

Venture Capital Reputation and Investment Concentration

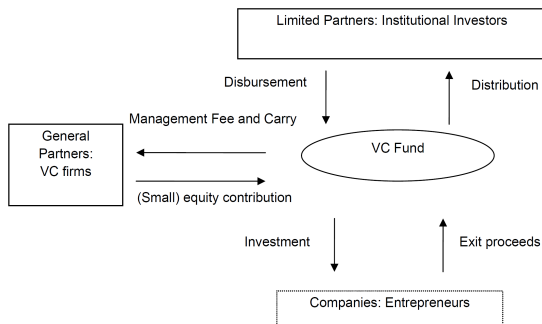
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Preliminary work

April 30, 2021

Background

- Venture capital (VC) is a crucial resource for financing and nurturing potentially high growth but risky new ideas.
- As of 2014, public companies with venture capital backing employ 4 million people and account for 1/5 of the market capitalization and 44% of the R&D spending of U.S. public companies.



VC Deal/Exit Activity

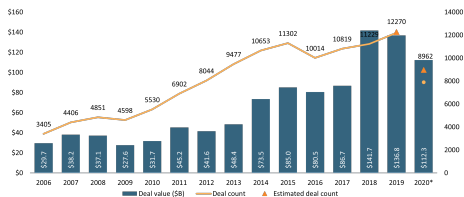


Figure 1: VC Deal Activity

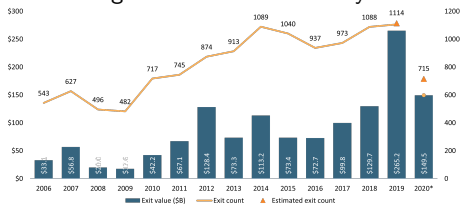
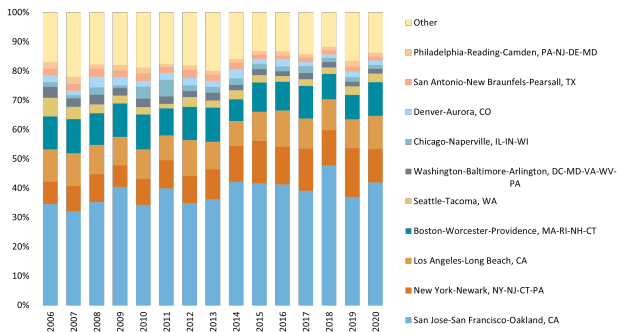


Figure 2: VC Exit Activity

■ Data: Pitchbook-NVCA Venture Monitor as of September 30, 2020

VC Deals Value by CSA



■ Data: Pitchbook-NVCA Venture Monitor as of September 30, 202

- We source the data from VentureXpert database provided by Thomson Financial. It contains detailed information about the dates of venture financing rounds, the investors and portfolio companies involved, the estimated amounts invested by each party and the ultimate portfolio outcomes.
- The primary sample includes all VC investments made between 1980 and 2016 and focus on venture stage (seed, early, expansion or later stage).
- We focus on investments made by U.S. based VC firms in private companies headquartered in the U.S. and exclude those by angels and buyout funds.

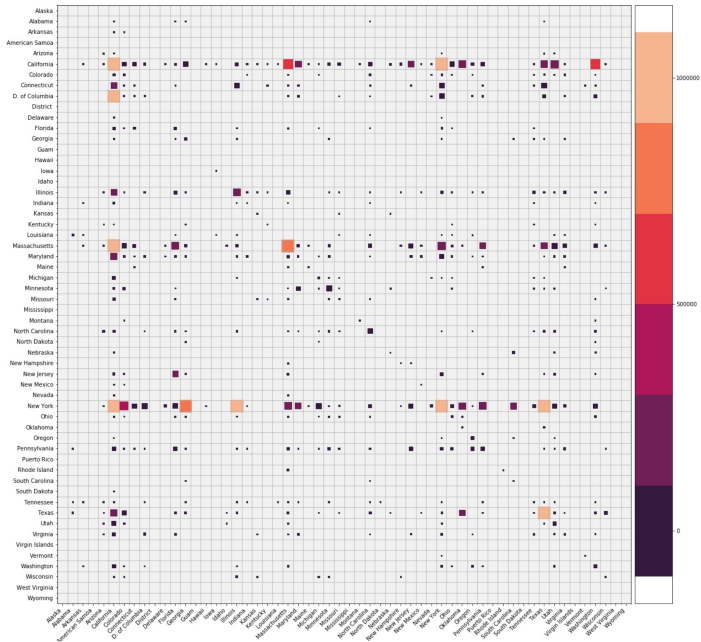
- The investment is treated as **successful** if the portfolio companies go public or are acquired.
- For each VC firm, we cumulate the dollar market value of all companies taken public by the VC firm from the beginning of calendar year 1980 up until a given calendar year and normalize it by the aggregate market value of all VC-backed companies that went public from the beginning of 1980 up until the same calendar year (Hereafter refer to this measure as **reputation**).

Summary Statistics

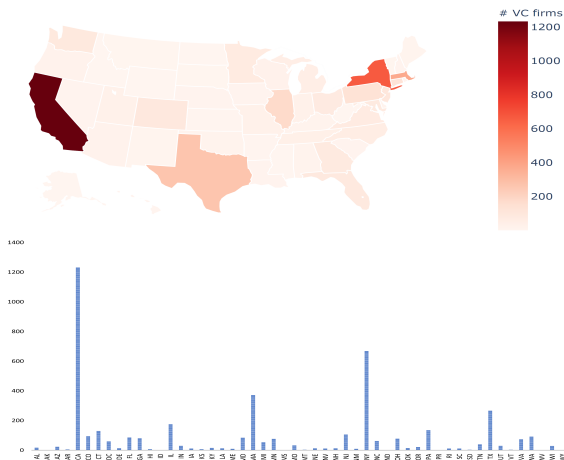
Variable	Obs	Mean	Std. Dev.	Min	Max
Round year	204126	2001	9.146	1980	2016
Annual VC backed Companies	36	2211.556	1234.041	266	5691
Nbr. Syndicate	34,567	2.707	2.456	1	26
Investment Success Rate	34,567	0.385	0.487	0	1
Investment IPO Rate	34,567	0.091	0.287	0	1
Company total investment	30,815	22997.54	72783.85	0.2	$7 * 10^6$
Annual VC firms	36	797.139	407.751	164	1507
VC firm relative age	89,050	0.501	0.346	0.027	1
Per firm investment	89,050	5962.37	19820	0.1	2865000
Firm reputation	89,050	0.013	0.030	0	0.590

Observation is at a company-firm-round level. The units of investment terms are all 1000 dollars.

Investment Flows: 2015

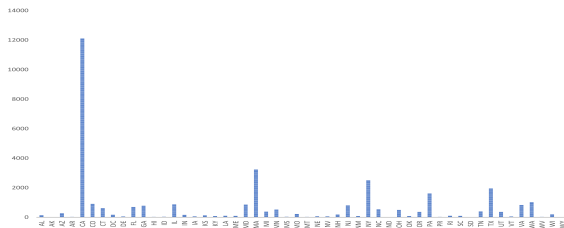
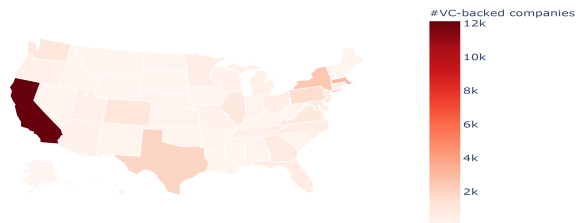


VC Firm Distribution



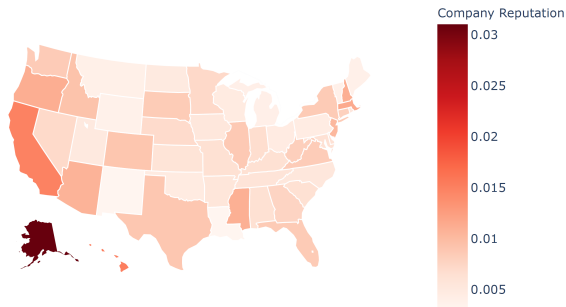
- U.S. venture capital is heavily clustered in four MSA: San Jose, San Francisco, Boston and NY. (We later refer these four cities the venture capital centers.) More than half of all venture capital offices in the U.S. are located in those metropolitan areas.

VC-backed Company Distribution



- More than half of all companies financed by venture capital are located in those venture capital centers areas, too.
- The distribution of VC-backed companies are even more concentrated than VC firms, mostly clustered in the Bay area.

Reputation Distribution



- Average reputation of VC firms invest in the states over 35 years.
- The average reputation distribution is also concentrated but to a much less extent.

Empirical Patterns

VARIABLES	Instate	VCC	Syndicate*VCC
Firm Reputation	-1.299*** (0.179)	0.220*** (0.046)	1.826*** (0.378)
Firm Reputation*VCC Firm	1.226*** (0.182)		
Nbr.Syndicate	-0.004*** (0.001)	0.005*** (0.000)	
VC age	-0.059*** (0.005)	0.025*** (0.004)	-0.054 (0.036)
log (firm investment)	-0.002 (0.002)	-0.002 (0.001)	-0.505*** (0.009)
Enter Round	-0.135*** (0.005)	0.009** (0.004)	-0.625*** (0.036)
Distance between Company and VC		0.154*** (0.003)	0.720*** (0.025)
Company Quality	-0.049*** (0.002)	0.009*** (0.001)	0.914*** (0.009)
Firm MSA*Year FE	YES	YES	YES
Company MSA*Year FE	YES	YES	YES
Company SIC	YES	YES	YES
Observations	79,233	78,605	78,605
R-squared	0.345	0.578	0.394
Adjusted/Pseudo R-Square	0.409	0.329	2.723

- High reputation VC firms are more likely to invest out of their home state later and invest in venture capital center areas.
- High reputation firms are more likely to form syndication with other VC firms to back companies in venture capital center areas.

Motivation:

- Strong concentration of VC firms and company (Agglomeration).
- Investments go mostly from the venture capital centers to the venture capital centers, but those investment flows are not symmetric.
- More reputable VC firms tend to invest in venture capital centers (Sorting).
- VC firms headquartered in those venture capital centers perform better overall, and disproportionately invest in local start-ups.
- The VC firms, on average, get better results from their investments in locations outside their headquarters region (Chen et al. 2010).

Research Questions:

- What role does VC reputation play in shaping VC investment distribution?
- How much of this sorting in location behavior is inefficient?
- How does the information of reputation helps alleviate or aggravate this inefficiency?

- **VC search and matching theory:** Keuschnigg (2003), Keuschnigg and Nielsen (2003), Inderst and Muller (2004), Michelacci and Suarez (2004), Boadway et al.(2005), Sørensen (2007), Dam (2007) and Plehn-Dujowichy et al. (2011), Silveira and Wright (2016)
- **Sorting, selection and agglomeration:** Behrens et al (2014), Duranton and Puga (2004), Eeckhout and Kircher (2010), Combes et al. (2012), Eeckhout, Pinheiro, and Schmidheiny (2014), Davis and Dingel (2012, 2014)
- **Reputation and investment performance:** Nahata (2007), Anderson and Smith (2010), Board and Meyer-ter-Vehn (2019)

A Static Toy Benchmark

Set-up and Timing

- There's a continuum of cities/sites c
- For a given city c , two types of agents: (1) talents with mass L_c ; (2) 'fresh' capitalists (with no experience/reputation) with mass δL_c .
- There is a mass of mature capitalists (VC) with positive reputation $r \in (0, \bar{r}]$ can move across the nation \Rightarrow choose a city L_c to enter
- Reputable VCs corporate with local capitalists to form syndicates.
- Within a city, each talent draws its ability φ from common distribution $G(\cdot)$ and make an occupational choice: entrepreneur or worker
- Occupational choice take the opportunity of being backed by VCs into account

Assumptions

Three key assumptions for the toy model:

1. Reputation increases project's success rate directly.
[deviate from benchmark] project success rate is higher for reputable firms
may be due to heavy-selections
2. A success of IPO is a result of improvement of TFP
[deviate from benchmark] reputable VC can strategically bluff about the
project to get successful exit
3. Reputation prevails across syndicates with fresh capitalists: a reputable VC
in the syndicate always increases the success rate

Environment

Local final good market is competitive:

$$Y_c = \left[\int_{\Omega_c} x_c(i)^{\frac{\sigma-1}{\sigma}} di \right]^{\frac{\sigma}{\sigma-1}}$$

Assume that it only uses local differentiated inputs $\{x_c(i)\}$ which is produced only by labor (*).

Monopolistic competition for entrepreneur conditional on realized ex-post productivity φ' :

$$\pi(\varphi') = \frac{1}{\sigma} Y_c \left(\frac{\varphi'}{\Phi_c} \right)^{\sigma-1} - Q(\varphi') \mathbb{1}\{\text{VC-backed success}\}$$

where $\Phi_c = \left(\int_{\Omega_c} \varphi'(i)^{\sigma-1} di \right)^{\frac{1}{1-\sigma}}$ aggregate ex-post productivity in city c , and

$$\varphi' = \begin{cases} \varphi & \text{no VC-backed or failed} \\ \varphi Z & \text{VC backed and success} \end{cases}$$

We interpret Z as some capital-embodied technology enhancement or nurturing by VCs

Benchmark VCs matching with private companies

For simplicity we assume reputable VCs with reputation r hire all local capitalists to form syndicates:

In equilibrium, ratio of VCs over companies is given by:

$$\theta_c \equiv \frac{V_c}{[1 - F(\underline{\varphi})]L_c} = \frac{\delta}{[1 - F(\underline{\varphi})]}$$

where the cutoff productivity $\underline{\varphi}$ is characterized indifference condition:

$$E[\pi(\varphi'(\underline{\varphi}))] = w\varphi^a,$$

where φ^a ($a \in [0, \sigma - 1]$) is the efficient unit of labor that a type φ chooses to work for wages;

$$E[\pi(\varphi'(\underline{\varphi}))] = \pi(\varphi)[1 + (1 - \beta)f(\theta_c)s(r)(Z^{\sigma-1} - 1)],$$

- $f(\theta_c)$ probability that a VC visits the company
- $s(r)$: successful rate with $s'(r) > 0$
- $(1 - \beta)$ surplus retained after bargaining with VC

Together with local labor market clearing condition $L_c^D = L_c^S$, equilibrium wage and cutoff are solved.

VC's return (in progress)

Let the mass of VC with reputation r denote by $\mu(r)$, her expected return conditional on choosing city c is

$$J_c(r) = \frac{V_c}{\mu(r)} \beta \chi f(\theta_c) s(r) (Z^{\sigma-1} - 1) \int_{\underline{\varphi}(r)} \pi(\varphi) dF(\varphi) - T(L_c)$$

where

- $\frac{V_c}{\mu(r)}$ # dealflow per VC(r)
- χ bargaining parameter against local capitalist
- $T(L_c)$ settlement cost in city c

If $\mu'(r) \leq 0$, $\frac{\partial^2 J_c(r)}{\partial r \partial L_c} > 0$ (Complementarity between reputation and size of talent pools)

Questions need to be answered

- What are the forms of misallocations caused by reputation concern?
- How to deal with reputation updating in a dynamic set-up with current sorting set-up?

Thank you!