm financing decision on industry valuation**

	Pure debt round	*Hybrid round*	*Equity & No new investor*
Valuation sales multiple	-0.0163***	-0.0086***	-0.0071**
	(0.0058)	(0.0031)	(0.0030)
Log(Total equity raised)	0.1705***	0.0139*	-0.0387***
	(0.0106)	(0.0072)	(0.0077)
Firm age >= 5	0.7898***	0.3906***	0.4638***
	(0.0423)	(0.0170)	(0.0127)
Generating revenue	-0.0394	0.0297	-0.1261***
	(0.0362)	(0.0215)	(0.0162)
Quarter-Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	129,588	129,588	129,588

This table provides regression results of the multinomial probit model of financing choices. The financing choices consist of: pure debt rounds, hybrid rounds, equity rounds with existing equity investors only, equity rounds with a new investor (base outcome). Robust standard errors clustered at the industry x year-quarter level are reported in parentheses. The independent variable *Valuation sales multiple* is defined as the median valuation-to-sales multiple of IPO and M&A deals in the company's industry sector in the previous quarter. *Log(Total equity raised)* is the natural logarithm of one plus the total amount of equity capital raised in the prior deal. *Firm age >= 5* equals one if firm age is at least five years, and zero otherwise. *Generating revenue* is a dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9: **Industry valuation and credit spread**

	(1) *Log(Spread)*	(2) *Log(Spread)*
Valuation sales multiple	-0.0086***	-0.0059**
	(0.0022)	(0.0019)
Log(Debt size)		0.0072
		(0.0055)
Syndicated		-0.1771***
		(0.0221)
Firm age >= 5		0.0214
		(0.0130)
Log(Maturity)		-0.1244***
		(0.0329)
Quarter-Year FE	Yes	Yes
Business status FE	Yes	Yes
Industry FE	Yes	Yes
Spread reference FE	Yes	Yes
Security FE	Yes	Yes
Rate FE	Yes	Yes
Observations	1,420	1,323
Adjusted R^2	0.4765	0.536

This table reports regression output for the effect of industry valuation on the cost of venture debt. Dependent variable is *Log(Spread)*, where *Log(Spread)* is the natural logarithm of the static portion of the interest rate multiplied by 100. For floating-rate loans, it measures the interest rate margin over the base rate. For fixed-rate loans, it measures the whole interest rate. The independent variable *Valuation sales multiple* is defined as the median valuation-to-sales multiple of IPO and M&A deals in the company's industry sector in the previous quarter. *Log(Debt size)* is the natural logarithm of the debt amount (in $million). *Syndicated* is a dummy variable that takes a value of 1 if the loan is a syndicated loan, and zero otherwise. *Log(Maturity)* is the natural logarithm of the loan maturity. *Firm age >= 5* equals one if firm age is at least five years, and zero otherwise. Robust standard errors clustered by business status are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 10: **Robustness tests**

Panel A. Alternative industry valuation measure: Value sales multiple (all)

	(1) *Debt round*	(2) *Debt round*	(3) *Debt ratio*	(4) *Debt ratio*
Value sales multiple (all)	-0.0022***	-0.0019***	-0.0022***	-0.0020***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Control variables	No	Yes	No	Yes
Quarter-Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	129,965	129,965	129,965	129,965
Adjusted R^2	0.113	0.130	0.146	0.164

Panel B. Alternative industry valuation measure: Enterprise value sales multiples

	(1) *Debt round*	(2) *Debt round*	(3) *Debt ratio*	(4) *Debt ratio*
Enterprise value sales multiples	-0.0071***	-0.0060***	-0.0058***	-0.0049***
	(0.0014)	(0.0012)	(0.0014)	(0.0013)
Control variables	No	Yes	No	Yes
Quarter-Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	129,965	129,965	129,965	129,965
Adjusted R^2	0.113	0.130	0.146	0.164

Panel C. Further controls

	(1) *Debt round*	(2) *Debt round*	(3) *Debt ratio*	(4) *Debt ratio*
Valuation sales multiple	-0.0046***	-0.0025***	-0.0039***	-0.0017**
	(0.0013)	(0.0008)	(0.0012)	(0.0007)
Log(Revenue)	0.0257***		0.0213***	
	(0.0025)		(0.0022)	
Log(Prior valuation)		0.0235***		0.0217***
		(0.0031)		(0.0029)
Control variables	Yes	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	14,490	46,301	14,490	46,301
Adjusted R^2	0.112	0.179	0.144	0.242

Panel D. Using the sample that excludes observations in 2020

	(1) *Debt round*	(2) *Debt round*	(3) *Debt ratio*	(4) *Debt ratio*
Valuation sales multiple	-0.0020***	-0.0018***	-0.0015***	-0.0014***
	(0.0005)	(0.0004)	(0.0005)	(0.0004)
Control variables	No	Yes	No	Yes
Quarter-Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	117,304	117,304	117,304	117,304
Adjusted R^2	0.00723	0.0224	0.00646	0.0222

This table reports the regression results of a robustness test on the effect of industry valuation on the company's use of debt financing. The dependent variables are *Debt round* and *Debt ratio*, where *Debt round* is a dummy variable equal to one if the current financing deal has debt, and zero otherwise, and *Debt ratio* is the proportion of debt in the current financing deal. Control variables include *Log(Total equity raised)*, *Firm age* >= 5 and *Generating revenue*. *Log(Total equity raised)* is the natural logarithm of one plus the total amount of equity capital raised in the prior deal. *Firm age* >= 5 equals one if firm age is at least five years, and zero otherwise. *Generating revenue* is a dummy variable equal to one if the company is at the stage of generating revenue, and zero otherwise. In Panel A, the independent variable is *Value sales multiple (all)*, which is defined as the median value of valuation sales multiples of all deals of the portfolio company's industry sector in the previous quarter. In Panel B, the independent variable is *Enterprise value sales multiples*, which is defined as the median value of valuation sales multiples of all companies in the portfolio company's industry sector in the previous quarter. In Panel C, we repeat the baseline regression, further controlling for *Log(Revenue)* and *Log(Prior valuation)*. *Log(Revenue)* is the natural logarithm of the company's revenue in the current financing round. *Log(Prior valuation)* is the natural logarithm of the portfolio company's valuation in the prior financing round. In Panel D, we repeat our baseline regression using the sample that excludes observations in the year 2020. Robust standard errors clustered at the industry x year-quarter level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.