

New Models in Entrepreneurial Finance

*A Roundtable Sponsored by the Private Capital Research Institute and the
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On June 15, 2018, a group of Limited Partners (“LPs”), academics, and General Partners (“GPs”) met to share perspectives on the growth of new models in entrepreneurial finance. The massive inflows of capital into entrepreneurial firms, whether through venture funds or alternative vehicles, has challenged GPs and LPs to rethink the traditional VC model, their value creation strategies, and their relationship with each other. As GPs find it harder to identify and fund attractive opportunities, they have had to examine what value they add. LPs, frustrated about their inability to access the most attractive opportunities, are reinventing themselves to move further up the value chain to get closer to the entrepreneur. Lastly, a group of academics presented their research that shows the broad disruptive impact that big data is having across the venture landscape, including investment decision-making.

GP Perspective

Nikhil Sinha, CEO at GSVlabs, led a panel discussion with a group of general partners. The panelists were Anne Dwane, co-founder and partner of Village Global; Aaron Gershenberg, managing partner of Silicon Valley Bank; and Mike Maples, founding partner of Floodgate.

With an estimated \$80 billion invested in venture capital in 2017 and \$170 billion of capital on the sidelines to be deployed, the GP panel agreed that the industry's competitive dynamics have been upended. A particular concern of the funders was how to differentiate themselves in a world in which seed round funding seems to be basically "free" for entrepreneurs. Being early is essential for investment success, but it is also important to avoid the mindless competition driven by too much money and the fact that everyone wants to be in the seed round.

Faced with these new challenges, VC groups have successfully responded in a variety of ways:

- When investing, VC firms need to position themselves as value-add partners to entrepreneurs by leveraging their insights and industry networks to facilitate access to capital, customers, and commercial partners. VCs can also act as valuable strategic advisers and sounding boards.
- While providing value-added services is important for success, being trustworthy and transparent is also very crucial for establishing and maintaining long-term relationships.
- To avoid buying into "craziness", GPs should challenge themselves to rethink their deal sourcing approaches. Finding the next area of opportunity is extremely difficult, as there seems to be no direct correlation between capital invested and the magnitude of outcomes. Thus, it is very critical for GPs to continuously search for new things in new, different, and even old spaces (e.g., the rebirth of investments in the life sciences, machine learning, institutionalized project finance, etc.), as well as expand geographically to identify investment opportunities.
- Sometimes the best strategy to avoid hyper-inflated valuations is not to invest at all, particularly with the ever-present danger of "fake growth." There are many false growth metrics that can make it look like a company is more valuable than it actually is (e.g., hiring a lot of employees and increasing office space), but are unrelated to the ultimate profitability and success of the business.

As the competitive landscape for venture capital evolves, VC managers are showing a tendency to take money off the table considerably sooner than before. They are likely to be more proactive about managing toward early exit options by establishing relationships with private equity firms and strategic investors. Also, some VC firms may take advantage of the later-stage liquidity markets provided by large venture investors, like Softbank's \$100 billion Vision Fund. Furthermore, investing in initial coin offerings could also offer further liquidity in the VC markets in the future. With the growth of these options for early liquidity, the big decision for VCs has morphed to become whether it is better to stick to their competitive advantage of early-stage investing and liquidate early, or to continue to pile money into potential winners and avoid the scrutiny brought on by a sales process or going public.

Ultimately, the focus of VCs has to be on returns, not just on finding the next big opportunity. Good founders do not necessarily care about money, they just want the best ideas and technology. With supergiant rounds and "money bombs" being lobbed into the venture industry, companies, even in the absence of a clear catalyzing event or other performance improvement metric, can raise more late-stage capital than what many companies raise in their IPOs. The shift toward preemptive funding has changed the traditional role of VC firms of just writing seed checks. They need to have a sharper focus on capital efficiency and the drivers of long-term value creation.

Academic Perspective

Josh Lerner, from Harvard Business School, led a panel discussion with a group of academics, including Ramana Nanda from Harvard Business School, Rick Townsend from the University of California-San Diego's Rady School of Management, and Toby Stuart from that University of California-Berkeley's HASS School of Business.

Ramana Nanda presented research (conducted with co-authors Christian Catalini from MIT and Chris Foster at HBS) on the use of machine learning to evaluate applications by early-stage startups to accelerator programs. As the cost of starting ventures has fallen and the number of startups have sky-rocketed in recent years, early stage investors in general and accelerators in particular face an increasing challenge to screen these applications. The vast majority of applications are of low quality, but a few 'unicorns' such as Airbnb and Dropbox nevertheless first developed traction by joining accelerators. Nanda and his colleagues sought to assess whether artificial intelligence could be used as a scalable way to effectively screen the high volume of applications while preserving or even increasing the chances of identifying such 'needles in a haystack'.

The researchers started with a set of 14,000 applications received by one of the largest accelerator programs in the US between 2013 and 2016. They first collected the amount of money raised by the applicants to the accelerator by December 2017 (as an intermediate measure of success), regardless of whether the applications were accepted to the accelerator program. They then used machine learning techniques, including natural language processing, to study the extent to which success could be predicted from characteristics of the applications, and whether machines could do so more effectively than the human judges. To do so, they trained two sets of models: the first model was trained to mimic the score given to applications by the accelerator's judges, as a way to replicate the considerations used by the humans when screening applications. A second model was trained to pick the most successful startups as measured by the amount of money raised, regardless of whether judges scored the application highly.

The researchers had three main findings. First, models trained to mimic judges were able to replicate the heuristics of these investors extremely well. Second, models trained to maximize success did significantly better in picking successful ventures than the actual judges (and the models trained to mimic the actual judges). When comparing the emphasis placed on attributes of the applications by the two different models, the researchers found that the model trained to mimic humans tended to emphasize a few variables extremely highly, and entirely miss others. As an example, Table 1 below shows the Rank versus Importance of the various characteristics of the different startups when considering the startup's revenue model. The model that best mimics the judges, on average, assigned nearly half the total weight to whether the start-up employed a subscription-based business model, showing the human judges strongly prefer ventures with recurring revenue. The 'unconstrained model' that maximizes the amount raised also put a high weight on firms with a subscription model, but the weights were more evenly distributed across characteristics. This difference implied that while recurring revenue was important, several other factors were also relevant for success – many that the models mimicking humans did not end up emphasizing due to the large weight but on applications with a recurring revenue model.

Overall, this research suggests that human judges follow an identifiable pattern that can be replicated by machine learning. More importantly, this research finds that machine intelligence, which does not face the cognitive limitations and biases of humans, may do substantially better than human judges in finding successful startups in terms of money raised when processing the large volumes of applications received by early-stage startup financiers.

Table 1
Rank vs. Importance within category

Revenue Model	Mimic Judge Importance	Mimic Judge Rank	Unconstrained Importance	Unconstrained Rank
Subscription	0.40	1	0.09	1
Ads	0.16	2	0.07	6
Sales	0.05	3	0.07	3
Freemium subscription	0.04	4	0.07	2
Licensing	0.04	5	0.03	13
Subscription channel	0.04	6	0.02	17
Sales self	0.03	7	0.05	10
Direct	0.03	8	0.07	5
Direct sales	0.03	9	0.06	7
Freemium	0.02	10	0.07	4

*Source: NBER Productivity Lunch Presentation, April 10, 2018. Authors: Christian Catalini (MIT), Chris Foster (HBS), Ramana Nanda (HBS)

In the second presentation, Rick Townsend described his research¹ (with Michael Ewens from Caltech) that explores whether early-stage male investors were biased against female entrepreneurs. The data show that there is a significant gender gap in both VC funds and in VC-backed entrepreneurs: for instance, studies of startup activity in the U.S. find that only 10-15% of funded startups are founded by women. Table 2 below provides a Gender Distribution on investments from three different information sources. Many have speculated that part of the gender gap may, in fact, be due to a lower propensity for investors to fund female entrepreneurs seeking capital.

Table 2
Gender distribution on AngelList, Crunchbase and VentureSource

	Angel List	Crunchbase	Venture Source
% firms with female CEO/founder	15.8	13.0	11.0
% firms with any female founder	20.9	13.4	17.3
% female investors	8.0	5.0	6.5

*Source: Ewens, Michael and Townsend, Richard, "Are Early-stage Investors Biased Against Women?" April 29, 2018 working paper.

The table reports the percent of women in entrepreneurial firm founder positions or as investors in three databases. The AngelList sample includes the startups and investors active on the platform starting in late 2009. Startups are those that sought capital publicly on the website. Crunchbase is a wiki-style website of startups, investors and exits maintained since 2010. VentureSource is a database of venture capital financings and investors provided by VentureSource. Gender of both founders and investors was identified using the algorithm and manual assignment detailed in Section 4.3. Crunchbase numbers for founders are for firms founded between 2010 and the present and headquartered in the U.S. The VentureSource founder statistics are for firms founded between 2010–2015. The VentureSource investor statistics report the fraction of board members of firms financed between 2010–present that are women.

¹ Ewens, Michael and Townsend, Richard, "Are Early-stage Investors Biased Against Women?" April 29, 2018 working paper. Available at SSRN: <https://ssrn.com/abstract=2953011>

The researchers use data from AngelList, which provides detailed investor-founder interactions for a large sample of fundraising startups, some of which succeeded in raising capital and some of which failed. Using these unique data, they find that female founders are significantly less successful in garnering interest and raising capital from male investors, as compared to similar male founders. The researchers also find that female entrepreneurs are more likely to be funded by female investors rather than male investors. Lastly, they find that female-led startups are more successful when funded by female investors and, in fact, are more successful than male-led startups supported by male investors. This research demonstrates that there is clearly gender bias in early-stage investments and that in order to boost female entrepreneurship, there needs to be an increase in the number of female investors.

Lastly, in the final presentation, Toby Stuart shared his current research (with co-authors Weiyi Ng and Mosche Barach). Toby began by explaining that many leading technology companies in the Silicon Valley have been buying start-up companies. In many of these transactions, the buyer has little interest in acquiring the startup's projects or assets. Instead, the buyer's primary motivation is to hire some or all of the startup's software engineers. In this research, Toby looks at the retention rate of these "acqui-hires" as compared to engineers of similar background and skills who were directly hired by the firm. Toby first gathers a database of 60 million resumes by scraping LinkedIn profiles and then, using machine learning, he creates two samples of employees who are observably similar: those who were organically hired and those who joined the firm through an acquisition.

Toby finds that the retention rate of acqui-hires in the year of a merger is 50% lower than that of similarly skilled organic hires. He also finds that higher-ranked employees have lower retention rates. Being in Silicon Valley further decreases the average retention rate. Also, he finds that acqui-hires are more likely than organic hires to leave their firms to start their own companies. These results suggest that a strategy by publicly-traded leading technology companies to undertake acquisitions to satisfy the high demand for engineering talent is not a good strategy in the long-term and that the shareholders of these companies lose in the process.

Limited Partnership Perspective

Carlos Monfiglio from State Street Global Advisor led a panel discussion on new models in entrepreneurial finance with a group of limited partners: Jagdeep Singh Bachher from the Regents of the University of California, Robert Ross from California State Teachers Retirement System, and Stephen Whatmore from Queensland Investment Corporation.

Does venture capital investing still makes sense for asset owners? While there is skepticism, as illustrated by some LPs who have recently dropped out of VC, the consensus among the panelists was that VC adds value to institutional portfolios. However, they argued that LPs can no longer depend on the traditional VC model, in which they had often found themselves begging top VC firms for an allocation and paying high fees. Instead, the LPs have found themselves exploring new ways to get direct VC exposure.

VC has always been a tough asset class for LPs, they argued. The current environment, with bigger funds investing in bigger rounds, is making it even harder to overcome barriers to finding and accessing the “winners” in an arms race environment. There has been an influx of funding from new angel investors, from sovereign wealth funds into mega venture funds, and from non-equity capital providers, such as the Silicon Valley Bank. As a result, VC is ubiquitous and with the advent of the initial coin offerings, retail and institutional investors may have the ability to buy and sell investments on the open market, circumventing the VC firm altogether.

What stops the fundraising surge remains to be seen. But the prevailing competitive dynamic has forced institutional investors to move up the value chain to get much closer to the entrepreneur. Before doing so, however, they must evaluate what they bring to the table, such as a specialization in a certain space (e.g., expertise in artificial intelligence), human capital, or having a differentiated process to evaluate investment opportunities. That said, there is no formula that applies to each asset-owning organization. It is imperative for capital allocators to identify a clear and compelling competitive advantage that makes their capital more valuable than others on comparable terms. For instance, LPs that are part of an academic system may use the strategy of getting access to the entrepreneur by leveraging the expertise on their academic campuses (for example, the Massachusetts Institute of Technology has a \$250 million fund to fund student start-ups, which is also open to some outside investors, and the University of California has set up its \$250 million arms-length VC firm as well). Another strategy might be having expertise in investing in seed and accelerator funds. Lastly, for some LPs, being able to help entrepreneurs expand globally may be advantageous. While these strategies were compelling, the panelists emphasized that successfully executing them posed substantial challenges.

So, is the traditional model of serving as a limited partner in VC funds completely gone? The consensus is no, but there is a need to rework the relationship between the LPs and VC firms. They pointed out that VC firms need to provide more transparency, scalability, and have more flexibility on fee structures. For example, some LPs have emphasized co-investing with the funds in which they invest, in the hopes that they will have better alignment with VCs. Lastly, LPs need to be more thoughtful about funds that target inflated early rounds. Most importantly, with billions of dollars continuing to flow into new venture capital funds challenging return outcomes, it has never been more important for LPs to be clear about how the VC asset class fits into their broader portfolio and to the necessity of having a clear plan to generate satisfactory returns in exchange for the risks they are taking on.