

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

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Introduction

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- A fundamental challenge for VC-backed start-ups 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 start-ups (Nanda and Rhodes-Kropf 2023, 2017)

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 - What are key factors determining the depth of J-curves?
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- **Question:** What determines J-curves (or "loss tolerance") in VC investing?
 - What are key factors determining the depth of J-curves?
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- **Approach:**
 1. Develop a **theory of J-curves** and "loss tolerance" in VC investing
 2. Take predictions to Swedish data, where we can **measure J-curves**
 3. Show evidence of deeper J-curves for US vs non-US investors

- **Staged financing and financing risk:**

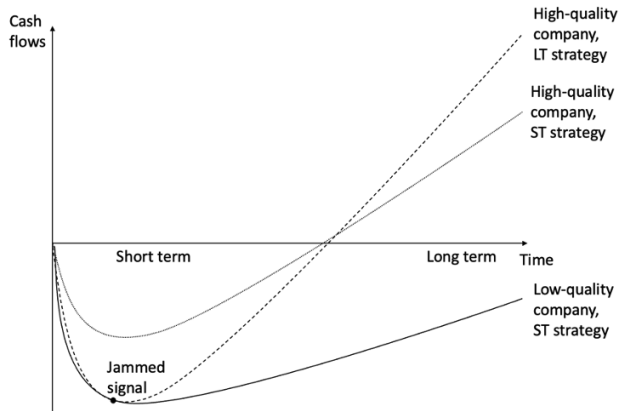
- Staged financing Sahlman 1990; Gompers 1995; Neher 1999; Kerr et al 2014
- Financing risk and innovation incentives Nanda and Rhodes-Kropf 2013, 2017
- Failure tolerance in VC Tian and Wang 2011; Ewens et al 2018
- VC funding and portfolio company productivity Chemmanur et al 2011; Puri and Zarutskie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

- **Contribution:**

- First theory of J-curves: **continuous short-run losses** allows an analysis of **J-curves**
- First **empirical evidence** of J-curves and how they vary across US vs non-US investors

Theory

Intuition



Key problem: How much short-term losses can a company afford to have before being considered of too low quality to be worthy of the next investment round?

- **Purpose of model:**

- Introduce the key tension between short- vs long-term investments ("depth" of J-curves)
- Derive condition under which loss tolerance is high vs low

- **Building blocks:**

- Staged financing (Sahlman 1990)
- Signal jamming with short-term profits (Stein 1989)
- Financing risk (Nanda and Rhodes-Kropf 2013)

Components

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- **Key exogenous parameter:** x , which represents I -specific access to:
 - exit markets
 - product markets
 - networks (funding, follow-on funding, and new investors)

Solving the model

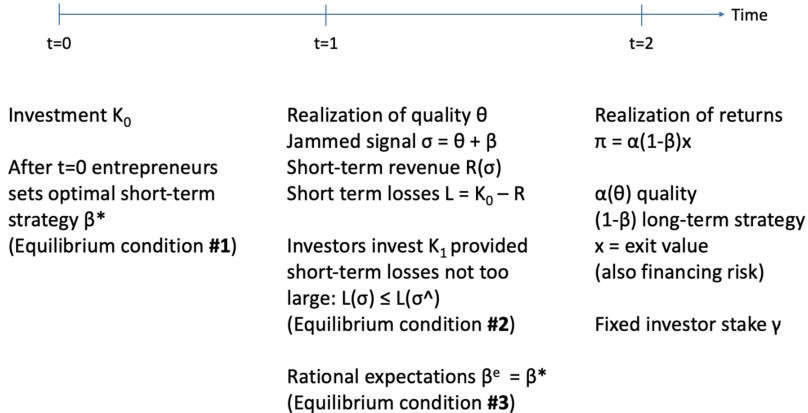
- **Three equilibrium conditions:**

1. Entrepreneur sets β^* to maximize profits (FOC)
2. The investor forms expectations $\hat{\beta}$ and makes a reinvestment choice: $L(\sigma) \leq L(\hat{\sigma})$
3. Expectations are rational: $\beta^* = \hat{\beta}$

- **Assume some specific functional forms:**

- $\alpha(\theta) = 1 - \exp(-\vartheta\theta)$
- $R(\sigma) = r(1 - \exp(-\rho\sigma))$
- θ is negative exponential with density $\omega(\theta) = \lambda \exp(-\lambda\theta)$

Timing



Key proposition/prediction on x

- Higher x allows the entrepreneur to be more focused on a long-term strategy:
 - The equilibrium choice of β^* is decreasing in x
 - "E more reluctant to give up long-term profits to boost short-term profits"
- Higher x makes the investor more loss tolerant (the J-curve deeper):
 - The equilibrium loss tolerance $L(\hat{\sigma})$ is increasing in x
 - Thus, the probability of refinancing is also increasing in x
 - "Better long-term prospects, less concern for short-term losses"

Evidence

Structure of analysis

- **Objective:**
 - Provide evidence that J-curves are real
 - Show evidence of heterogeneity in loss tolerance w.r.t. x
- We focus on heterogeneity across **US vs non-US** investors in Sweden
- Assumption is that experienced US investors investing abroad have **higher** x :
 - Better access to exit markets
 - Better access to the global product market
 - Better access to networks (funding, follow-on funding, and new investors)

Structure of analysis

- Objective is **NOT** to show that US VCs **causally** leads to deeper J-curves
- Theory silent on sorting effects vs causal effects
- US VC investors in Sweden likely to **strongly** sort on unobservables:
 - Time varying ability to scale abroad
 - Unobservable entrepreneur characteristics
 - Unobservable prior VC involvement (e.g. Creandum ties to US)
- Also the issue of **"treatment-induced"** selection:
 - US VCs select startups because they have the potential to scale under "loss tolerant" investors, **but not otherwise**
 - Startups would not have scaled in the absence of US VC involvement

Data and empirical approach

- **Principal data source:** Swedish Companies Registration Office
 - Annual reports and company events (e.g., bankruptcies)
 - VC investments and exits from Crunchbase, Pitchbook, ThomsonOne, and Preqin
 - Data on population of Swedish limited liability companies between 1998 and 2020
 - Must submit annual reports to the Companies Registration Office (by law)
 - Focus on firms that receive VC investments and that are at least 2 years old
 - Construct company-fiscal year panel for companies that ever receive VC funding

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- **Approach:** Compare companies that get VC funding from US and non-US investors in each year
 - Take each cohort separately and pick up first US VC investment vs non-US VC investments for companies not currently US VC-backed.
 - Create panels for each cohort
 - Append/stack the panels together

Descriptives

	(1) Full	(2) US VC	(3) Non-US VC	(4) Difference	(5) <i>t</i> -statistic
Operating cash (mil SEK)	-9.923	-13.111	-9.628	-3.482	(-1.033)
EBITDA (mil SEK)	-8.787	-10.806	-8.601	-2.205	(-0.854)
Sales (mil SEK)	69.514	42.354	72.024	-29.670	(-1.502)
Foreign subsidiary dummy	0.200	0.189	0.201	-0.012	(-0.315)
Employees	44.883	40.523	45.286	-4.764	(-0.311)
Assets (mil SEK)	65.004	86.931	62.978	23.953	(0.830)
VC backed	0.389	0.342	0.394	-0.051	(-1.087)
Observations	1,312	111	1,201	1,312	

Empirical test for differences in means

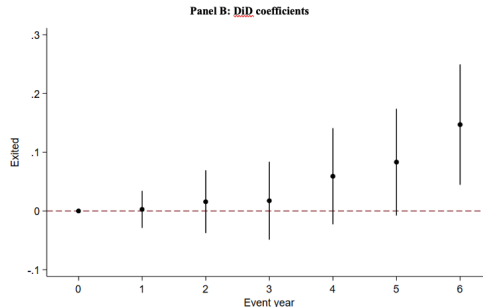
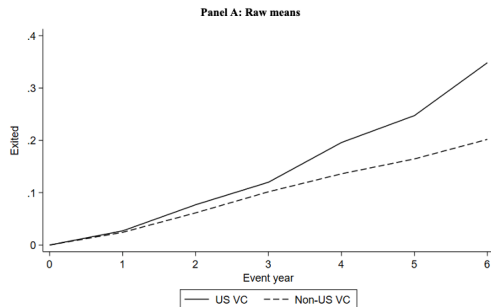
$$Y_{f,k,t} = \alpha + \pi After_k + \gamma USVC_f + \beta After_k \times USVC_f + \epsilon_{f,k,t} \quad (1)$$

- **Details:**

- "Treatment": Initial "US VC" funding in a given year
- "Benchmark": "Non-US VC" funding in the same year and do not have US VC
- Normalized event time with investment at 0
- Follow companies for up to 6 years post-treatment
- Cluster at company times cohort level

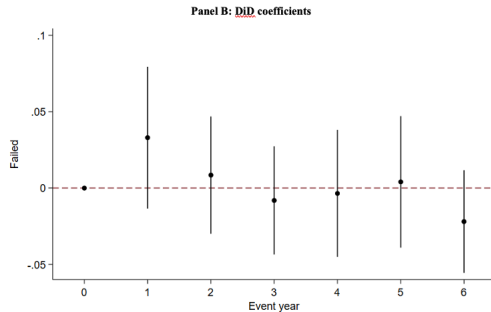
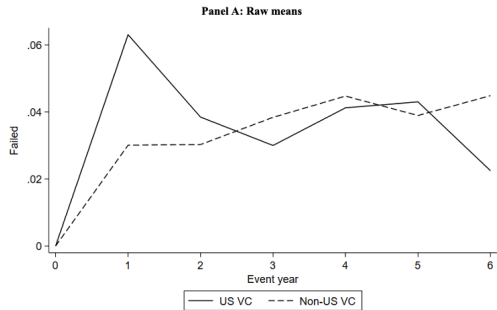
Do US investors have higher x ?

Exit market access: Exits

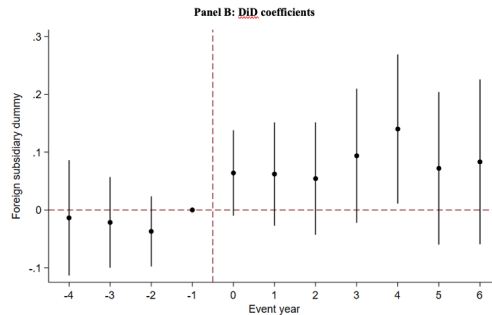
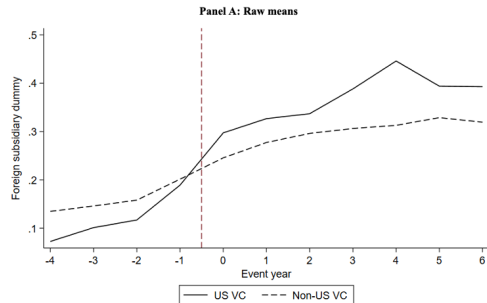


- Mean US VC backed Exit (IPO): \$572M (\$454M)
- Mean non-US VC backed Exit (IPO): \$220M (\$165M)

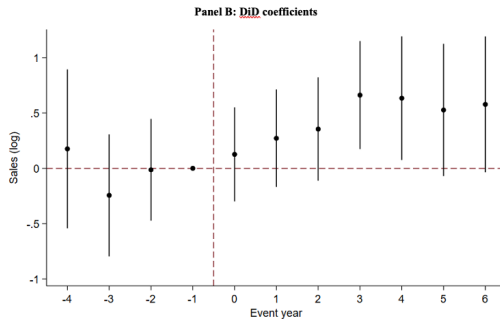
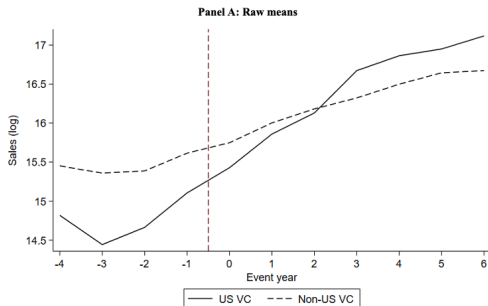
Not just about more risk-taking: Failures



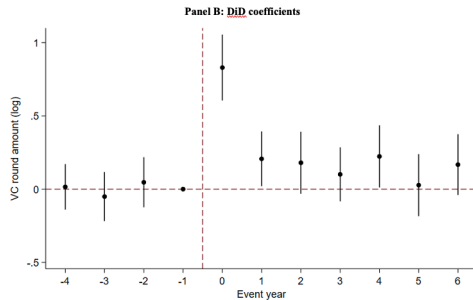
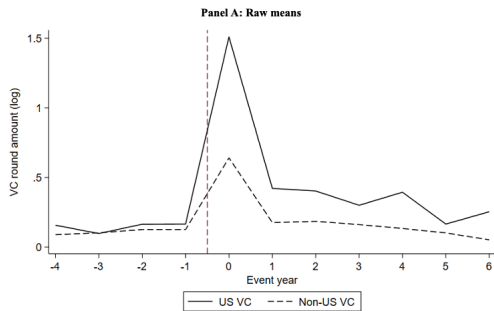
Product market access: Foreign subsidiaries



Product market access: Sales

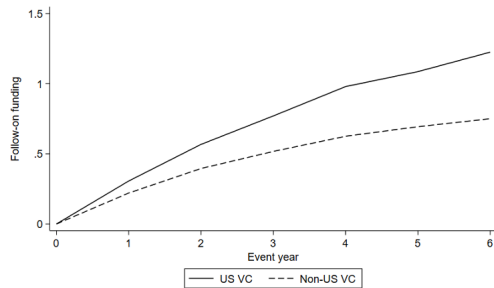


Networks: Funding

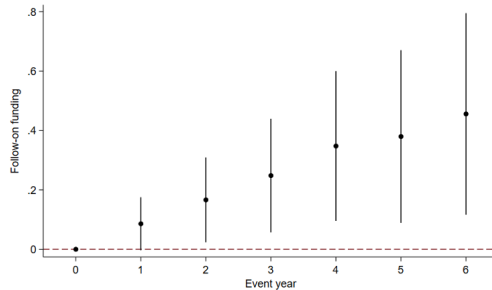


Networks: Follow-on funding

Panel A: Raw means

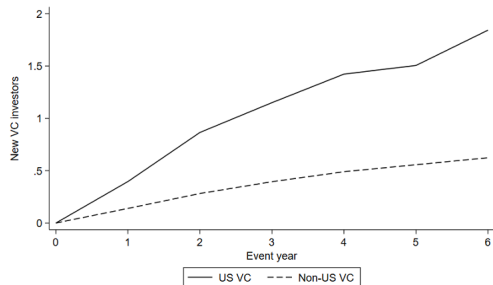


Panel B: DiD coefficients

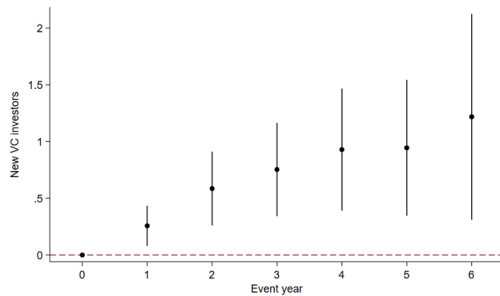


Networks: New investors

Panel A: Raw means

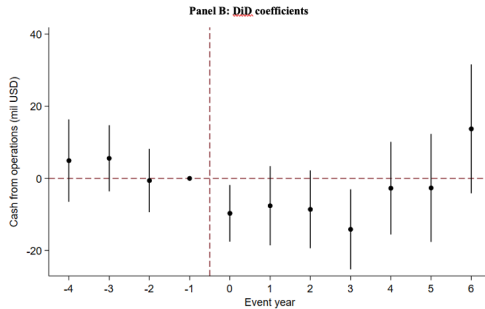
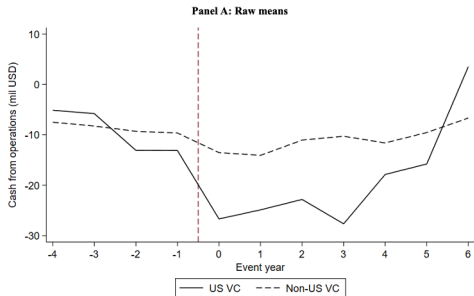


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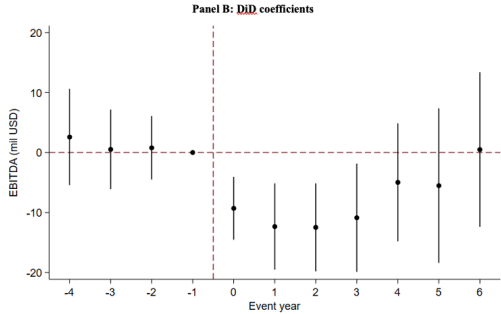
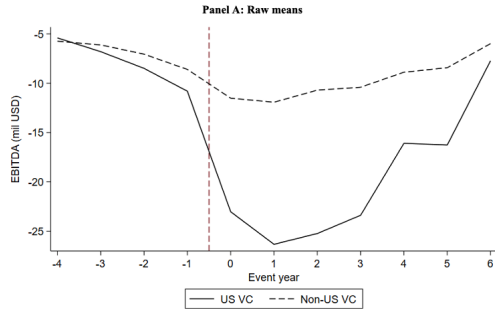


**Do US investors have deeper
J-curves (higher loss tolerance)?**

Cash from operations



EBITDA



Magnitudes and robustness

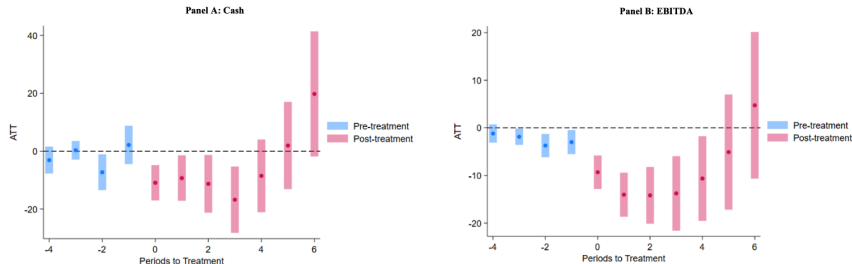
Regressions

Panel B: Short- vs long-term effects						
	(1) Cash from operations	(2) EBITDA	(3) Sales (log)	(4) Foreign subsidiary dummy	(5) Employment (log)	(6) VC round amount (log)
US VC	-1.6815 (-0.479)	-1.6728 (-0.633)	-0.4837** (-2.152)	-0.0364 (-1.014)	-0.1399 (-0.984)	0.0469 (1.220)
<u>PostST</u>	-3.1875*** (-4.707)	-3.3120*** (-5.560)	0.3096*** (6.294)	0.0988*** (10.442)	0.2055*** (7.245)	0.1813*** (14.463)
<u>PostLT</u>	-0.2412 (-0.216)	0.0013 (0.001)	0.7843*** (10.581)	0.1387*** (9.635)	0.4064*** (9.298)	-0.0237* (-1.719)
US VC #PostST	-11.3642*** (-2.718)	-11.7539*** (-3.786)	0.3699* (1.854)	0.0810* (1.952)	0.3555*** (3.297)	0.3527*** (5.534)
US VC #PostLT	0.4233 (0.074)	-4.2042 (-0.724)	0.6179** (2.096)	0.1145* (1.846)	0.3197* (1.866)	0.1360 (1.599)
Cohort FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,310	11,310	11,310	11,310	11,310	11,310
Adjusted R^2	0.014	0.018	0.847	0.034	0.314	0.045
ST effect size (%)	107	127	3	55	17	208
LT effect size (%)	-4	45	5	78	16	80

Regressions

Panel C: Post-period only regressions					
	(1) Exited	(2) Failed	(3) Follow-on rounds	(4) New VC investors	(5) Old VC investors
US VC	0.0510** (2.132)	0.0036 (0.390)	0.2043** (2.357)	0.6079*** (3.211)	0.3169** (2.077)
Cohort FEs	Yes	Yes	Yes	Yes	Yes
Observations	8,460	8,460	8,460	8,460	8,460
Adjusted R^2	0.010	0.002	0.052	0.026	0.037
Effect size (%)	52	11	44	154	60

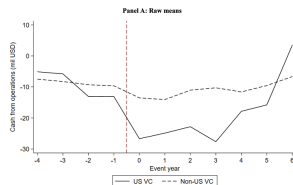
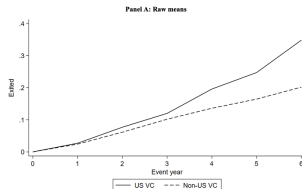
Robustness



- Also robust to:
 - Restricting to firm age 3 or 4 and more
 - Adding FE for firm age, industry, location
 - Controlling for company observables measured at $t = -1$ (assets, sales ect.)
 - US vs Sweden, US vs non-US (excluding Sweden)

Takeaways

Takeaways



- We develop a **theory** and provide **empirical evidence** for J-curves and "loss tolerance" in VC investing
- US VCs are more loss tolerant than non-US VCs:
 - Higher x: better access to exit markets, product markets, networks (funding, follow-on funding, new investors)
 - Have deeper J-curves (incur more losses, especially in the short run)

The bigger picture

- Debate in EU about lack of unicorns and VCs that are “playing it too safe”
- US VC investors play a prominent role internationally in funding unicorns
 - Why are European VC investors not more aggressive in scaling startups?
 - Our results suggest that loss tolerance may be a key element
- To encourage more loss tolerance (deeper J-curves), ecosystems need higher investors with higher x :
 - Investors with connections to good exit markets and follow-on funding
 - Diversity in investor type and stage focus (lowers financing risk and increases follow-on funding)