

Trends in Entrepreneurial Funding

ENTREPRENEURIAL FUNDING

The Funding Impact of Innovation

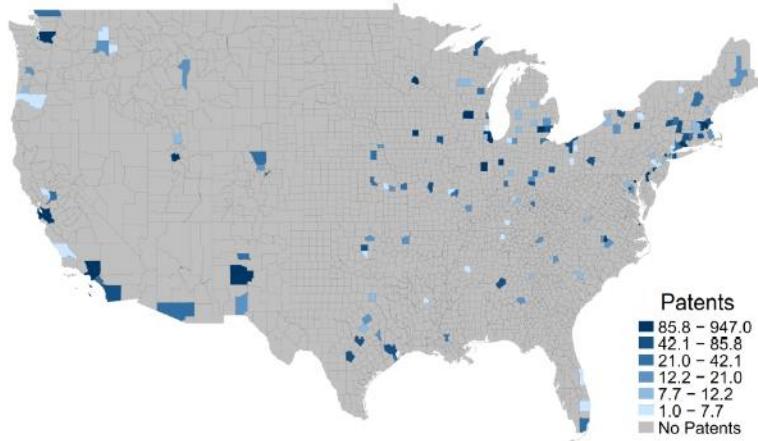
Notable Trends

- Understanding how innovative new technologies enter the marketplace is fundamental to understanding how innovation increases productivity.
- Recent research suggest a symbiotic relationship between finance and innovation — not only does financing generate innovation, but innovation generates financing.
- A new NVCA survey identifies what happens with venture capital investment once companies receive capital.
 - Four out of five respondents spent at least 70% of their budgets on two activities: wages and compensation, and research and development.

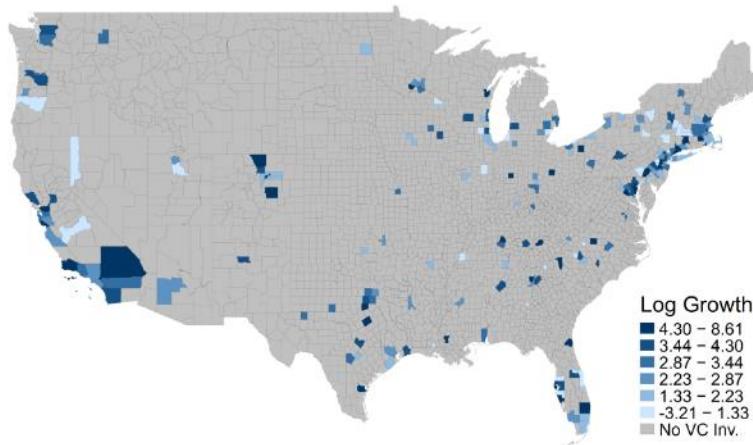
Funding and Innovation

- It has been known for decades that funding leads to more innovative activity (Kortum and Lerner, 2000). In addition, financing does not only generate innovation, but also innovation generates financing (Hausman et al, 2020).
- The research utilizes a regime change in the commercialization of university innovation in 1980 that strongly increased university incentives to patent and license discoveries.
- Because universities have different technological strengths, each local area surrounding a university experienced an increase in innovation relevant to particular sets of industries after 1980 — industries which differ widely across university counties.
- Comparing industries within a county that were more, rather than less, related to the local university's innovative strengths shows that venture capital dollars after 1980 flowed systematically toward geographic areas and industries with the greatest sudden influx of innovation out of universities.
- The results support the notion of a “virtuous cycle” wherein innovation serves to draw capital investment, which then funds future innovation.

Funding and Innovation



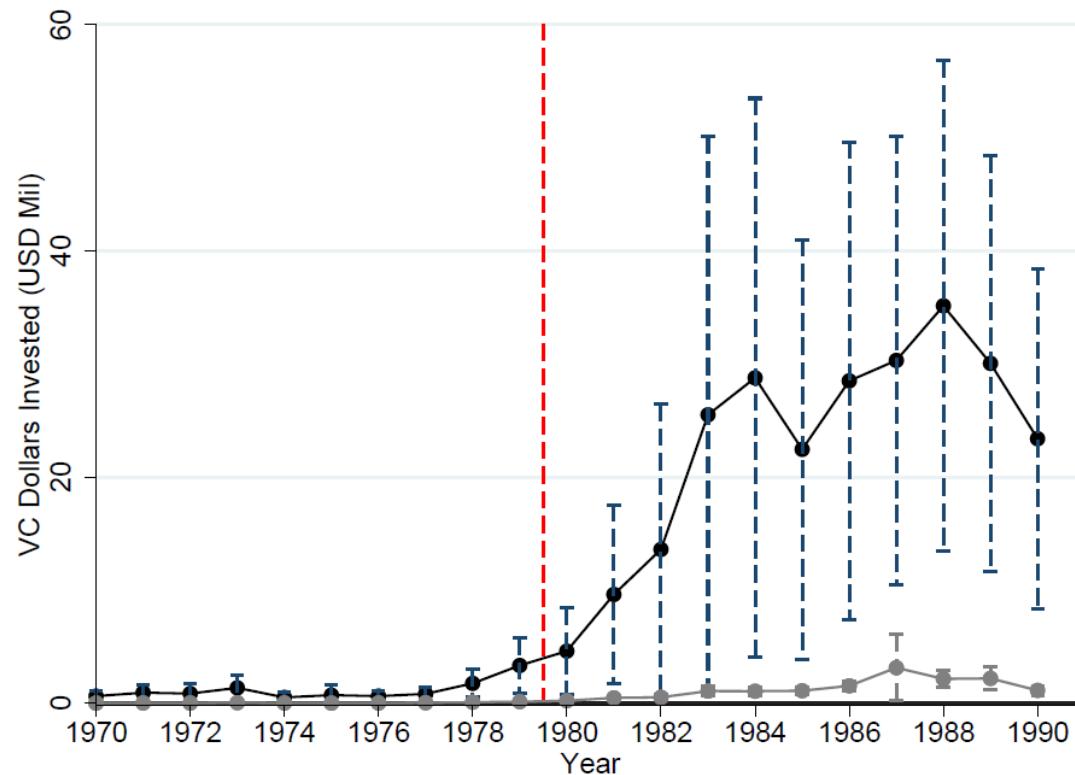
(b) University Innovation, 1976-1980



(d) VC Growth, 1980-1990

- The Bayh-Dole Act of 1980 and the subsequent Trademark Clarification Act gave universities property rights to innovations developed at their institutions using federal research funding. This provided strong incentives for universities to engage in patenting and licensing activity (Hausman et al., 2020).
- The locations with the greatest VC growth from 1980-1990 (bottom graph) closely resemble the locations of pre-1980 university innovation (top graph) (Hausman et al., 2020).
- Formal statistical tests show the Bayh-Dole-induced shock to innovative activity in the vicinity of top research universities has led to the increased flow of VC funds to university regions over non-university regions, and specifically to the industries in each university region that are most closely related to the local university's ex-ante technological strengths (Hausman et al., 2020).

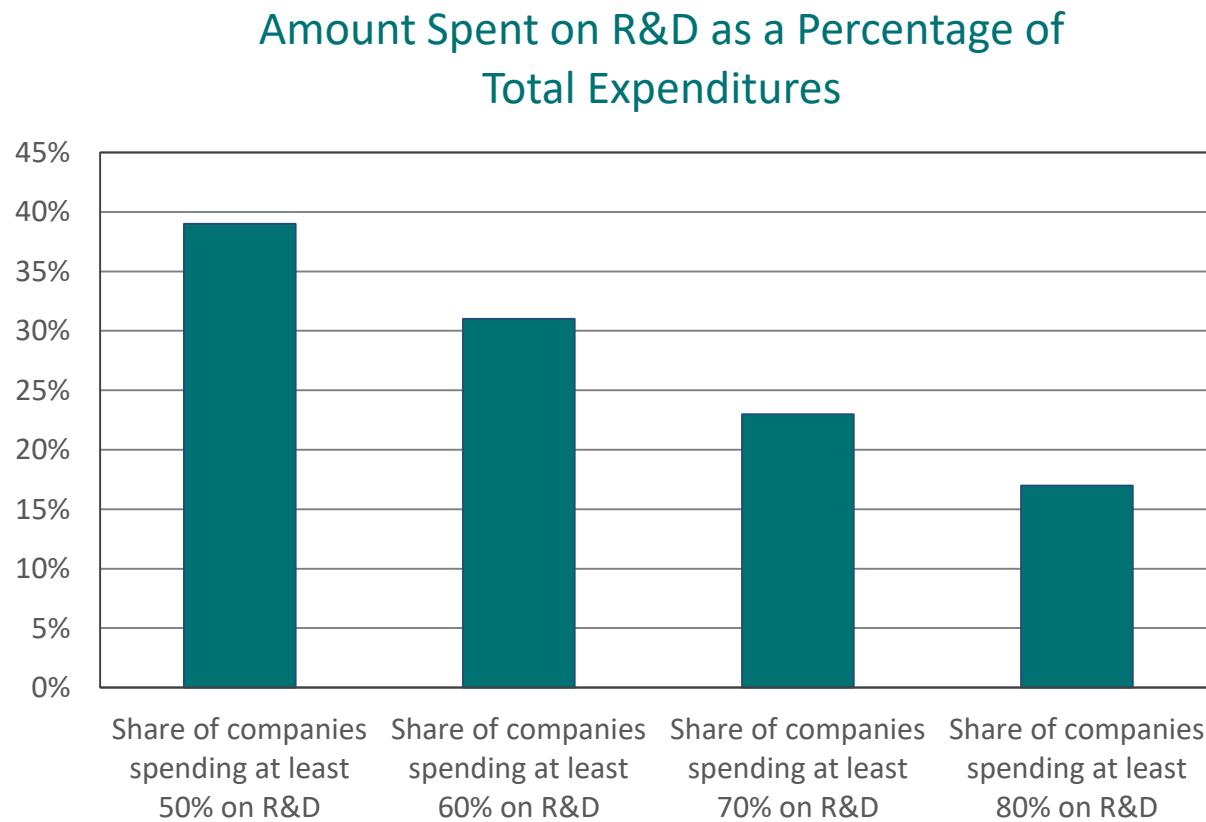
Funding and Innovation



(a) VC Dollars Invested (mil.)

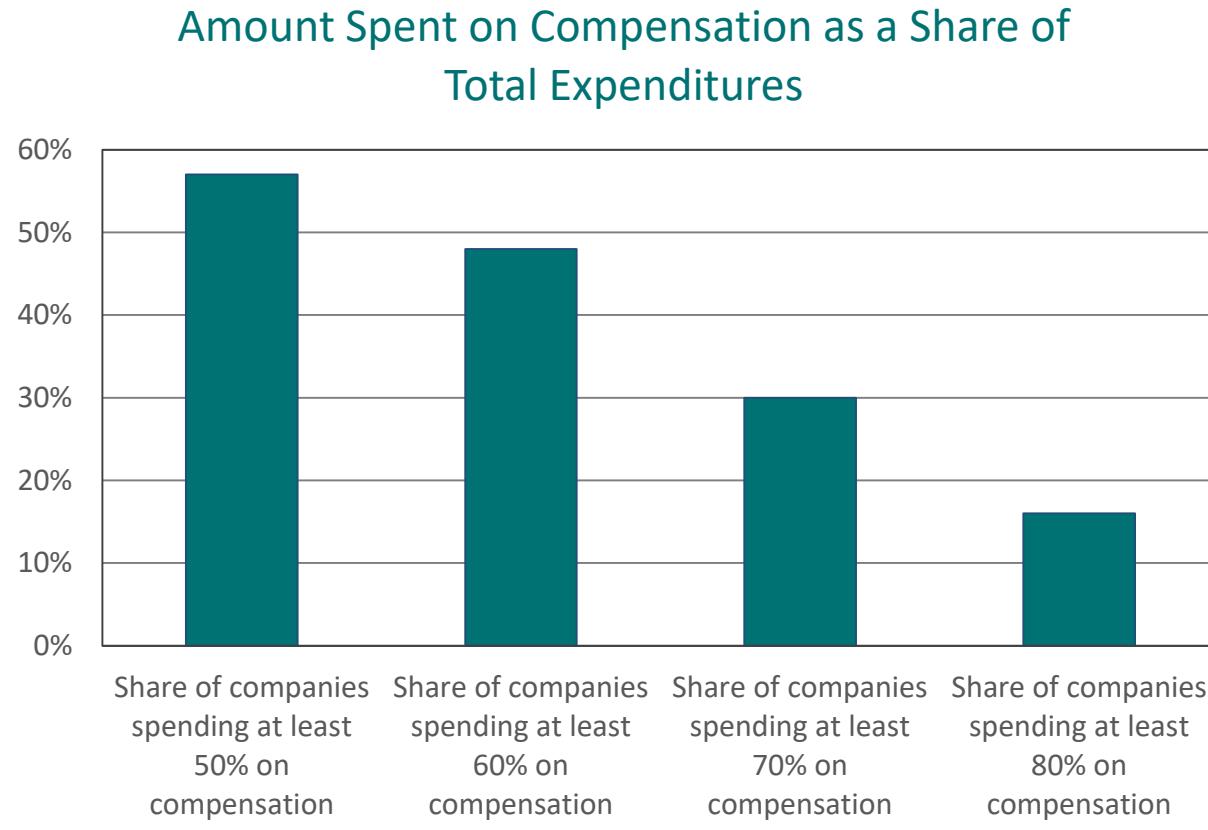
- This figure shows raw means of VC outcomes by year in university (dark curve) and non-university (gray curve) counties. University counties are defined as those containing a top 100 university or research hospital, in terms of patenting during the research period. Seventy-five counties contain the top 100 universities (Hausman et al., 2020).
- We find an increase of \$117,000 in VC funds after Bayh-Dole per county-industry, per standard deviation increase in our university “innovation index” measure, or \$54,000 per county-industry per citation to a university patent. This effect amounts to approximately \$23.2 million additional VC investment per county after Bayh-Dole, which represents the vast majority of the increase in VC funding to these locations (Hausman et al., 2020).

Funding and Innovation



- Innovation is closely linked to productivity growth, a key source of economic growth and essential to progress in living standards.
- For this reason, the percentages of capital deployed to finance research and development among respondent companies are particularly notable.
- A remarkable 40% of companies reported spending 50% of their annual total expenses on research and development (R&D).

Funding and Innovation



- Data suggests that recent increases in venture capital investment will lead to greater job creation and innovation.
- With many VC-backed companies exploring solutions to issues such as the COVID-19 crisis, access to education, and climate change and agricultural sustainability, increased funding will also help address some of the greatest challenges facing society today.

**Yael Hochberg***Ralph S. O'Connor Professor in Entrepreneurship & Finance; Head, Rice University Entrepreneurship Initiative*

Professor Hochberg's research and teaching interests are focused on entrepreneurship, innovation and the financing of entrepreneurial activity. Her research focuses on the venture capital industry, accelerators, networks, and corporate governance and compensation policies. Hochberg serves as the head of the Entrepreneurship Initiative at Rice University and as academic director of the Rice Alliance for Technology and Entrepreneurship. She is also managing director of the Seed Accelerator Rankings Project, which publishes the annual ranking of accelerator programs in the U.S.

EXPERT INSIGHT

- Economists since Adam Smith have emphasized the importance of entrepreneurs and new business formation to the economy. Understanding the forces underlying the formation of entrepreneurial clusters — particularly of a high-growth, innovation-driven nature — is of critical interest to economists and policymakers alike.
- Our findings have several policy implications. First, intellectual property policy that provides incentives for the commercialization of university innovation appears to have positive effects for the local economies nearby.
- Our results are relevant to policymakers seeking to cultivate innovation-driven entrepreneurial (IDE) ecosystems. The importance of strong local innovation may be one reason policy efforts to provide seed capital or attract venture capital to a region — such as tax breaks for early-stage investment and the formation of local government-backed funds — have met with mixed success.
- The evidence suggests that spending money on programs to encourage local innovation may be more productive in developing local ecosystems than spending on programs to create venture funds directly. Specifically, by encouraging formal technology transfer, informal knowledge sharing and an increased density of skilled workers, policymakers can harness the substantial power universities have to stimulate local high-growth entrepreneurial clusters.