

Tolerating Losses for Growth: How US Venture Capitalists Invest Abroad

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Introduction

Motivation

- A fundamental challenge for 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 (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)
- Debate in EU about lack of unicorns and VCs that are “playing it too safe”

Research question

- **Question:** What determines loss tolerance in VC investing?
 - What are key factors determining loss tolerance (depth of J-curves)?
 - What are the implications for company growth and exits?
 - Do certain VCs have a more “loss tolerant style” in investing?
- **Our approach:**
 - Develop a theory of loss tolerance in VC investing
 - Take the predictions to Swedish data, in which we can **measure the rate of burn**
 - Empirically analyze if US VCs have a more “loss tolerant style” in investing

- **Staged financing and financing risk**
 - Staged financing (binary choice) 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
- We develop (and document) the concept of **loss tolerance in VC investing**
- Continuous short-run losses allows an analysis of **burn rates and J-curves** ("fund use" vs "fund raising")

- **Foreign vs domestic VCs**

- Differences between domestic and foreign VCs

Large and growing literature, see for example Devigne et al. 2018

- Differences between US vs non-US VCs

Conti and Guzman 2019; Lerner and Tåg 2013; Hege, Palomino, and Schwienbacher 2009

- Role of scale-ups

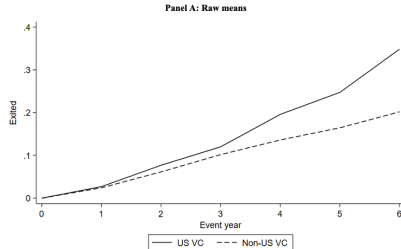
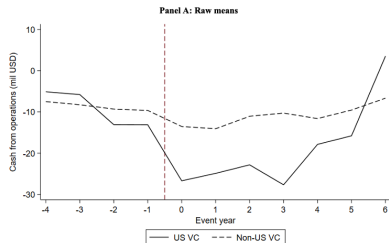
Hellmann and Thiele 2024; Norbäck, Persson, and Tåg 2024

- We develop (and document) the concept of **loss tolerance in VC investing**

- Relate investor origin to investment behavior

- US investors have a more "loss tolerant style" relative to non-US investors

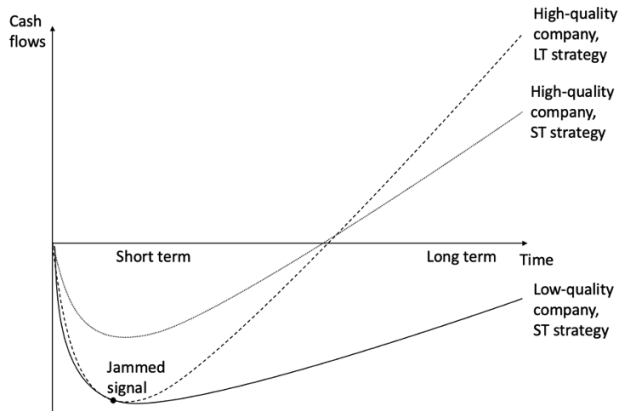
Preview of results



- **US VCs have a more loss tolerant investment style than non-US VCs**
 - Incur more losses (higher burn), especially in the short run (deeper J-curve)
 - Eventually raise more funding, have better growth, and exit outcomes
 - Have the same failure rates

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
- Frame the empirical analysis that compares US vs non-US investments

- **Building blocks**

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

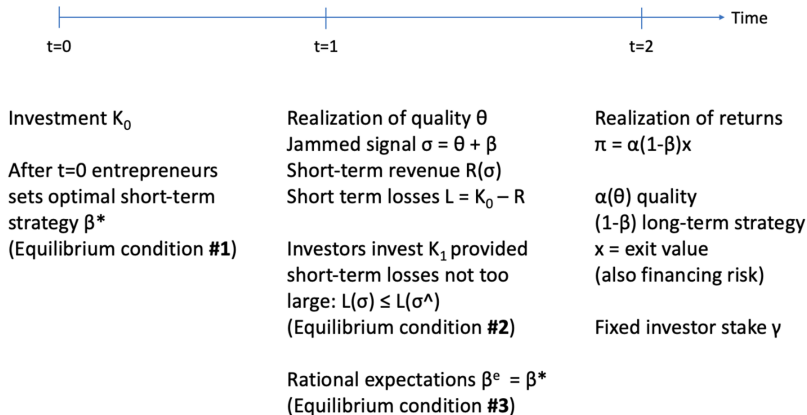
Components

- One entrepreneur (E) and one investor (I). Both are risk neutral.
- Three periods, no discounting:
 1. Initial investment K_0 by I and strategy choice β by E . The entrepreneurs stake is γ .
 2. Short-term losses $L(\sigma) = K_0 - R(\sigma)$ with $\sigma = \theta + \beta$. Reinvestment choice K_1 by I , observing only signal σ and not strategy choice β .
 3. Long-term profits realized: $\pi = \alpha(\theta)(1 - \beta)x$.
- Key exogenous parameter is x , which represents
 - exit opportunities (IPO/MnA)
 - failure values
 - further refinancing/financing risk

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 predictions

- **Prediction #1:**

- Higher x make the investor more loss-tolerant
- "Better long-term prospects, less concern for short-term losses"

- **Prediction #2:**

- Higher x allow the entrepreneurs greater focus on the long-term
- "E more reluctant to give up long-term profits to boost short-term profits"

- **Prediction #3:**

- Higher x increase the probability of refinancing
- "Since E is more reluctant, this signals better expected exit values"

Data

Empirical approach

- **Challenge:** Need a credible measure of financial losses for VC-backed companies and "random" allocation of US VC (investors we take to have higher x)
- **Solution:** Private Swedish limited liability companies must submit annual reports to Swedish Companies Registration Office by law (independently of listing status)
 - Construct company-fiscal year panel for companies that ever receive VC funding
 - Compare companies that get VC funding from US and benchmark non-US investors around investments for multiple outcomes (DiD, take inspiration from PE buyout lit.)
 - **Ideal:** conditional on investment, US or non-US investing is "random" with respect to **trends** in outcomes over time

- **Principal data source:** Swedish Companies Registration Office
 - Annual reports and company events (e.g., bankruptcies)
 - VC investments and exit events 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
- **Sample construction:**
 - Take each cohort separately and pick up US and non-US investments
 - Create panels for each cohort
 - Append/stack the panels together

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

- **Notes:**

- "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
- Data consists of 11.5k company-year observations of 863 VC backed companies
- Cluster at company times cohort level
- Robustness: Callaway and Sant'Anna DiD

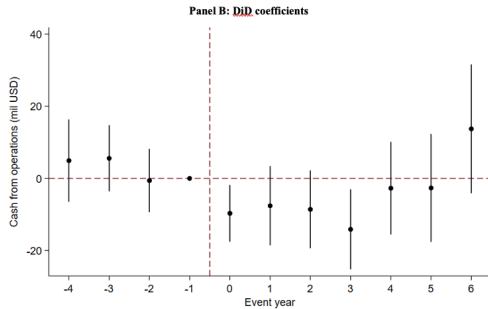
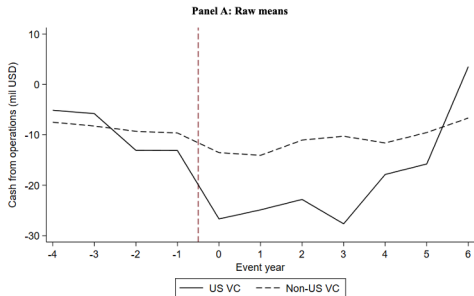
Descriptives

	(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	

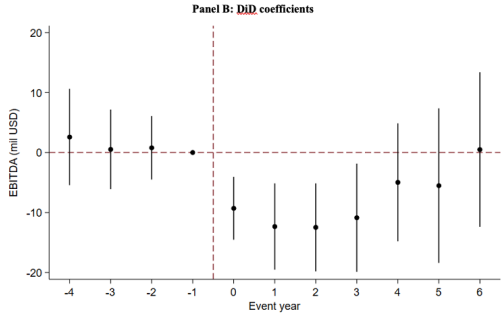
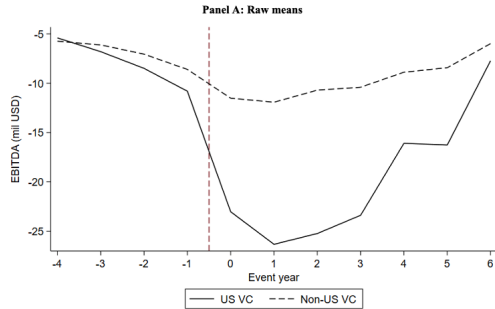
- **Parallel trends**
 - No difference in means of observables prior to investment
 - Parallel pre-trends for multiple observables correlated with venture quality
- **No spillover effects (SUTVA)**
 - Individual deals small compared to overall market
- **Note on unobserved potential to scale**
 - Must be invisible in all pre-levels and pre-trends
 - Must apply only to US, but not to non-US
 - Results hold vs Sweden and vs non-Sweden non-US

Results

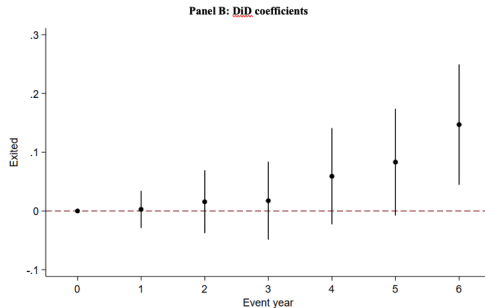
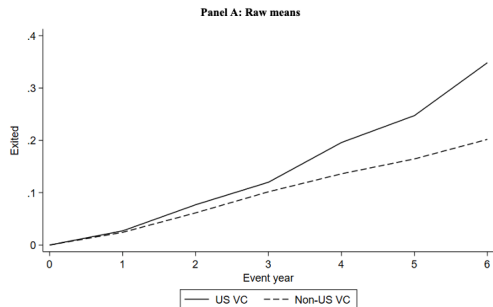
Cash from operations



EBITDA

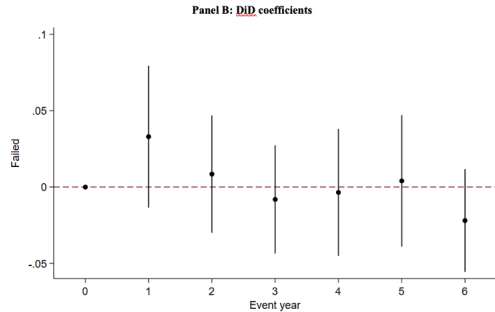
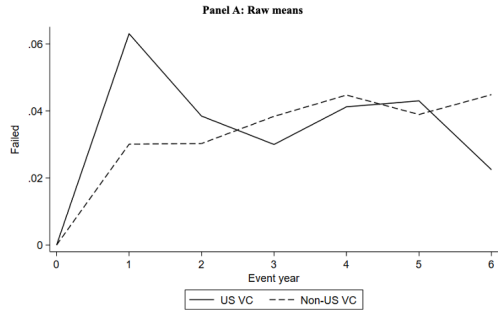


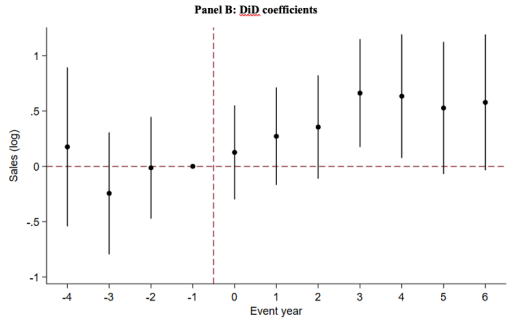
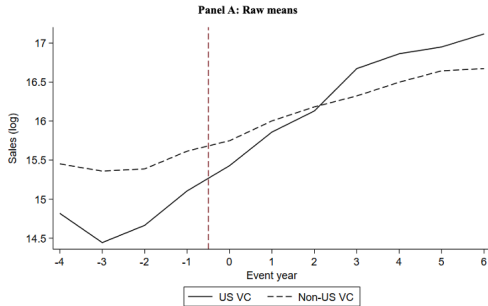
Exits



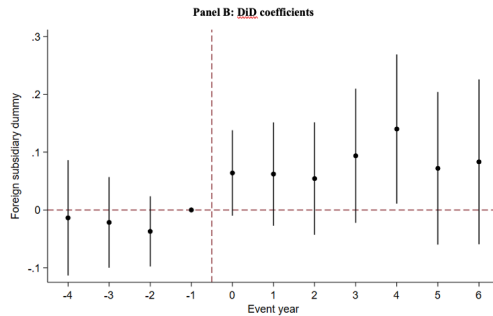
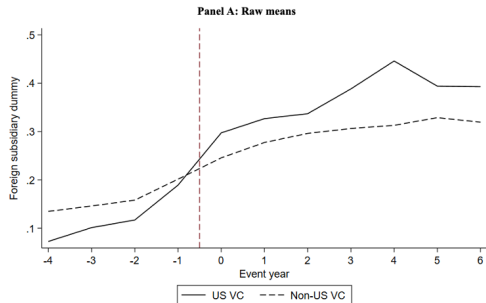
- Mean US VC backed Exit (IPO): \$572M (\$454M)
- Mean non-US VC backed Exit (IPO): \$220M (\$165M)

Failures

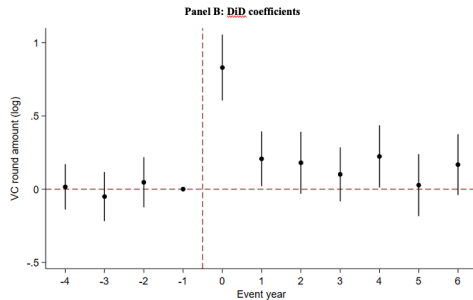
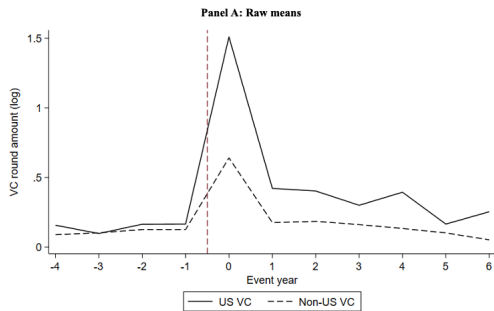




Foreign subsidiaries

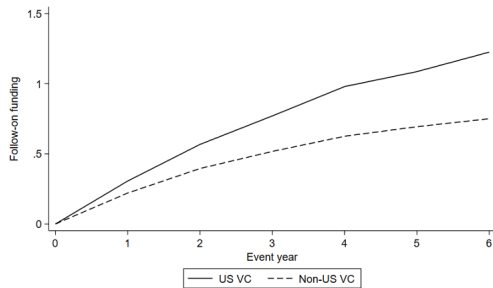


Funding

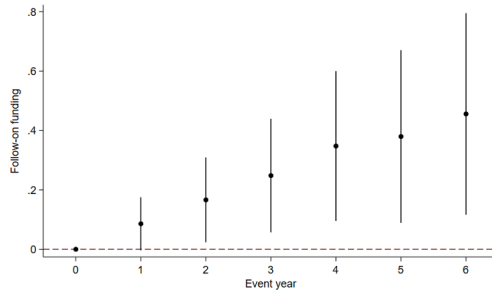


Follow-on funding

Panel A: Raw means

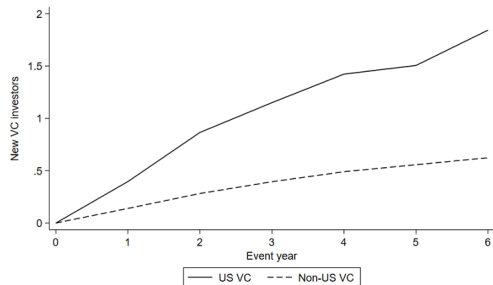


Panel B: DiD coefficients

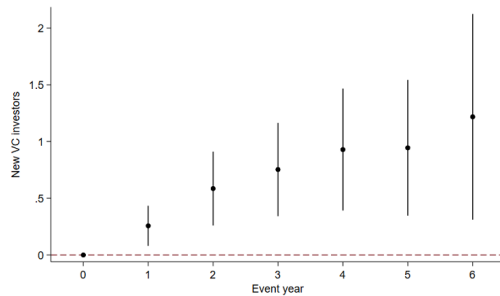


New investors

Panel A: Raw means



Panel B: DiD coefficients



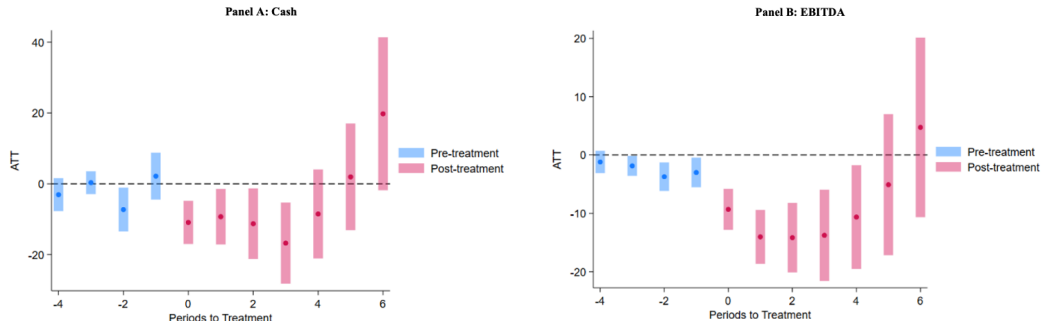
Regressions

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

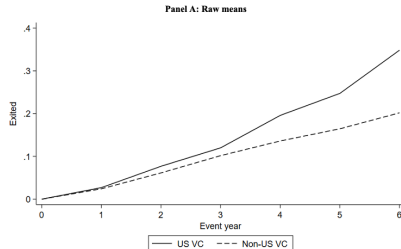
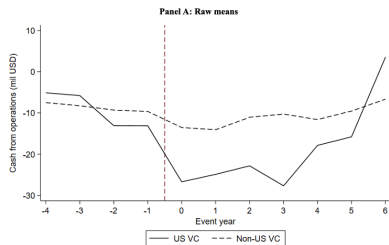
Robustness



- 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.)

Takeaways

Takeaways



- We develop and document the concept of "loss tolerance" in VC
- US VCs have a more loss tolerant investment style than non-US VCs
 - Incur more losses (higher burn), especially in the short run (deeper J-curve)
 - Eventually raise more funding, have better growth, and exit outcomes
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The bigger picture

- 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, ecosystems need higher x :
 - Investors with connections to good exit markets and follow-on funding
 - Diversity in investor type and stage focus (lowers financing risk)