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VENTURE DEBT

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ABSTRACT

The provision of venture debt financing to growth-oriented startups which are backed by venture capital (VC) equity has been a bit of a puzzle given the lack of positive cash flows or traditional collateral of such startups. This short paper lays out the hurdles for debt to overcome to be a viable source of finance and casts the three types of venture debt – patent loans, venture leverage, and bridge loans – as solutions to such hurdles, casting the literature in terms of financial innovation. Finally, the paper addresses the risks implied by venture debt and discusses whether the demise of Silicon Valley Bank speaks to whether innovation ecosystem risk transmutes to the financial system through debt and the extent to which innovation ecosystem risk remains unstudied.

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Introduction

Venture debt is a form of lending for growth-oriented startups who generally already have some form of professional equity investment. It is a bit of a puzzle as to why venture lending exists at all, given that growth startups with equity capital backing have numerous attributes making debt a seemingly a suboptimal form of finance (Gompers and Lerner 1996; Mann 1999; Winton and Yerramilli 2008; Ibrahim 2010). Hence, any understanding of venture debt starts with placing venture debt as a construct to overcome these hurdles (Davis, Morse, Wang 2020; Gonzalez-Uribe and Mann 2024). Yet, the rapid growth of venture debt over the last few decades attests to innovations in the financial design and the perceived benefits of venture debt to stakeholders in the ecosystem (Ibrahaim, 2010). Venture debt is now evident in over a third of startups during their venture finance lifecycles (Tykvov, 2017, Davis et al 2020) and accounts for 15% of the sum of venture capital (equity) and venture debt (Gonzalez-Uribe and Mann 2024).

This article brings to light the state of knowledge on the hurdles, innovations, and benefits to venture debt. However, with these benefits comes the realization that venture debt is a vehicle that applies debt to growth startups, bringing with it the risk of default on required payments. Thus, the final piece of understanding of venture debt must be in terms of any risks it introduces into the market of startup finance. This risk lens leads to a question as to whether any such risks played out in the failure of Silicon Valley Bank (Metrick 2023, Jiang, Matvos, Piskorski and Seru 2023, Acharya 2023, United States Government Accountability Office 2023) the banking architect of venture debt, or if the SVB failure was orthogonal to the business model of venture debt.

Hurdles to Debt Financing of Startups

Growth startups have very few features that would make them attractive to lenders. First, growth startups rarely have positive cash flow out of which to make payments on the debt (Gompers and Lerner 1996). What little cash flow they do have is needed for working capital and expansion in the grow-or-fail startup setting. This leads to the second flaw from a lender perspective; growth startups often fail (Sahlman, 1990; Fenn, Liang, and Prowse, 1995; Winton and Yerramilli 2008). This high level of risk overall leads to a market failure in the provision of a debt market in the spirit of Stiglitz and Weiss (1981) or Jaffe and Russell (1976). One solution to credit rationing can be found in the borrower's posting of collateral (Bester 1985). Herein again, however, growth startups generally lack sufficient collateral that can be posted as security (De Bettignies 2008). What collateral they do have is often of the intangible nature, which is often not sellable at full value in the event of bad firm outcomes, which makes for weak collateral for lenders.

For equity investors, the solution to these frictions comes from very high returns conditional on success, accompanied by control and cash flow rights to encourage the high return outcome (Kaplan and Stromberg, 2001). In addition, evidence supports the premise that the value add of managerial and growth expertise is valuably conveyed from VCs to entrepreneurs, a role not undertaken by bank monitoring (Winton and Yerramilli 2008; Hall and Lerner 2010; Da Rin, Hellmann, and Puri 2013). Thus, across the board, financing via equity would seem to dominate the setting.

Innovations in and Benefits from Venture Debt

The solutions driving the robust growth of venture debt encompass three subclasses of lending -- patent loans, bridge loans (bridging cash flow needs between venture equity rounds), and venture leverage (debt added to an equity round). All of these solutions depend on their ability to overcome the hurdles plaguing

debt financing provision to growth startups. The most straightforward comes solution is that of patent loans, the starting place below.

Patent Loans.

Writing in the early stages of the dot.com wave of venture capital, Mann (1999) points out that the most likely form of startups' intellectual property that could be tradeable is that of patents. Conventional wisdom would guess that patents are like other intangible assets in that they lose value when the growth startup fails, making for poor collateral. However, Serrano and Ziedonis (2023) provide evidence otherwise, that patents remain robust assets. This asset base gives rise to use of patents as collateral, a fact documented by Chava, Nanda, and Xia (2017) in their study of patent collateral in bank lending to mature corporations for R&D and, first in the venture space, by De Rassenfosse and Fischer (2016) in their study of credit assessments by venture debt providers.

The flip side of this analysis of creditworthiness is the extent to which the existence of patent collateral help to increase access to venture debt and potentially innovation success. Hochberg, Serrano and Ziedonis (2018) document the role of patent trading as a determinant impacting the overall role of venture debt, especially in sectors with redeployable patent assets. Focusing on the initial computing tech wave of startups funded first during 1987-1999, these authors further show that 36% of the sample had received a patent loan by 2008 (Hochberg et al 2018). Mann (2018) uncovers a very similar magnitude for 2013; 38% of U.S. patenting firms had pledged patents as collateral. These two papers work with very different (but overlapping) denominators in the set of firms. Hochberg et al (2018) study tech companies as a whole and Mann (2018) study all patenting firms. This difference is important as it speaks to the breadth across industry sectors and within the technology sector among firms that patent or not. In addition, Mann (2018) also shows that when credit rights are strengthened (making the provision of debt more attractive on the supplier side), patenting companies raise more debt, providing seemingly causal evidence for the mechanism of patents in the provision of venture debt.

Venture Debt as Bridge Loans and Venture Leverage.

Not all growth startups have patents, nor do patents alone explain the overall use of venture debt in firms with patents. Thus, we have to consider what other innovations and benefits enable venture debt to exist. For an understanding of bridge loans and venture leverage, we need to delve into the unique features of venture debt.

How can a debt provider offer debt to a startup without the positive cash flow out of which to make debt payments? Ibrahim (2010), Davis et al (2020) and Gonzalez-Uribe and Mann (2024) provide more details, summarized here in five features.

First, and most importantly, venture debt is a unique construct that depends on the next financing round as its source of repayment of the principle and compounded interest. The founder signs a loan contract triggering repayment on a successful equity financing.[1] Second, the maturity is short, aligned in the milestone-to-milestone provision of equity investment describing venture capital staging.

Third, the lenders – specialized banks and debt funds – generally have add-on benefits from contracting with the startup issuer. For instance, banks may gain a client, the startup, who pays current and future fees through other banking, investment banking, and line of credit services (Hellmann, Lindsey and Puri 2008). Debt funds on the other hand typically require the startup to provide them with warrants, access to

[1] Venture debt contracts have other covenants that trigger repayments such as a liquidation (acquisition or closure) or the issuance of new debt round to refinance.

future equity rounds, or other equity-like rights on the upside cash flow of the venture (Gonzalez-Uribe and Mann 2024). These add-on benefits to the profitability of the loan are understood because of what might be viewed as a below market rate interest rates offered, given the risk of failure in startups. Gonzalez-Uribe and Mann (2024) show that venture debt issued in years 2002-2022 have interest rates generally in the four to eight percentage points above the prime rate. While this is some buffer for risk, it is surely not enough credit risk compensation to cover the kinds of default rates seen in startups.

The fourth feature is related to this risk point. If venture debt providers were to face the same failure rate as venture capital equity investment, even with the add-ons to profitability, these lenders would likely remain unprofitable.

Davis et al (2020) and Gonzalez-Uribe and Mann (2024) argue that a key ingredient to the possibility of venture debt provision is the relationships with venture capital partners (VCs). Venture debt providers and VCs play a repeated game, whereby startups are referred to venture debt by VCs, with the VCs providing a filtering role of sending companies more likely to succeed to the next round of financing to the venture debt providers. For example, Davis et al (2020) quote Stephen Levin from Leader Ventures stating: "…milestones are important in venture debt because they serve as the basis for a relationship that lenders ideally look for as providing identifiable targets that can be achieved using debt.[2]" The fact that venture debt is a relationship business also implies that the banks and debt funds issuing venture debt tend to be specialized and established with reputation in the market.

The fifth and final feature of venture debt is in its benefit of altering the incentives of the startup founder and financier. The two versions of this impact in the literature, both likely operating in the market, are from Davis et al (2020) and Gonzalez-Uribe and Mann (2024).

Davis et al (2020) propose and test a model whereby the raising of needed operational cash by venture debt rather than equity induces a founder to target higher risk, larger market share strategies. This behavior change happens because the founder keeps more skin-in-the-game (equity ownership) of the startup when financing needed cash requirements by debt rather than equity. The strategy action choice in turn positively affects valuation. Note that this role of financing changing agent's behavior mirrors, but with a very different mechanism, a role for VCs in changing founder's actions (e.g., Hellman and Puri 2002; Chemmanur, Krishnan, and Nandy 2011). Davis et al (2020) add empirical support for their theory, showing that venture debt increases the probability of a higher-valued exit by 5%.

Gonzalez-Uribe and Mann (2024) focus on the bridge loan form of venture debt, where the loan is in lieu of equity investment and stand-alone. In their model, the equity investor wants to participate passively with a startup until the startup hits a milestone, thus preserving valuable and scarce VC time. Upon hitting a milestone, this VC would then re-invest contingent on success of the milestone. Thus, the VC refers [good prospect] founders to venture debt providers, who provide time-bridging loans for the experimentation period. The VC retains its role in the firm by allowing for passive (cheaper) finance in the interim. This novel story of a `trial period with cheaper finance' is supported empirically in the authors' use of patent filings and clinical trial resolutions as instruments for the milestone triggering the next round of financing; the venture debt bridging these periods rarely default (Gonzalez-Uribe and Mann 2024).

A final note on the innovations concerns use of venture debt as a vehicle to support public sector innovation aims, a setting that the academic literature has yet to consider. For example, the European Investment Bank, the European Union member states investment vehicle, deployed EUR 2.65 billion in

[2] http://leaderventures.com/overview.pdf

venture debt from 2015 until early 2021, to support scaling up of innovation (European Investment Bank 2022). Yet, unstudied is how such investment relates to the opening up the credit supply for causal impact on innovation (Mann 2018), the changing strategic behavior of the entrepreneur (Davis et al 2020), or in facilitating cheaper financing for the periods of passive financier involvement while founders experiment (Gonzalez-Uribe and Mann 2024).

Risks Inherent in Leveraging Ventures

Venture debt places large debt liabilities on the balance sheet of startups. This can lead to more financial distress and default compared to the counterfactual of the startup having taken equity investment. The question here is the same as that poised by Andrade and Kaplan (1998) in terms of the leveraged buyout form of private equity: does leveraging firms cause financial distress over and above economic distress? If so, could venture debt be causing excess risk in the innovation ecosystem?

The starting point for answering this question is in the model of Davis et al (2020), which shows that when a startup takes on venture debt, it must reach a higher milestone of valuation in order to pay off the venture debt and raise the investment capital. Thus, venture debt may increase risk. However, at the same time, the model also shows that venture debt may increase productive risk-taking, thereby reducing risk of default, depending on the characteristics of the opportunity. They find evidence for that latter; venture debt is associated with a lower probability of default, reducing startup failure by 1.6 percentage points. Furthermore, because both Davis et al (2020) and Gonzales-Uribe and Mann (2024) provide evidence for a VC selection of startups (those with lower likelihood of failure) into venture debt, the leveraging of startups may not be causing unproductive risk into the system.

However, the collapse of Silicon Valley Bank begs a reconsideration of that punchline and an extension of the viewpoint on risk. Because of the relationship model whereby VC and venture debt providers work in a repeated game based on reputation, venture debt provision does not lend itself to atomistic providers. Thus, perhaps large providers are systemic to the system. Furthermore, because venture debt volume and performance likely follows some of the business cycle of venture capital, it is likely that macros risks take a different form than for other debt providers.

The literature has not yet produced answers to such questions. However, research on the recent demise of Silicon Valley Bank (SVB), one of the architects of banking venture debt, does shed light on an important punchline and some unknown risks.

As discussed in Metrick (2023), Jiang, Matvos, Piskorski and Seru (2023), Acharya (2023), United States Government Accountability Office (2023), Bhagat and Laurion (2023), and many others, the cause of SVB's collapse relates to a perfect storm of reasons: large stores of uninsured deposits, asset-liability duration mismatch, the rise in interest rates, liquidity needs of innovation economy clients, and many SVB agency and regulation governance shortfalls. A complete assessment of SVB's demise is beyond the scope here. Notably, omitted from the list above, however, is credit risk. As Metrick (2023) writes concerning the credit quality of SVB's portfolio:

> Their loan portfolio was concentrated in the ecosystem of startup technology firms, the venture capital firms that fund them, and the employees of both. Although this portfolio was not well-diversified, SVB never faced serious concerns about the quality of its loans.

Yet even if the loans themselves were performing, because of the unique attributes of venture debt clients, the jury is still out on the role of venture debt on the risking of the innovation ecosystem. Much more is yet to be done on business cycle risks, risk on the provider side (the bank providers and venture debt

funds), startup risk heterogeneities (including counterparty risk), risk profiles in the ultimate investors in debt funds, and the risk spillovers to other stakeholders in the innovation finance ecosystem (notably, VCs).

Summary

This brief synopsis of venture debt encapsulates the nascent literature on the unique features of venture debt that make lending to growth startups possible, highlighting the revealed preference benefits evidenced in the steep growth of venture debt lending for innovation. Many questions remain regarding risks to all stakeholders, the role of relationships, and the market structure for venture debt providers, which is mostly missing from the literature.

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