

Tolerating Losses for Growth: J-Curves in Venture Capital Investing

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Motivation and Research Question

- Venture capital is a key driver of innovation and growth (Lerner and Nanda 2020)
- A fundamental challenge for VC-backed startups is the trade-off between **short-term profitability and long-term growth**
- Often more ambitious development or growth strategies involve lower short-term profitability, i.e. a **J-curve** (e.g. Spotify, Uber)
- Requires investors that are willing to tolerate **prolonged financial losses** and imposes **financing risk** on startups (Nanda and Rhodes-Kropf 2023, 2017)
- Practitioners frequently argue that **US VCs are more loss-tolerant than other VCs**

“US VC funds generally tend to adopt a home run strategy. (...) In contrast the high risk appetite (...) in the USA is not mirrored in the UK and Europe. (...) American VC firms place greater emphasis on the companies ability to establish product market fit (...). In comparison European and UK funds place greater emphasis on the finance and profitability of the company.”

– Kumar (2018)

“The problem is not that Europe lacks ideas or ambition.(...) But innovation is blocked at the next stage: we are failing to translate innovation into commercialisation, and innovative companies that want to scale up in Europe are hindered at every stage (...).”

– Draghi (2024)

Research question

- Massive literature on VC fundraising and capital allocation (Da Rin and Hellmann 2020)
- **This paper:** First look at the **dynamics of capital use** in VC investing
- **Question: Do USVCs have deeper J-curves compared to non-USVC investors? And why?**
 - **Challenge:** Cash flow data is not available + non-random nature of VC investments
 - **Our solution:** Swedish registry data + stacked DiD design
- **Preview of results:** USVCs have **deeper J-curves** due to being **larger** and **better connected to larger** VC firms
- **So what?** Helps policymakers design better policies and stakeholders understand the industry better

- **Staged financing and financing risk:**

- Staged financing (Sahlman 1990; Gompers 1995; Neher 1999; Kerr et al 2014)
- Financing risk and innovation incentives (Nanda and Rhodes-Kropf 2013, 2017)
- Failure tolerance in VC (Tian and Wang 2011; Ewens et al 2018)
- VC funding and portfolio company productivity (Chemmanur et al 2011; Puri and Zarutskie 2012; Croce et al 2013; Chemmanur et al. 2018)
- The role of scale-ups and short term profitability (Hellmann and Thiele 2023; Norbäck, Fresard et al. 2023, Persson, and Tåg 2024)

- **Contribution:**

- First large scale **empirical evidence** of J-curves in VC investing
- Documenting **differences in J-curves across investor origin**
- Investigation of **mechanisms** driving differences across investor origin

Data and Identification

- **Cashflow data:** Swedish Companies Registration Office
 - Companies must submit annual reports to the Companies Registration Office
 - Data on population of Swedish limited liability companies between 1998 and 2023
 - Annual reports and company events (e.g., bankruptcies)
- **VC data:** Crunchbase, Pitchbook, and VentureXpert
 - Investments and exits
 - VC firm characteristics (size, experience, LPs, etc)
 - VC firm country of origin
 - Exclude GVC
- **Data aggregation:**
 - Construct company-year panel for companies that ever receive VC funding

- **Stacked differences-in-differences estimator** combined with matching:
 - Matching allows us to account for sorting on observables (identical industry, stage, and quartiles in EBITDA and number of employees)
 - The stacked DiD estimator avoids biases in TWFE estimations
 - Allows us to compare USVC investments to non-USVC investments
- **Key identifying assumptions:**
 - Parallel trends in absence of treatment
 - SUTVA (no spillover effects)
- **Need to account for:**
 - Matching on outcome level differences may create RTM bias (Daw and Hatfield 2018)
 - Weighting and aggregation of cohort estimates (Wing et al. 2024)

- **Sample construction:**

1. Take each cohort up to 2020 separately and pick up first US VC investment vs non-US VC investments for companies not currently US VC-backed
2. Require one fiscal reporting year prior to investment
3. Drop industries (21 levels) and rounds (12 levels) with no USVC investments during sample period
4. Cell match non-USVC investments to USVC investments by ensuring identical industry (3 levels), stage (3 levels), and quartiles in EBITDA and number of employees
5. Create panels for each cohort
6. Append/stack the panels together

Sample descriptives

	(1) Full	(2) US VC	(3) Non-US VC	(4) Difference	(5) <i>t</i> -statistic
Assets (mil SEK)	31.838	33.899	31.132	2.768	(0.265)
ROA (%)	-67.575	-76.054	-64.671	-11.383	(-1.091)
Operating cash (mil SEK)	-12.409	-14.102	-11.829	-2.273	(-0.634)
Foreign subsidiary dummy	0.145	0.128	0.151	-0.023	(-0.641)
Employees	15.973	17.899	15.313	2.586	(0.589)
VC backed	0.402	0.424	0.395	0.029	(0.575)
Round number	0.682	0.672	0.685	-0.013	(-0.125)
Round amount (mil USD)	1.157	1.922	0.895	1.027	(0.835)
Sales (mil SEK)	16.669	15.655	17.016	-1.360	(-0.243)
EBITDA (mil SEK)	-13.003	-13.979	-12.669	-1.310	(-0.446)
Profitable	0.145	0.184	0.132	0.052	(1.344)
Observations	490	125	365	490	

- Run standard (weighted) DiD model:

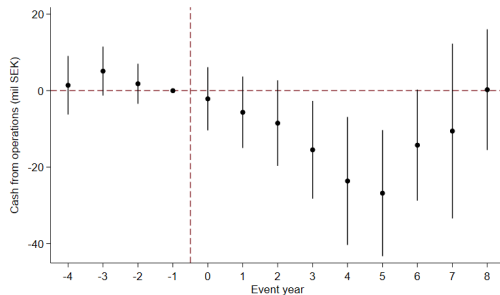
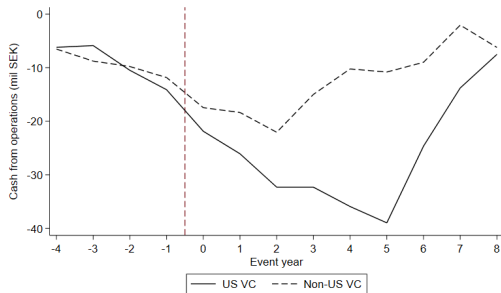
$$Y_{f,k,t} = \alpha + \pi Post_k + \gamma USVC_f + \beta Post_k \times USVC_f + \epsilon_{f,k,t} \quad (1)$$

- Notes:

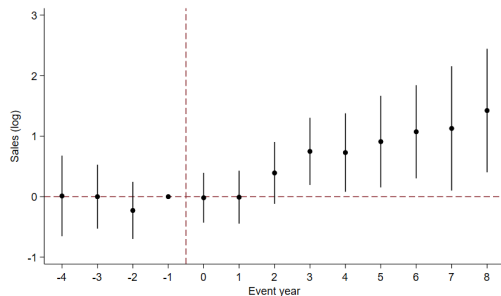
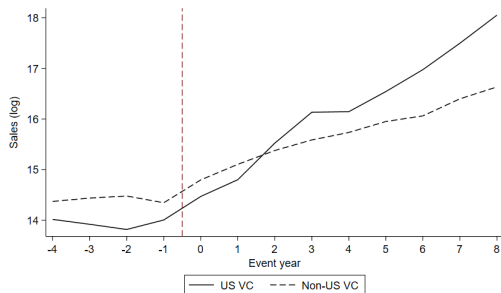
- We follow companies from up to 4 years before to up to 9 years after investments
- Control firms can appear multiple times and also later receive USVC investments (but not prior)
- We cluster standard errors at the company-cohort level and include cohort FE

Do US Investors Have Deeper J-Curves?

Cash from operations

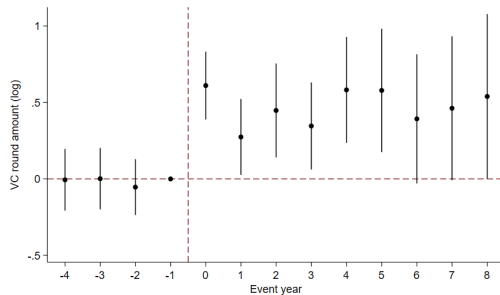
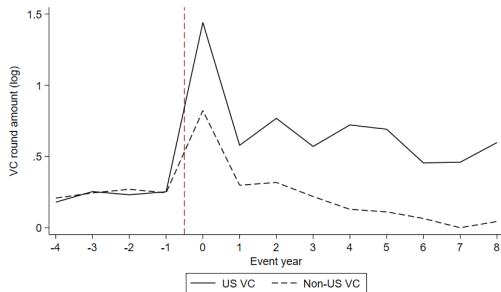


- DiD estimate at $t = 5$: **-26.8** (t -stat=-3.20)



- DiD estimate at $t = 8$: **1.4** (t -stat=2.74)
- Mean US VC backed Exit (IPO): \$235M (\$72M)
- Mean non-US VC backed Exit (IPO): \$113M (\$44M)

Funding



- DiD estimate at $t = 0$: **0.6** (t -stat=5.41)

Mechanisms

Why do USVCs have deeper J-curves?

- **We consider two core potential mechanisms:**
 1. More capital
 2. Larger networks that provide better access
- **Other stories:** different LPs, more experience, selection, cultural differences, etc...

Why do USVCs have deeper J-curves?

Panel A: Company-VC firm level					
	(1) Full	(2) US VC	(3) Non-US VC	(4) Difference	(5) <i>t</i> -statistic
VC firm age (years)	11.445	11.049	11.712	-0.663	(-0.618)
VC firm AUM (mil USD)	1055.995	2147.005	299.609	1847.396***	(2.714)
VC firm funded startups	75.541	78.347	73.789	4.558	(0.486)
VC firm investments	90.477	99.471	84.859	14.612	(1.247)
VC firm co-investors	56.011	87.260	36.495	50.766***	(5.998)
VC firm performance	0.139	0.153	0.130	0.024*	(1.924)
Observations	971	393	578	971	

- VCs of US origin have more capital and larger networks

Why do USVCs have deeper J-curves?

Panel B: Company-VC firm level: within treated

	(1) Full	(2) US VC	(3) Non-US VC	(4) Difference	(5) <i>t</i> -statistic
VC firm age (years)	11.049	10.391	11.536	-1.145	(-0.805)
VC firm AUM (mil USD)	2147.005	3939.151	751.481	3187.669**	(2.079)
VC firm funded startups	78.347	118.642	51.933	66.709***	(4.181)
VC firm investments	99.471	154.949	63.105	91.844***	(4.228)
VC firm co-investors	87.260	158.752	40.397	118.355***	(6.491)
VC firm performance	0.153	0.160	0.149	0.010	(0.496)
Observations	393	161	232	393	

- VCs of US origin have more capital, larger networks, and more experience

Mechanisms

Size of VC Firm

“The limited availability of large-scale venture capital funds in the European Union makes it harder for EU scaleups to raise capital. . . .Between 2013 and 2023, there were 137 venture capital funds larger than \$1 billion in the United States compared with only 11 in the European Union and ten in the United Kingdom. (. . .) EU-based companies struggle to find EU investors with the ability to write big tickets in a large capital funding round. This also explains why scale-up deals in the European Union are more likely to involve foreign lead investors than in other countries.”

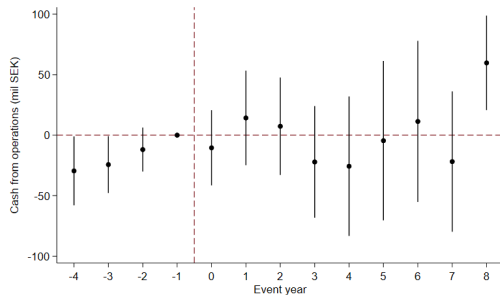
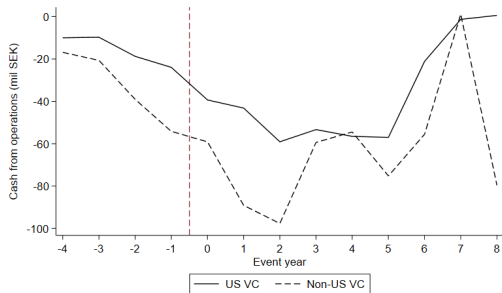
– European Investment Bank (2024)

- **Story:** USVCs manage more capital, which means they can
 1. take larger bets and still diversify
 2. internalize financing risk (Nanda and Rhodes-Kropf 2013, 2016) by drawing on their own funds
- **Tests:**
 - If we narrow in on subsamples of investments by either “large” or “small” VCs, do USVCs still have deeper J-curves in the large subsample?
 - Is there heterogeneity in J-curves across VC firm size in a non-USVC sample?

Mechanisms

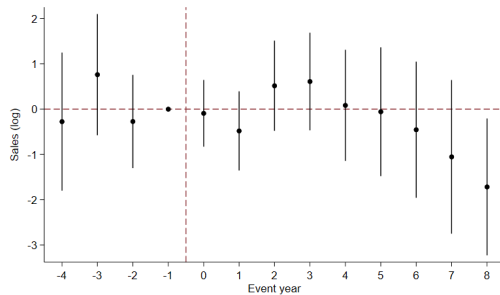
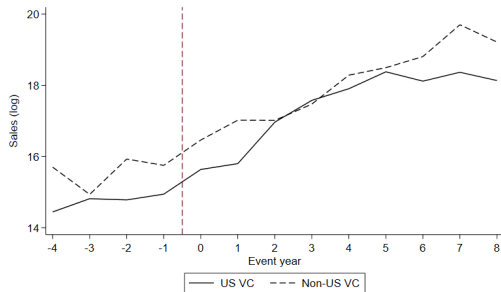
Subsample Analysis

Cash from operations in “large” subsample



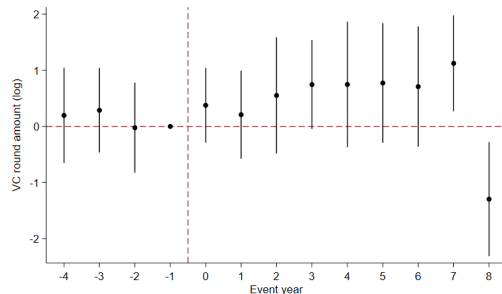
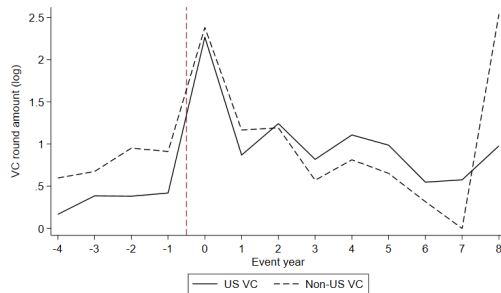
- DiD estimate (full): **13.4** (t -stat=0.97)

Sales in “large” subsample



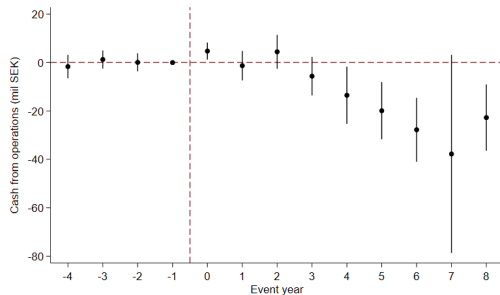
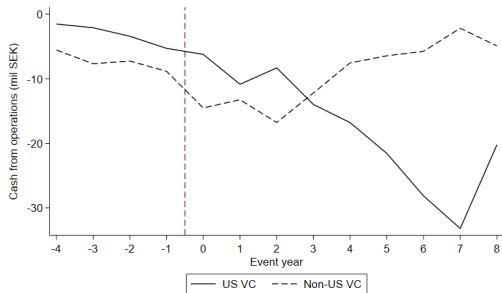
- DiD estimate (full): **0.02** (t -stat=0.05)

Investment amounts in “large” subsample



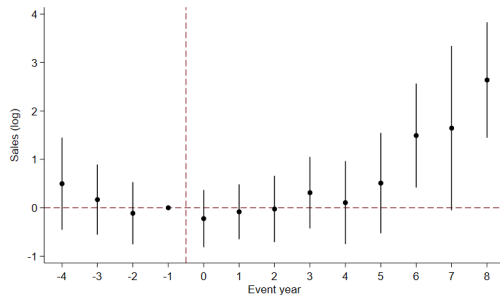
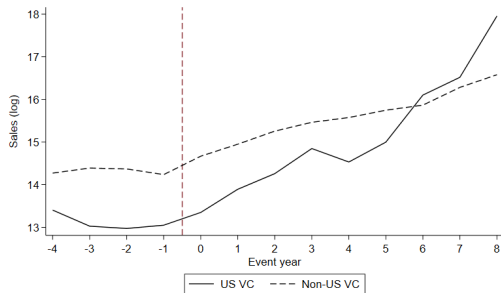
- DiD estimate (full): **0.4** (t -stat=1.70)

Cash from operations in “small” subsample



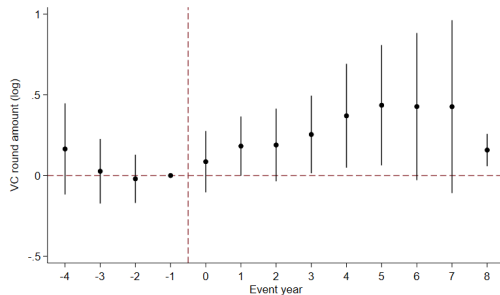
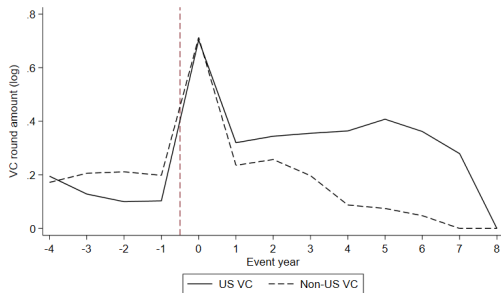
- DiD estimate (full): **-5.8** (t -stat=-2.44)

Sales in “small” subsample



- DiD estimate (full): **0.02** (t -stat=0.05)

Investment amounts in “small” subsample



- DiD estimate (full): **0.22** (t -stat=3.78)

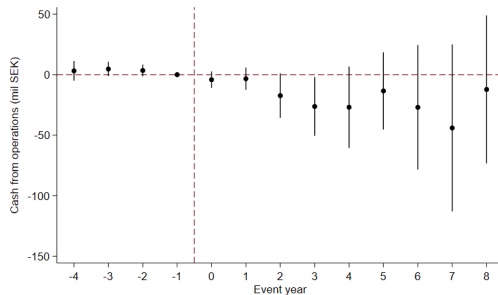
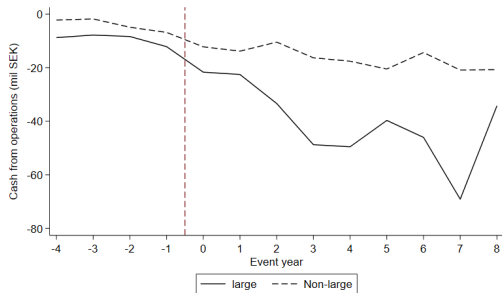
Mechanisms

Non-USVC Sample

Descriptives on the non-USVC sample

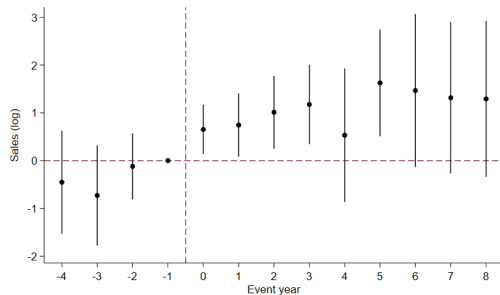
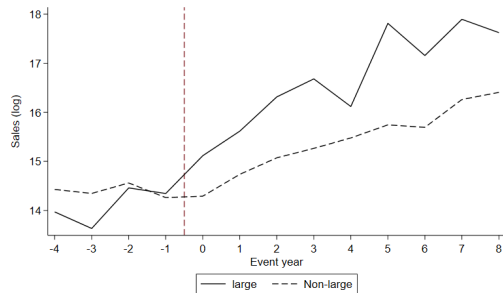
	(1) Full	(2) Large VC	(3) Small VC	(4) Difference	(5) <i>t</i> -statistic
Assets (mil SEK)	23.038	20.881	23.817	-2.936	(-0.248)
ROA (%)	-52.506	-72.777	-45.190	-27.587*	(-1.968)
Operating cash (mil SEK)	-8.218	-12.121	-6.809	-5.312	(-1.079)
Foreign subsidiary dummy	0.088	0.104	0.083	0.021	(0.424)
Employees	16.729	22.042	14.811	7.231	(0.595)
VC backed	0.177	0.250	0.150	0.100	(1.415)
Round number	0.177	0.250	0.150	0.100	(1.415)
Round amount (mil USD)	0.159	0.215	0.139	0.076	(0.505)
Sales (mil SEK)	20.036	32.188	15.650	16.538	(0.732)
EBITDA (mil SEK)	-9.235	-13.621	-7.652	-5.970	(-1.118)
Profitable	0.215	0.125	0.248	-0.123**	(-2.013)
Observations	181	48	133	181	

Cash from operations in non-USVC subsample



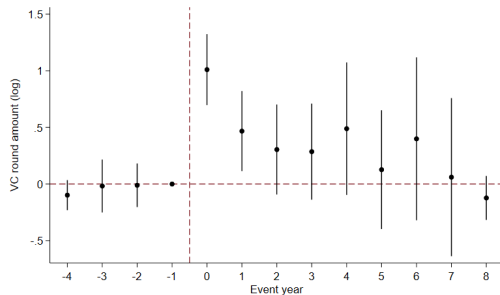
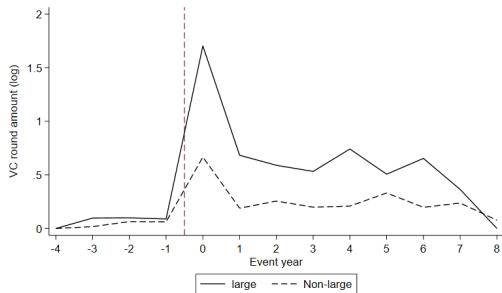
- DiD estimate (full): **-17.26** (t -stat=-2.31)

Sales in non-USVC subsample



- DiD estimate (full): **1.15** (t -stat=2.95)

Funding in non-USVC subsample



- DiD estimate (full): **0.48** (t -stat=4.59)

Summary: Larger investors

- **Story:** USVCs manage more capital, which means they can diversity and mitigate financing risk
- **Results:**
 - USVC investments associated with higher capital injections
 - In non-USVC sample, VC fund size matters
 - Comparing “large” VC investments only, the USVC difference in outcomes largely disappears
 - There is a delayed USVC J-curve in the “small” subsample, which suggests that investor networks might be important among “small” VCs

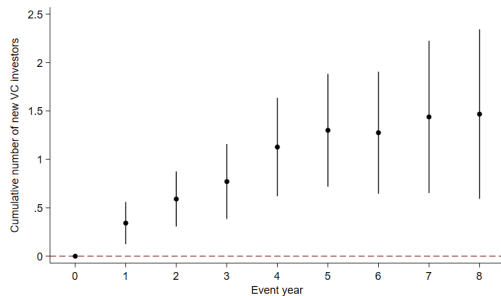
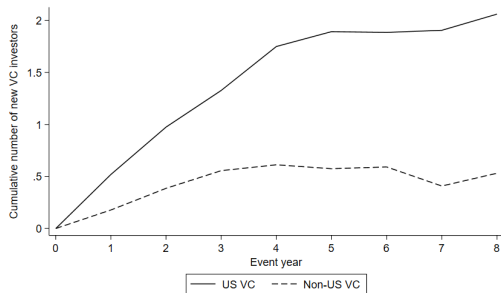
→ **VC firm size is a key mechanism of why USVCs have deeper J-curves**

Mechanisms

Better Networks

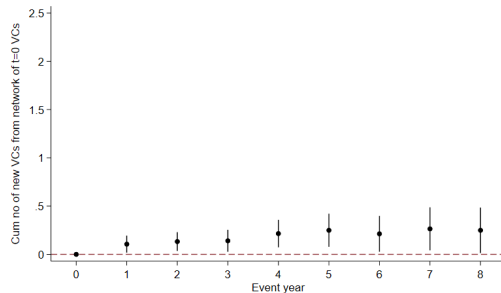
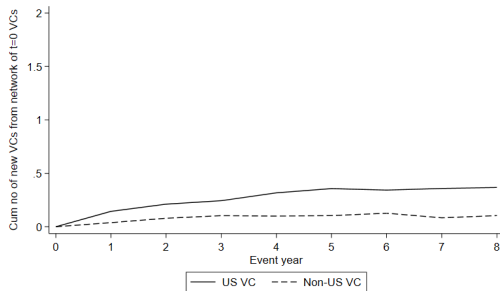
- **Story:** USVCs have better networks, meaning they can drive deeper J-curves as they can more easily tap into follow-on capital (Nanda and Rhodes-Kropf 2016)
- **Tests:**
 - Do USVCs bring in more new investors?
 - Do they bring in more investors conditional on having a “large” or “small” VC?

New investors



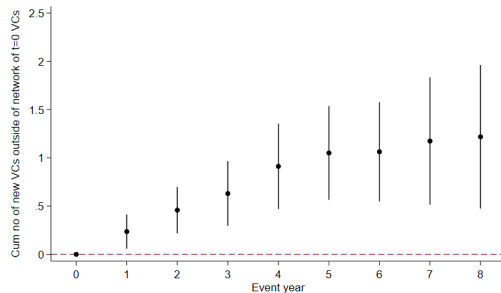
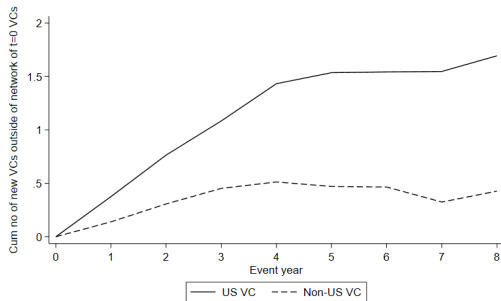
- DiD estimate at $t = 8$: **1.47** (t -stat=3.29)

New investors from $t = 0$ VCs' network



- DiD estimate at $t = 8$: **0.25** (t -stat=2.08)

New investors from outside $t = 0$ VCs' network

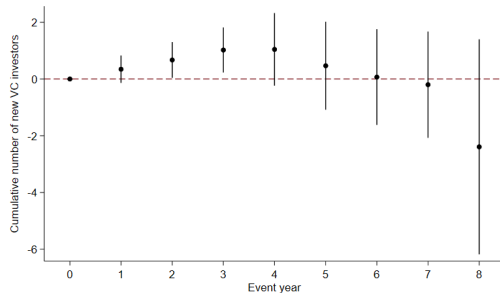
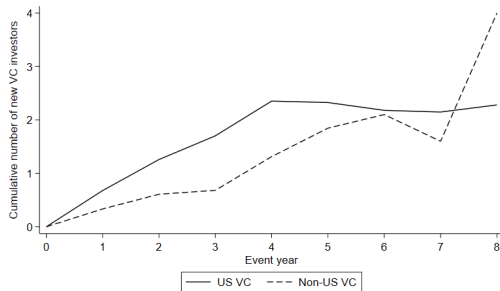


- DiD estimate at $t = 8$: **1.22** (t -stat=3.22)

Mechanisms

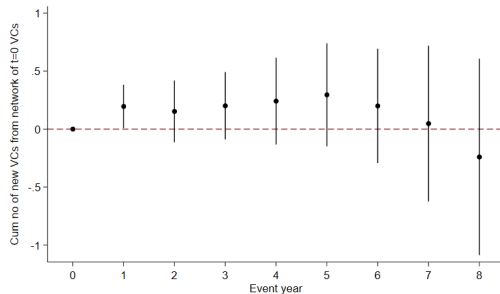
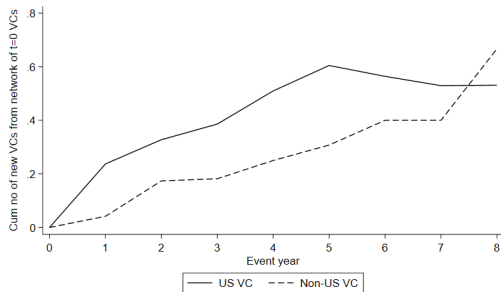
Better networks in “large” VC subsample

New investors in “large” VC subsample



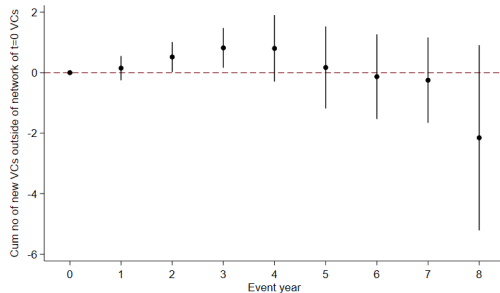
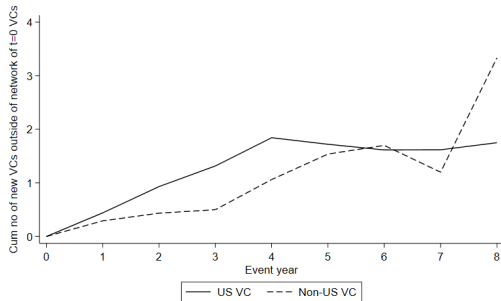
- DiD estimate (full): **0.9** (t -stat=2.05)

New investors from $t = 0$ VCs' network in “large” VC subsample



- DiD estimate (full): **0.24** (t -stat=1.87)

New investors from outside $t = 0$ VCs' network in “large” VC subsample

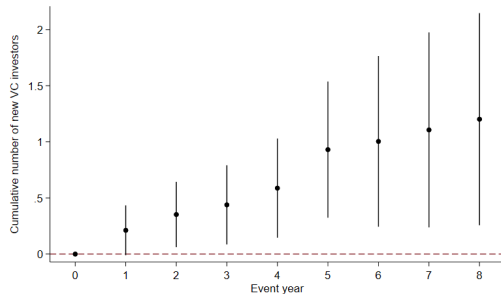
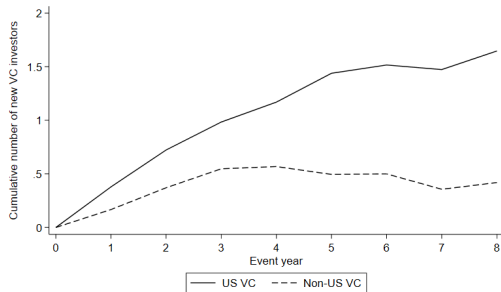


- DiD estimate (full): **0.65** (t -stat=1.83)

Mechanisms

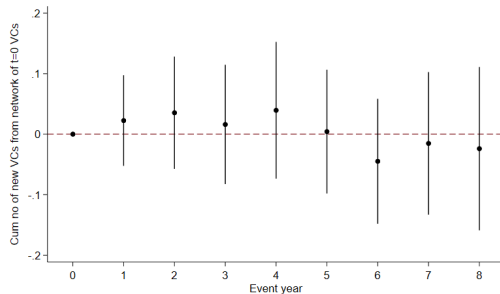
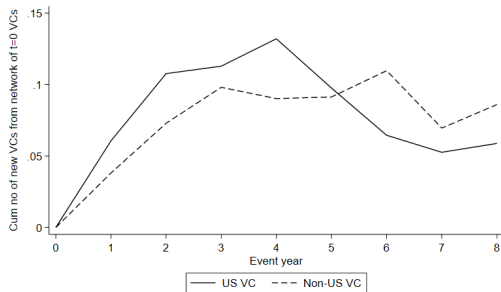
Better networks in “small” VC subsample

New investors in “small” VC subsample



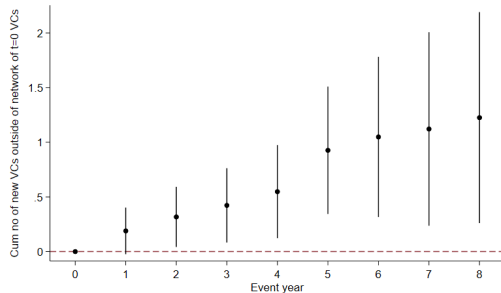
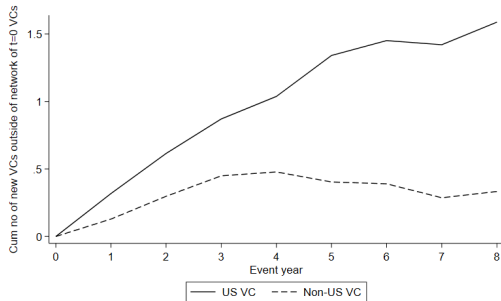
- DiD estimate (full): **0.5** (t -stat=2.93)

New investors in “small” VC subsample



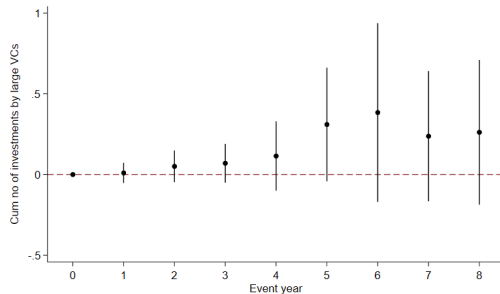
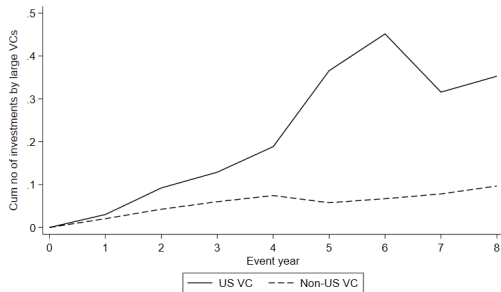
- DiD estimate (full): **0.01** (t -stat=0.30)

New investors in “small” VC subsample



- DiD estimate (full): **0.48** (t -stat=2.91)

Investments by large VCs in “small” VC subsample



- DiD estimate (full): **0.1** (t -stat=1.75)

Summary: Better networks

- **Story:** USVCs have better networks, meaning they can drive deeper J-curves as they can more easily tap into follow-on capital (Nanda and Rhodes-Kropf 2016)

- **Tests:**

- Do USVCs bring in more new investors? YES
- Do they bring in more investors conditional on having a “large” VC? NO
- Do they bring in more investors conditional on having a “small” VC? YES

→ **Investor size seems to be of primary importance for deeper J-curves**

→ **Investor networks allow “small” VCs to have deeper J-curves by bringing in more follow-on funding from large VCs**

Additional Analyses and Robustness

Alternative ways of measuring J-curves

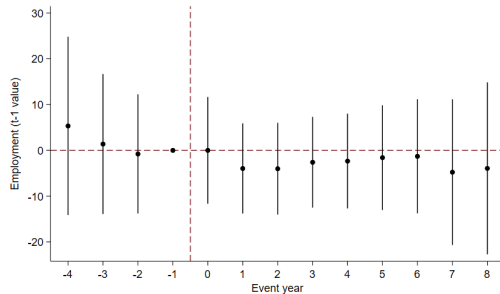
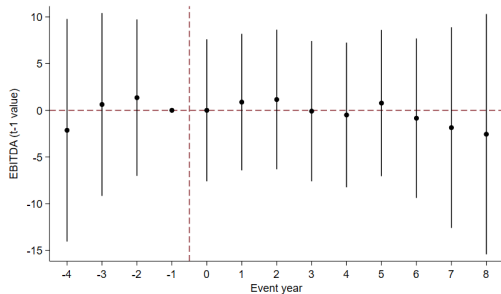
- We can create two other measures of J-curves using the cross-section a year before the investment
- **Depth:**
 - Maximum losses of a company during post-period measured as minimum value
- **Width:**
 - Duration of losses of a company during post-period measured as number of years until outcome variable is back at $t = -1$ level

Depth and Width

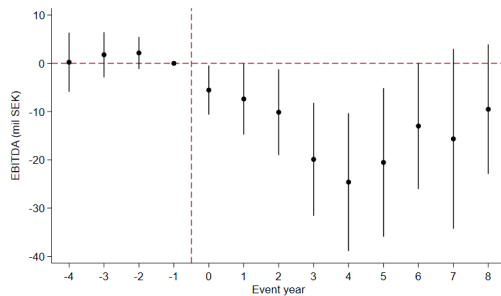
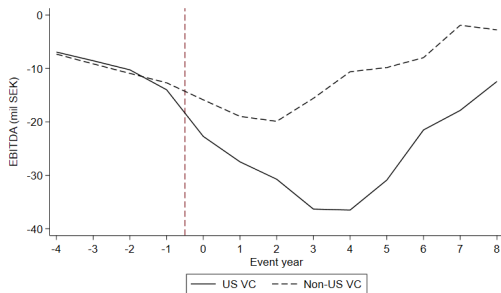
	(1)	(2)	(3)	(4)
	Depth		Width	
	OCF	EBITDA	OCF	EBITDA
US VC	-26.4387*** (-3.746)	-25.6971*** (-4.136)	0.6441 (1.613)	0.8888** (2.260)
Cohort FEs	Yes	Yes	Yes	Yes
Observations	490	490	490	490
Adj. R ²	0.040	0.049	0.037	0.070

Differential attrition

- **Issue:** Differential attrition out of the sample can introduce biases
- **Check:** Run regressions with pre-investment variables on the LHS. Expect loading on coefficients only if differential selection is an issue

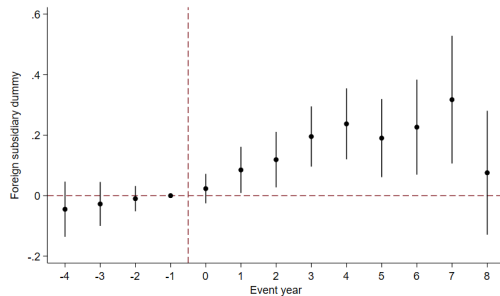
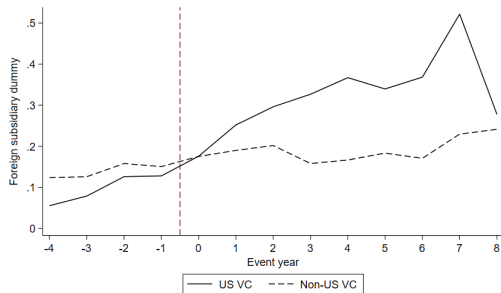


Alternative outcome: EBITDA



- DiD estimate at $t = 4$: **-24.6** (t -stat=-3.39)

Alternative outcome: International expansion



- DiD estimate at $t = 7$: **0.3** (t -stat=2.95)

Additional Analyses and Robustness

- Weighted Regressions, Entropy Matching, CS DiD
- Do non-US foreign VC have the same effect as USVCs?
- Do VC firms with US LPs have higher loss tolerance?
- Do VCs that have syndicated with USVCs drive deeper J-curves?

Takeaways

- Massive literature on VC fundraising and capital allocation (Da Rin and Hellmann 2020)
- **This paper:** First look at the **dynamics of capital use** in VC investing
- **Question: Do USVCs have deeper J-curves compared to non-USVC investors? And why?**
 - **Challenge:** Cash flow data is not available + non-random nature of VC investments
 - **Our solution:** Swedish registry data + stacked DiD design
- **Results:** USVCs have **deeper J-curves** due to being **larger** and **better connected to larger** VC firms
- **So what?** Helps policymakers design better policies and stakeholders understand the industry better

1. **Recognize the value of loss tolerance:** Policy frameworks for ecosystems should avoid prematurely emphasizing early profitability. Support policies that enable startups to pursue aggressive, long-term growth strategies—e.g., through longer runway financing instruments or internationalization support
2. **Reform LP mandates in public VC programs:** Government-backed VC funds should allow for staged, risk-tolerant investment strategies and syndication with large VCs, mimicking the behavior of successful US LPs and GPs
3. **Implement a real capital markets union:** Europeans save about double that of Americans (15%), but a third of the savings sit idle in bank accounts. More of these savings need to go to European startups (would support larger fund sizes in Europe)