VoxEU: Venture capital-backed innovation and recessions

Although governments have taken steps to bolster their venture capital sectors in response to the Covid-19 crisis, we find that early-stage venture investment falls sharply during recessions, writes Sabrina Howell, Josh Lerner, Ramana Nanda, Richard Townsend for VOXEU

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Governments shore up the venture capital sector

In the wake of the Covid-19 crisis, governments around the world have raced to buttress their economies (Baldwin and di Mauro 2020). National venture capital sectors have not been exempted: Canada, France, Germany, the UK, and many other nations have committed billions of dollars to shore up venture firms and the companies they fund.

The interest in promoting venture capital reflects four considerations.

The first three are well documented. First, across the developed world, productivity growth appears to be slowing, as compilations by the OECD and many national governments have documented. Second, basic research spending and research efficiency appear to be lagging at large corporations, which traditionally accounted for the bulk of R&D expenditures (Arora et al. 2019, Bloom et al. 2020, Miyagawa and Ishikawa 2019). Against this backdrop, the third consideration – the ability of VC funds to stimulate innovation – is increasingly relevant (Akcigit et al. 2019, Bernstein et al. 2016, Kortum and Lerner 2000).

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But the final rationale for these public policy interventions has received less scrutiny: the concern that venture-backed innovation is particularly vulnerable to downturns such as the one we are experiencing. For instance, leading British venture capitalists and entrepreneurs recently argued that absent targeted government aid, "companies of the future such as ours… will be put at risk". Their claim led the UK Treasury to introduce its so-called "runway" program.

This proposition raises questions. Venture capital firms, like other types of private equity, usually employ a ten-year fund structure and make private, long-term investments. This should provide some insulation from downturns. Moreover, venture investors are fond of pointing to successful companies launched in recessions, such as Airbnb, which received its initial funding in 2009. At the same time, we know that certain financial aspects of venture capital – such as the volume of investment, company valuations, and exits through IPO or acquisition – are pro-cyclical (Kaplan and Schoar 2005, Gompers et al. 2008, Robinson and Sensoy 2016).

In our recent working paper (Howell et al. 2020), we explore VC activity and VC-backed innovation during recessions. We start by examining the very recent past, and show that US VC activity fell precipitously during the initial phases of the Covid-19 crisis. The number of weekly early-stage VC deals declined by nearly 38% in the two months starting on 4 March 2020 relative to the previous four months. In contrast, later-stage VC has remained much more robust thus far.

Second, they show that the Covid-19 crisis is not an anomaly in this regard. Examining historical data on VC investment activity, they document that aggregate deal volume, capital invested, and deal size all decline substantially in recessions. Investors who specialise in early-stage deals are significantly more responsive to business cycles than later-stage investors.

We then examine whether the volume and quality of VC-backed innovation is higher or lower during recessions, and the potential reasons for these patterns. We use data on VC financing matched to the patenting of VC-backed startups over the period from 1976 to 2017. The analysis focuses on comparing innovation by VC-backed firms to innovation conducted more broadly in the economy.

But VC investment is pro-cyclical…

First, patents filed by VC-backed startups are of higher quality and greater impact than the average patent. Citation counts provide one indicator. For instance, 29.4% of VC-backed patents are in the top 10% of most-cited patents (defined relative to all patents whose applications were filed in the same month), and 4.7% are in the 1% most highly-cited patents. Moreover, VC-backed firms are disproportionately likely to have more original patents, more general patents, and patents more closely related to fundamental science. This is consistent with VC-backed firms playing a disproportionately important role in job creation and productivity growth (Puri and Zarutskie 2012).

Second, VC-backed innovation is pro-cyclical, even more so than the broader economy. Specifically, we find that relative to all other patent filings within a technology class, the number of patents applied for by VC-backed firms, as well as the quality of those patents, is positively correlated with the amount of VC investment in startups in a given month. Even after controlling for the lower amount of VC finance available to startups in recessions, we find these periods are associated with particularly low levels and reduced quality of innovation.

Third, we find that our innovation results, like the deal volume results, are driven by startups financed by venture groups who specialise in early-stage investment. In some specifications, there are few differences in the volume of innovation across the business cycle for startups backed by late-stage investors. The fact that late-stage VC appears to be more insulated from the public markets is consistent with Bernstein et al. (2019), who find that investment at private equity-funded companies was less sensitive to the 2008 financial crisis.

Fourth, the shift in innovation we measure during recessions stems from both the types of firms receiving VC financing during recessions and a change in the nature of innovation within VC-backed firms over the course of the business cycle. Specifically, our results appear to be driven by startups that raised their most recent round either during the recession or many months before it started. Startups that raised their most recent VC round during the six months before the recession started (i.e. during the boom period) experience no relative decline in innovation quality.

These findings underscore the policy concerns that motivate the policy interventions discussed in the first paragraph. They cannot, however, address some of the larger questions around public initiatives to support venture-backed startups in recessions. For instance, we might wonder about the public return from these expenditures relative to cash grants for hard-hit individuals. Similar questions surround the optimal design of such initiatives, given concerns about earlier programs targeted at high-technology firms (e.g. Howell 2017, Lerner 1999).

But the pro-cyclical nature of venture-backed innovation provides a powerful rationale for exploring interventions in this area.

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