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

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Motivation and Research Question

Motivation

- 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 2017)
- Practitioners argue that **US VCs are more loss-tolerant than other VCs**

So what?

"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**, because their size and networks help them mitigate the **financing risk** that comes with deeper J-curves

Literature and contribution

- **Staged financing and financing risk:**
  - The role of scale-ups and short term profitability (Hellmann and Thiele 2023; Fresard et al. 2023, Norbäck, Persson, and Tåg 2024)
  - Financing risk and innovation incentives (Nanda and Rhodes-Kropf 2017, 2013)
  - Staged financing (Sahlman 1990; Gompers 1995; Neher 1999; Kerr et al 2014)
  - VC funding and portfolio company productivity (Chemmanur et al 2011; Puri and Zarutskie 2012; Croce et al 2013; Chemmanur et al. 2018)
- **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 and providing evidence that **”cross-sectional” financing risk** matters

Data and Identification

Data

- **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

Estimation strategy

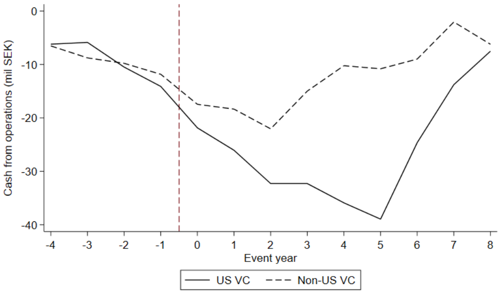
- **Stacked differences-in-differences estimator** combined with matching:
  - Matching allows us to account for sorting on observables (identical industry, stage, and quartiles in EBITDA and number of employees)
  - The stacked DiD estimator avoids biases in TWFE estimations
  - Allows us to compare 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)

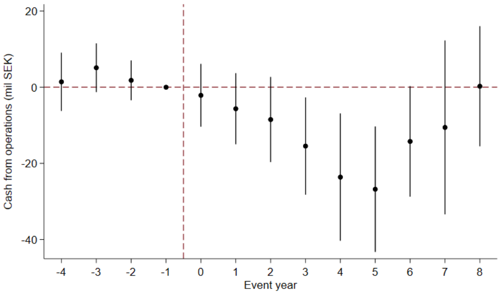
Sample descriptives

	(1) Full	(2) US VC	(3) Non-US VC	(4) Difference	(5) *t*-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	

Do US Investors Have Deeper J-Curves?

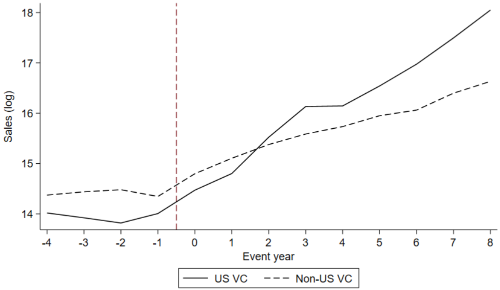
Cash from operations

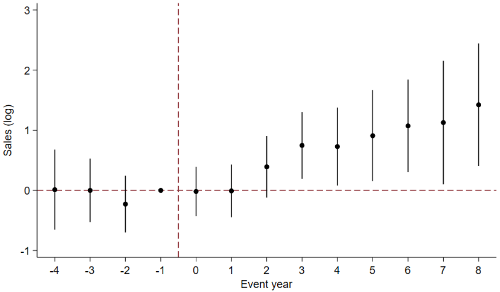




- DiD estimate at $t = 5$: **-26.8** (t-stat=-3.20)

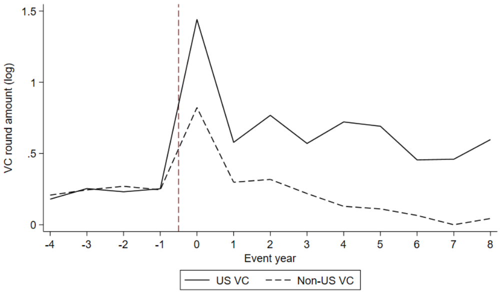
Sales

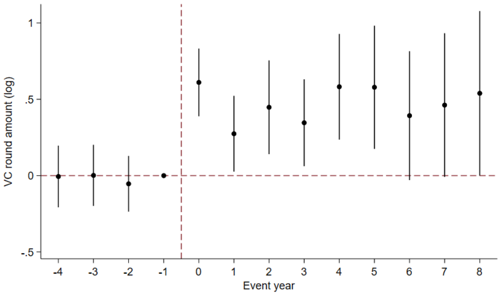




- DiD estimate at $t = 8$: **1.4** (t-stat=2.74)
- Mean US VC backed Exit (IPO): \$235M (\$72M)
- Mean non-US VC backed Exit (IPO): \$113M (\$44M)

Funding





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

Mechanism

Motivation

"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)

Why do USVCs have deeper J-curves?

- **Key hypothesis:** USVC are better att mitigating **financing risk** since they have
  1. More capital
  2. Larger networks that provide access to more capital

- **Financing risk:** The potential inability to find future investors for otherwise healthy firms

- **Other stories:** different LPs, more experience, selection, cultural differences, etc...

Descriptives at time of investment

Panel A: Company-VC firm level					
	(1)	(2)	(3)	(4)	(5)
	Full	US VC	Non-US VC	Difference	*t*-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

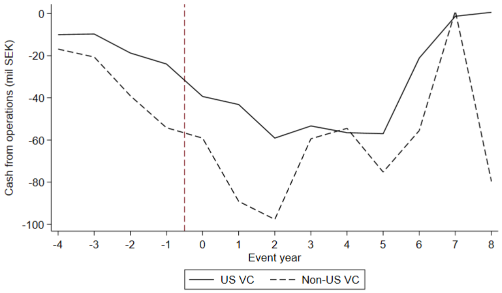
Mechanism

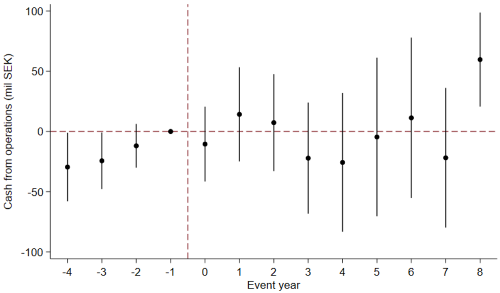
Part 1: Size of VC Firm

Size of VC Firm

- **Story:** USVCs manage more capital, which means they can internalize **financing risk** by drawing on their own funds without the need to go back to the market
- **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?

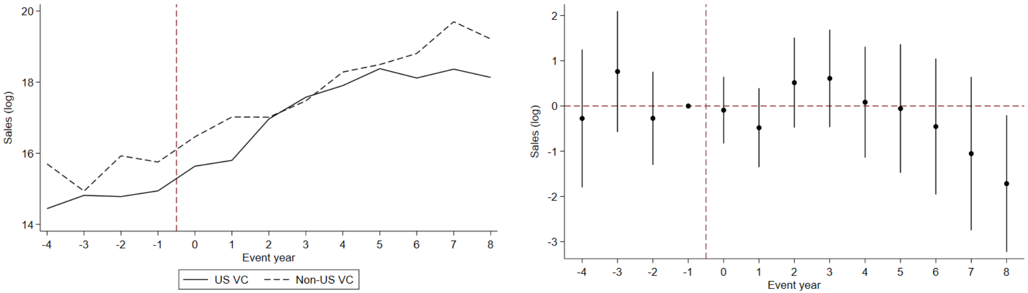
Cash from operations in “large” subsample





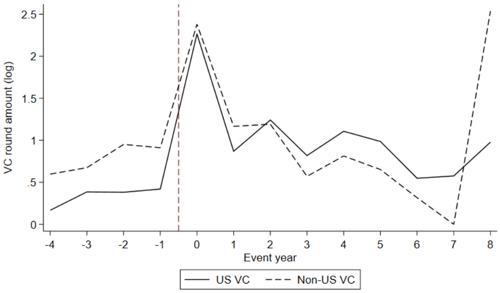
- DiD estimate (full): **13.4** (*t*-stat=0.97)

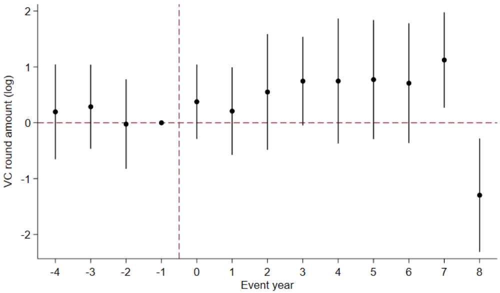
Sales in “large” subsample



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

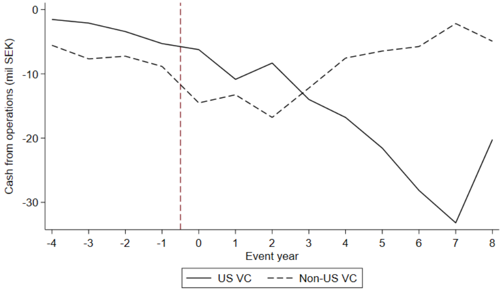
Investment amounts in “large” subsample

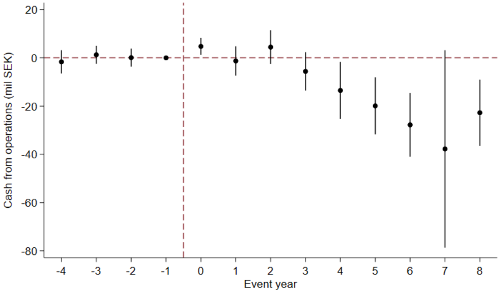




- DiD estimate (full): **0.4** (t-stat=1.70)

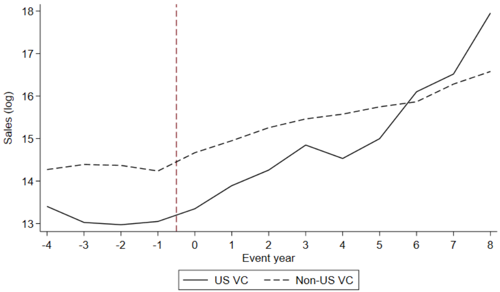
Cash from operations in “small” subsample

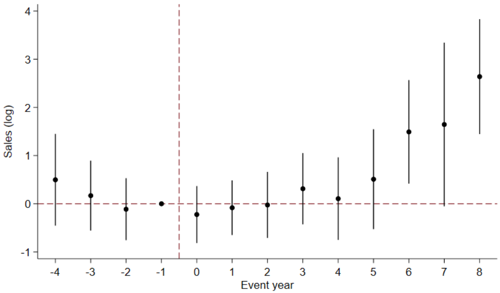




- DiD estimate (full): **-5.8** (t-stat=-2.44)

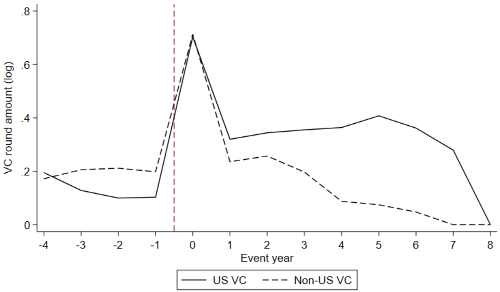
Sales in “small” subsample

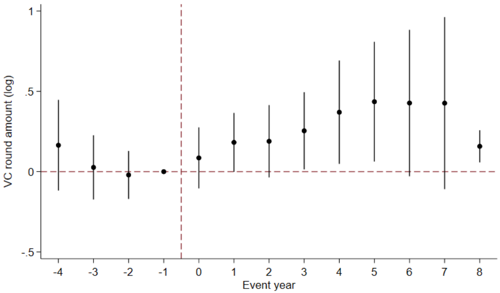




- DiD estimate (full): **0.02** (t-stat=0.05)

Investment amounts in “small” subsample





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

Mechanism

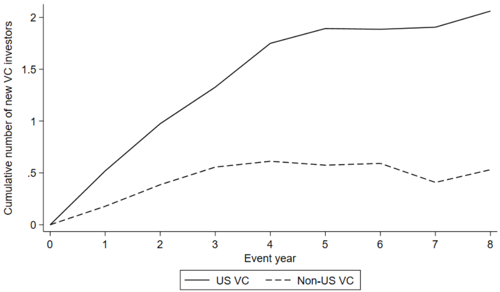
Part 2: Better Networks Gives Access to Capital

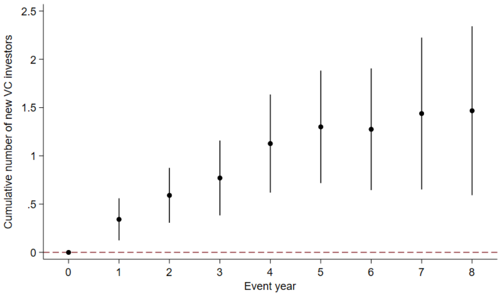
Better networks

- **Story:** USVCs have better networks, meaning they can drive deeper J-curves as they can more easily get commitments for follow-on capital to mitigate **financing risk**

- **Tests:**
  - Do USVCs bring in more new investors?
  - Do they bring in more investors conditional on having a “large” or “small” VC?

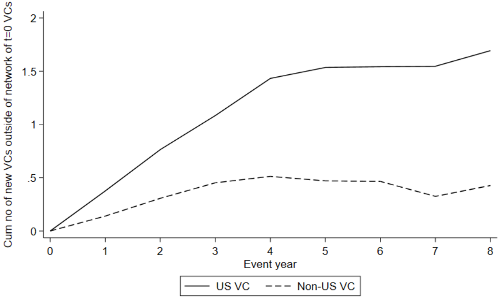
New investors

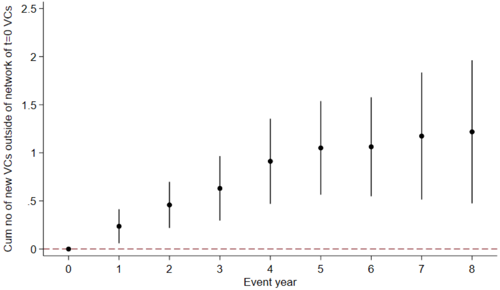




- DiD estimate at $t = 8$: **1.47** (t-stat=3.29)

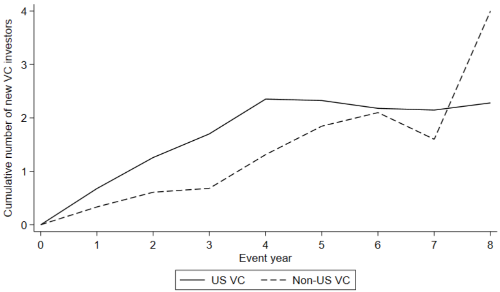
New investors from outside $t = 0$ VCs' network

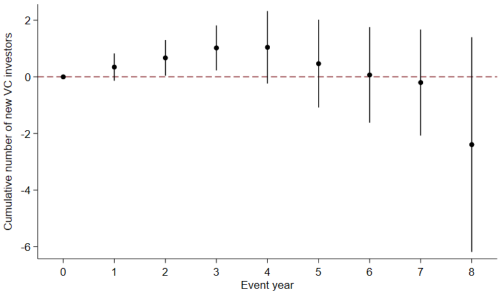




- DiD estimate at $t = 8$: **1.22** (t-stat=3.22)

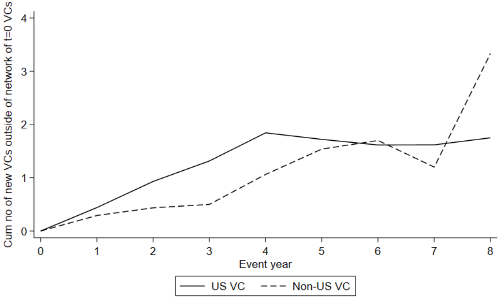
New investors in "large" VC subsample

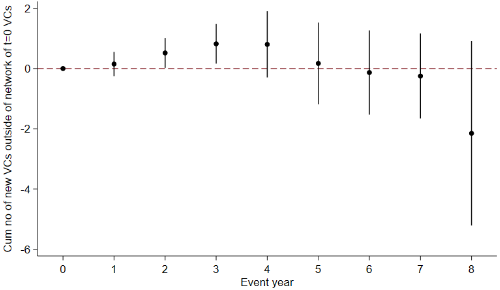




- DiD estimate (full): **0.9** (t-stat=2.05)

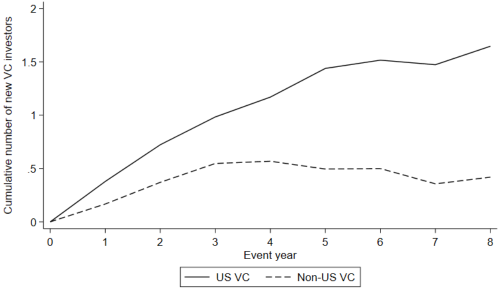
New investors from outside $t = 0$ VCs' network in "large" VC subsample

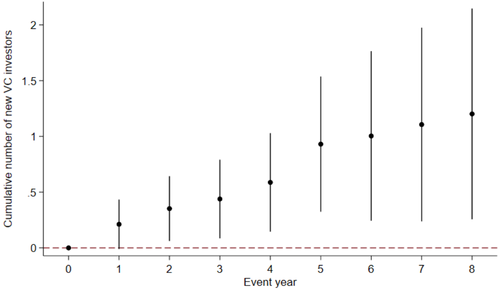




- DiD estimate (full): **0.65** (t-stat=1.83)

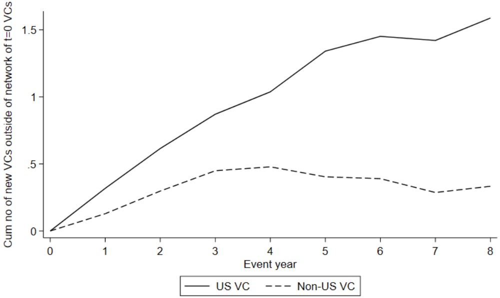
New investors in "small" VC subsample

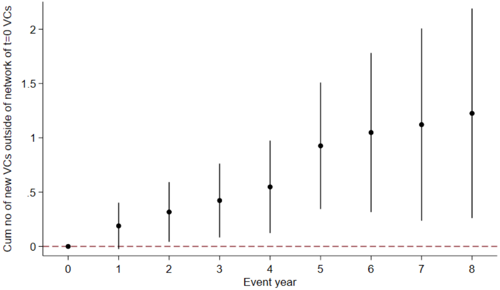




- DiD estimate (full): **0.5** (*t*-stat=2.93)

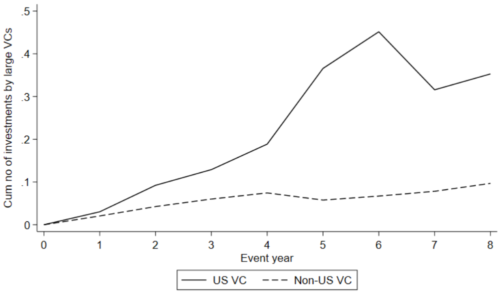
New investors from outside $t = 0$ VCs' network in "small" VC subsample

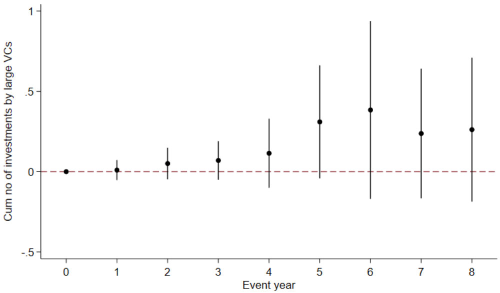




- DiD estimate (full): **0.48** (t-stat=2.91)

Investments by large VCs in “small” VC subsample





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

Summary

- **Story:** USVCs have more **capital and better networks**, meaning they can drive deeper J-curves as they can more easily mitigate **financing risk** (Nanda and Rhodes-Kropf 2017)

- **Tests:**
  - USVC investments associated with higher capital injections? YES
  - Comparing "large" VC investments only, the USVC difference in outcomes largely disappears? YES
  - 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

Additional Analyses and Robustness

Additional Analyses and Robustness

- **Additional analyses:**
  - In non-USVC sample, VC fund size matters?
  - 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?
  - Measuring J-curve ”depth” and ”width”
  - Alternative outcomes: EBITDA, international expansion
- **Empirics:**
  - Weighted Regressions, Entropy Matching, CS DiD...
  - Could differential attrition drive the results?

Takeaways

Takeaways

- **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**, because their size and networks help them mitigate the **financing risk** that comes with deeper J-curves
- **Policy implication:** The EU needs deeper capital markets (i.e a capital markets union) if we want to become less reliant on foreign VCs funding our scale-ups