

# Patents as Collateral and the Market for Venture Lending

## Proposal for NBER Innovation Policy Grant

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Standard financial theory often considers early stage, innovation-based startups as being unable to access debt, thus necessitating expensive (in terms of cost of capital and dilution) investment by venture capitalists. The reasoning typically given for this belief is that early stage, innovation-based startups lack the tradable collateral necessary to secure a standard loan, and have no history of performance or steady-state cash flows to obtain a cash-flow-based loan. In their 2012 paper, however, Robb and Robinson examine the capital structure of new firms, and find that even the equity-financed ones have a surprisingly large debt load, with debt representing approximately 25% of startup capital.

In this study, we will describe a little explored market: the market for venture lending, and discuss the mechanisms that may facilitate the use of debt by innovation-based startups. Lending to startups, often referred as venture debt, is typically secured by intellectual property (collateral) and backed by implicit promise of the startups venture capital investor to continue to fund the company. The market for venture debt is estimated to be significant: \$2-5 billion per year in loans to startups, representing approximately 10-20% of the capital structure of venture-backed startup companies (Ibrahim, 2010).

Examining the market for venture lending faces a number of challenges. The most significant of these is the nature of the available data, which is incomplete or non-existent. Venture Source, a leading data provider for the venture capital industry, collects data on venture lending, but not all venture lenders report all their deals to Venture Source, and many do not report venture loans at all. While the data that is reported to Venture Source is considered reliable, conversations with large U.S. venture lenders confirm the incompleteness of this data and lack of comprehensive reporting from lenders.<sup>1</sup> Furthermore, since these venture lending deals are rarely syndicated, they do not appear in commonly used lending databases such as DealScan.

In this paper, we take a different approach, and identify venture debt deals by tracking the collateral used in the deal - security agreements providing a lien on patents to secure debt. Our sample includes all VC-backed

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<sup>1</sup> For example, one specialized lender noted that the existence of a loan was more likely to be revealed when the startup was older/more likely to exit via IPO; otherwise, younger startups & their investors have little interest to advertise to others the presence of a loan.

companies (e.g., innovative, high-growth companies) in three industries that use a patent or portfolio of patents as security for a debt transaction.

We will examine the volume of activity in this market, and how it varies with changes in the value of patents and their resaleability, both of which significantly affect the value of patented intellectual property for use as collateral. For example, patents that are less tied to the human capital of their inventors, or are in other ways more valuable are more likely to be valuable as collateral, while patents that are more reliant on the human capital of their inventors, and therefore less tradable, are likely to be less valuable as collateral, and may require other facilitating factors, such as the implicit promise of the startup's venture capital investors to provide future rounds of financing, in order to be used to secure debt. Similarly, in thicker patent markets, where trade is easier, patents are more likely to be valuable as collateral.

This study will examine the tradeoff between the value and liquidity of a patent or patent portfolio as collateral, and the implicit promise of future financing for the company. We will exploit heterogeneity in the patent environment, in the thickness of patent markets, and in the reputation and capitalization of venture capital backers of the borrowing startups.

Importantly, the time period covered by our sample allows us to exploit a shock to the venture capital industry to provide plausibly exogenous variation in the capitalization of different venture capital firms: the crash of the internet bubble. Venture capital firms typically raise sequences of funds, separated by 3-5 years. When the capital from the previous fund has been allocated or reserved, the VC firm turns to its investors, typically institutions such as endowments and pension funds, to secure funding for their next fund. The crash of the internet bubble affected the willingness of these institutional investors to commit funds to the asset class. Depending on where a given VC firm was in the lifecycle of their most current fund at the time of the internet bubble implosion, it may have been well-capitalized or lack funds to invest. For example, a VC firm that had secured commitments to a new fund prior to the occurrence of the crash (that affects institutional investors' willingness to commit to the next fund) remains well-capitalized immediately after the shock, while a VC firm that was near the end of its fund's investment period or fundraising when the shock occurred may remain unable to secure new commitments and therefore is less capitalized after the shock. This provides us with likely variation in the implicit assurances that a given startup will receive future financing from its current investors.

Our preliminary sample is based on 14,929 patents filed by 1,533 venture-backed startups founded between 1987 and 1999. Based on patent security interest records from the U.S. Patent and Trademark Office, we find that 35 percent of startups in the three industries we examine - medical devices, computer software and semiconductor devices - use patents to secure a loan prior to exit.

Our study is the first to reveal the pervasiveness of patent-backed transactions in the market for venture lending, an under-studied source of growth capital for new science and technology companies. We expect our analysis to contribute to the literature on entrepreneurial finance, which has primarily focused on equity investment in startup companies.

If awarded, we will use the grant money to cover expenses related to data purchase, research assistance and data matching, and to travel to work together (one coauthor is in Europe, one is on the east coast, and one is on the west coast).