Venture Capital and the Economics of Innovation

Lecture 3

Evaluating Venture Capital Performance

U.S. as a % of Global VC Deal Flow by Year

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Global Deal Value (\$B)	36.60	45.60	49.56	36.40	46.53	65.32	61.11	72.35	112.62	150.70	158.91	174.61	254.25
US Deal Value (\$B)	29.23	36.01	36.94	27:17	31.27	44.75	41.51	47.54	71.03	82.97	77.23	82.95	130.93
Global Deal Value (#)	4,915	6,411	7,087	6,823	8,679	11,078	13,181	16,128	19,024	20,172	18,036	17,314	15,299
US Deal Value (#)	3,344	4,319	4,727	4,487	5,409	6,759	7,882	9,301	10,573	10,740	9,200	9,489	8,948
US as % of Global (\$)	80%	79%	75%	75%	67%	69%	68%	66%	63%	55%	49%	48%	51%
US as % of Global (#)	68%	67%	67%	66%	62%	61%	60%	58%	56%	53%	51%	55%	58%

Source: NVCA 2019 Yearbook, Data Provided by PitchBook

Why Use US Data? Only Data that Is NOT Self-Reported

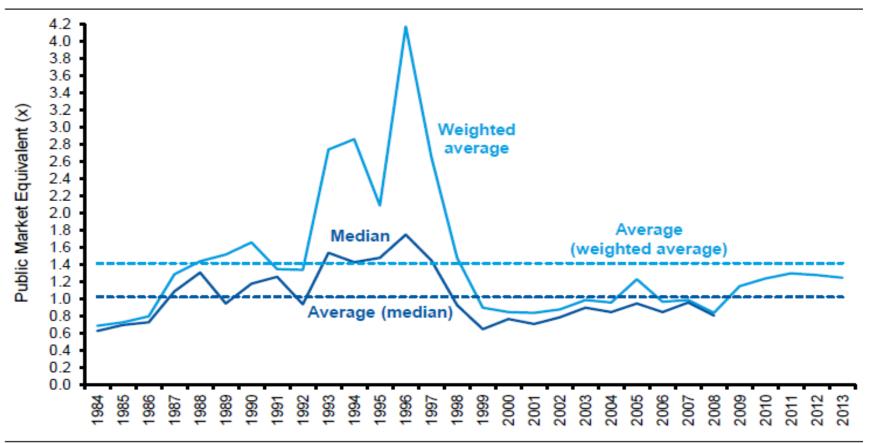
"In this paper, we use a new research-quality data set of private equity fund-level cash flows from Burgiss. We refer to private equity as the asset class that includes buyout funds and venture capital (VC) funds. We analyze the two types of funds separately. The data set has a number of attractive features that we describe in detail later. A key attribute is that the data are derived entirely from institutional investors (the limited partners or LPs) for whom Burgiss' systems provide record-keeping and performance monitoring services. This feature results in detailed, verified and cross-checked investment histories for nearly 1400 private equity funds derived from the holdings of over 200 institutional investors."

(R.S. Harris, T. Jenkinson, S. N. Kaplan, "Private Equity Performance: What Do We Know?" *Journal of Finance*, 69:5, October 2014, p. 1851)

US VC Fund-raising 1980-2018 (Independent VC Firms)

	# of Active VC Firms	\$B raised	\$B managed
1980	52	2.0	2.1
1985	93	3.8	11.8
1990	101	3.2	22.7
1995	184	9.5	33.3
2000	1,049	105.0	187.4
2005	557	30.8	241.6
2010	508	13.8	174.7
2015	798	28.2	152.1
Source: National \	enture Capital Association, 2016 Yearbo	ook, 18.	
2016	872	41.9	333.5
2017	970	33.9	358.9
2018	1,047	58.0	403.5
2019	1,328	50.5	444.3

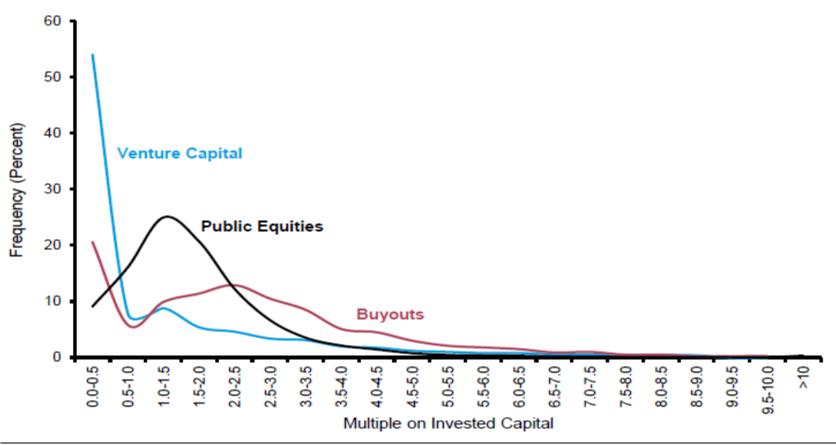
Public Market Equivalent (PME) Returns: US Venture Capital Funds, 1984-2013



Source: Robert S. Harris, Tim Jenkinson, Steven N. Kaplan, "Private Equity Performance: What Do We Know?" Journal of Finance, Vol. 69, No. 5, October 2014, 1851-1882 and Steve Kaplan, "What Do Venture Capitalists Do? How Well Have They Done?" University of Chicago Booth School of Business.

(Morgan Stanley, "Public to Private Equity in the United States: A Long-Term Look," August 4, 2020, Exhibit 6, p. 9)

VC Returns Are Hugely Skewed



Source: Gregory Brown, Robert S. Harris, Wendy Hu, Tim Jenkinson, Steven N. Kaplan, and David Robinson, "Private Equity Portfolio Companies: A First Look at Burgiss Holdings Data," SSRN Working Paper, March 3, 2020 and FactSet. Note: Past performance is no guarantee of future returns; Sources use Burgiss data.

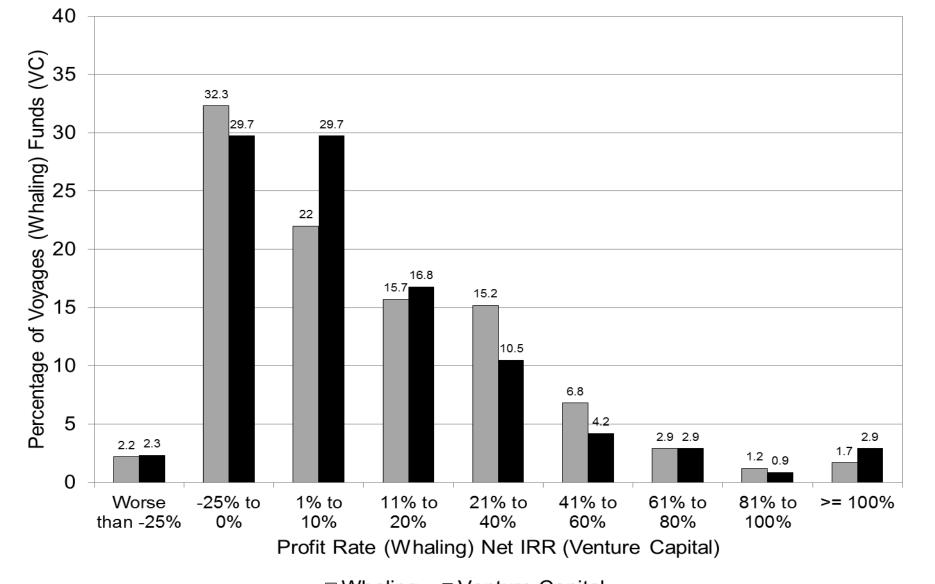


Figure 1.1 The Distribution of Returns in Whaling and Venture Capital. Based on data in Lance E. Davis, Robert E. Gallman, and Karin Gleiter, *In Pursuit of Leviathan: Technology, Institutions, Productivity, and Profits in American Whaling, 1816–1906* (Chicago: University of Chicago Press, 1997), 450. Venture capital estimates based on Preqin Venture Capital Database.

Venture Fund Performance Summary

The following table summarises the performance of the 205 venture funds in the database by IRR. To highlight the skewness of the data and the influence of a select group of high performing funds, these metrics are also presented when the top decile and quintile of performing funds are excluded. Finally, the performance of the funds is summarised across different periods of time.

	Maan	Mod	St.	Skow	25 th	75 th	May	Min
	Mean	Med.	Dev.	Skew	Percent	Percent	Max.	Min.
IRR	47%	24%	72%	2.74	9%	61%	515%	-94%
- Top decile only	215%	193%	92%	1.97	155%	254%	515%	133%
- Excluding top decile	27%	20%	35%	0.69	7%	41%	125%	-94%
- Excluding top quintile	18%	16%	24%	-0.46	6%	31%	76%	-94%
- 1980 – 1984	17%	9%	23%	2,10	4%	20%	92%	-5%
- 1985 – 1989	23%	19%	26%	2.06	11%	32%	155%	-57%
- 1990 – 1994	42%	37%	40%	-0.37	17%	64%	125%	-94%
- 1995 – 2006	86%	55%	107%	1.48	4%	136%	515%	-34%

Mckenzie and Janeway, "Venture Capital Funds and the Public Equity Market"

Venture Fund Performance Relative to the NASDAQ

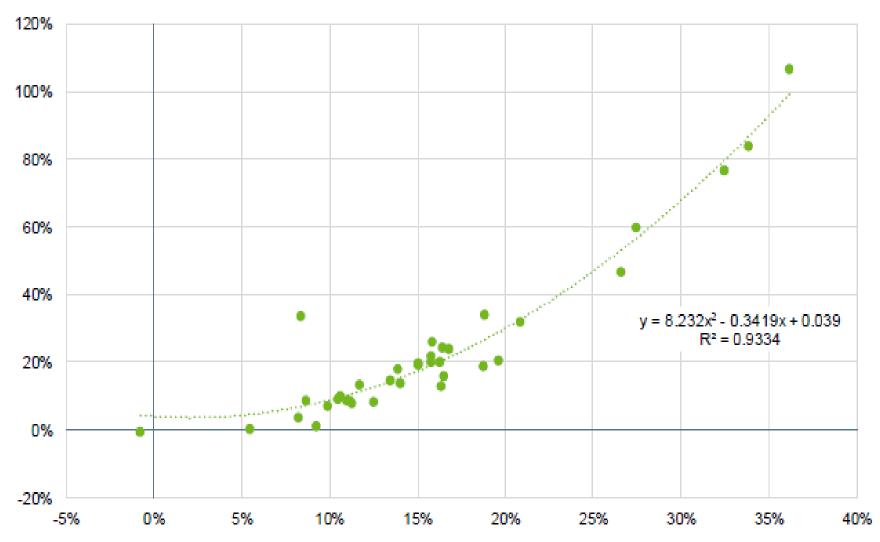
Fund Multiple and IRR measures of performance are estimated for a hypothetical set of funds that are created assuming that each terminated fund in the database made an equivalent investment in the NASDAQ. The Public Market Equivalent (PME) is a measure of the total disbursements to a fund expressed relative to the total distributions to the hypothetical fund. This data is also summarised excluding the top

decile and quintile of funds.

	Mean	Med.	St. Dev.	Skew	25 th Percent	75 th Percent	Max.	Min.
Nasdaq Multiple	2.42	2.38	0.83	0.39	1.96	2.82	5.05	0.63
- Excluding top decile	2.23	2.27	0.63	-0.69	1.92	2.71	3.27	0.63
- Excluding top quintile	2.12	2.21	0.58	-0.90	1.86	2.58	2.92	0.63
Nasdaq IRR	16%	15%	10%	-0.24	11%	21%	45%	- 24%
- Excluding top decile	14%	14%	8%	-1.50	11%	19%	28%	- 24%
- Excluding top quintile	13%	13%	7%	-2.02	11%	17%	23%	- 24%
Nasdaq PME	1.59	1.00	3.67	10.33	0.57	1.68	42.36	0.14
- Excluding top decile	1.02	0.93	0.57	0.66	0.57	1.33	2.48	0.14
- Excluding top quintile	0.88	0.83	0.43	0.44	0.54	1.19	1.85	0.14

9

U.S. Venture Capital Net IRRs (y) vs. Nasdaq PME IRRs (x) -- 1981-2016



The Persistence of Persistence

"For VC funds, we find that performance persistence post-2000 remains as statistically and economically persistent as pre-2000. Partnerships whose previous VC funds are below the median for their vintage year subsequently tend to be below the median and have returns below those of the public equity markets (S&P 500). Partnerships in the top two VC quartiles tend to stay above the median and their returns exceed those of the public markets."

(R. S. Harris, Jenkinson, T., Kaplan, S. N., and Stucke, R., "Has Persistence Persisted in Private Equity? Evidence from Buyout and Venture capital Funds, p. 2, ," available at https:papers.ssrn.com/sol3/papers.cfm?abstract_id=2304808)

Panel B: Venture Capital Funds

			1	anel B: V	enture Caj	pitai Fu	nas		
		1	Curren 2	it Fund Quar 3	rtile 4	N	Average Current Fund IRR	Average Current Fund MOIC	Average Current Fund PME
				W	hole Samp	le			
1	. 4	18.5% 64	16.7% 22	24.2% 32	10.6% 14	132	33.1%	3.28	2.26
Previous 2	2 2	28.9%	34.2% 39	20.2%	16.7% 19	114	14.6%	1.84	1.30
Fund Quartile		22.0% 24	29.4% 32	29.4% 32	19.3% 21	109	10.4%	1.74	1.19
4	1	14.8% 12	17.3% 14	29.6% 24	38.3% 31	81	-0.3%	1.00	0.79
NA, but not first fund	1 2	22.0% 52	21.2% 62	27.3% 72	29.5% 74	260	7.6%	1.53	0.98
First funds	2	23.6% 40	22.1% 39	24.4% 33	29.9% 44	156	9.7%	1.86	1.26
				Pr	e-2001 Fun	.ds			
1	. 4	18.7% 38	14.1% 11	23.1% 18	14.1% 11	78	47.7%	4.41	2.79
Previous 2 Fund	2 3	33.3% 21	27.0% 17	27.0% 17	12.7% 8	63	22.0%	2.35	1.48
Quartile		26.8% 15	35.7% 20	17.9% 10	19.6% 11	56	18.2%	2.33	1.40
4	ı	8.7% 4	19.6% 9	26.1% 12	45.7% 21	46	-0.3%	1.00	0.71
NA, but not first fund	d 1	19.9% 30	21.9% 43	30.1% 50	28.1% 44	167	10.9%	1.78	1.00
First funds	2	24.3% 25	23.0% 20	24.3% 20	28.4% 23	88	16.0%	2.36	1.40
				Po	st-2000 Fur	ıds			
1	4	48.1% 26	20.4% 11	25.9% 14	5.6% 3	54	12.1%	1.65	1.49
Previous	2 2	23.5% 12	43.1% 22	11.8%	21.6% 11	51	5.5%	1.21	1.07
Quartile		17.0% 9	22.6% 12	41.5% 22	18.9% 10	53	2.2%	1.11	0.96
4	1 2	22.9% 8	14.3% 5	34.3% 12	28.6% 10	35	-0.3%	1.01	0.90
NA, but not first fund	1 2	25.9% 22	19.8% 19	22.2% 22	32.1% 30	93	1.9%	1.08	0.94
First funds	2	22.6% 15	20.8% 19	24.5% 13	32.1% 21	68	1.6%	1.21	1.08

State of the US VC Industry

"The US venture capital (VC) industry ended the decade on a high note in 2019. For the second consecutive year, high-growth startups raised more than \$130 billion, and 2019 represented the second year on record (after 2015) where more than 10,000 venture-backed companies received an investment... "As the numbers of venture firms, startups, and available capital expanded in 2019, so did the prevalence of mega-funds and mega-deals, most of which have been concentrated in a few metro areas on the coasts....

"An important trend over the past decade has been the wave of new participants in the venture ecosystem. These include the surge in first-time funds raised and companies receiving their first venture investment. The industry has also seen an evolution in the investor base, with traditional venture funds now part of a broad mix of capital sources available to startups, i.e., accelerators, incubators, angel groups, corporate venture group, growth equity firms, platforms like AngelList, mutual funds, hedge funds, and sovereign wealth funds...."

US VC Deal Flow

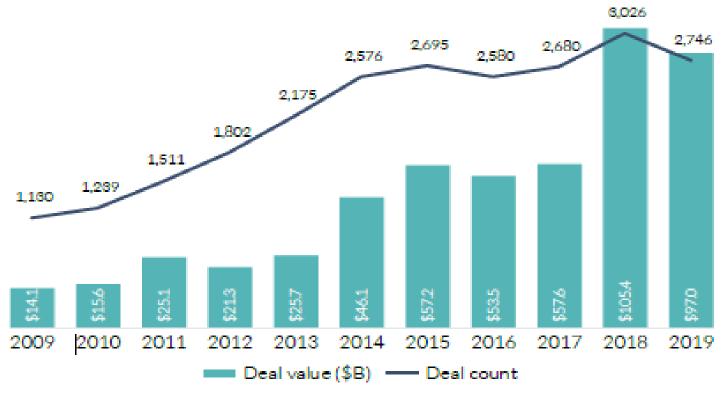


Source: NVCA 2020 Yearbook, Data Provided by PitchBook

Unconventional Capital: PE

Deal value participation reaches near \$100B again

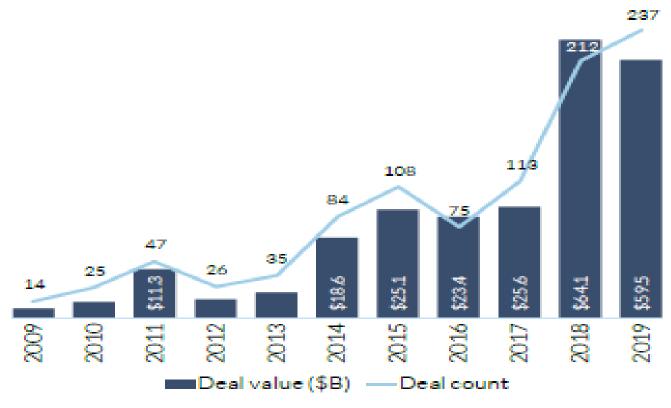
US VC deal activity with nontraditional investor participation



PitchBook-NVCA Venture Monitor

Fueling Mega Increase In "Mega-Rounds"

Mega-deals set new annual record by count
US VC mega-deal activity

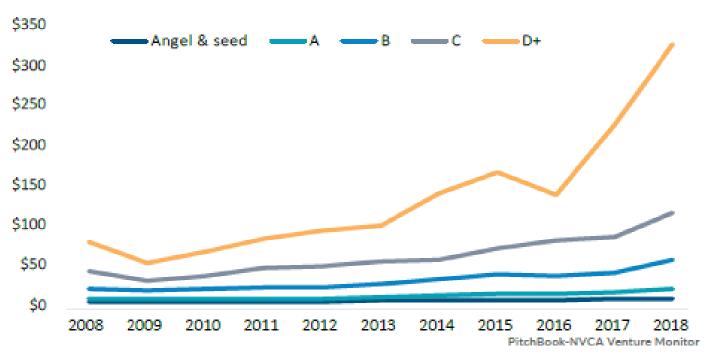


PitchBook-NVCA Venture Monitor

At "Nose-Bleed" Valuations

Latest stage valuations remain fastest growing

US VC median pre-money valuation (\$M) by series



The Unicorn Bubble



The Global Unicorn Club

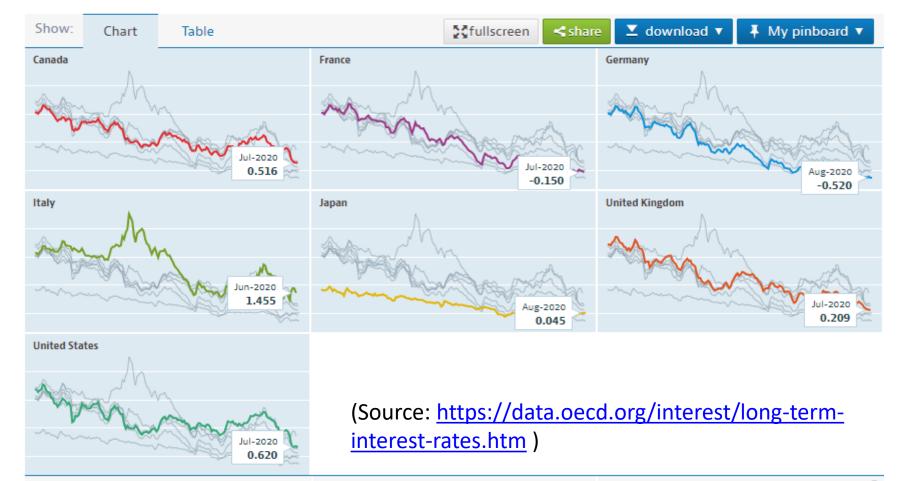
Current Private Companies Valued At \$1B+ (including whisper valuations)

Total Number of Unicorn Companies: 490
Total Cumulative Valuation: ~ \$1,527B

10-Year Government Bond Yields: January 2007-August 2020

Long-term interest rates Total, % per annum, Jan 2007 - Aug 2020

Source: Finance



Supplies Supplies Time

The Unicorn Bubble: What Is Different

"First, "premium prices": valuation metrics for the most recent financing rounds of unicorns – calculated as enterprise value divided by annual revenues, given the lack of profits reported by the vast majority of these fast-growing ventures – are currently on the order of twice that metric for comparable public companies.

"Second, by purchasing unregistered securities in the absence of a liquid trading market, the new investors have chosen to forego the most valuable option an investor in a speculative venture can possess: the ability to "sell too soon;" the right to get out before having to find out if the speculation has been validated by economic reality; the opportunity to make money even if the venture fails.

"Finally, the signature of a bubble can be discerned in the increasing volume of such purchases of securities even as the disparity in valuation between private placements and public markets has grown.

"Between 2013 and 2014, Goldman Sachs' count of the aggregate dollar value of private placements of tech company equity of more than \$100 million quadrupled from \$3.3 billion to \$12.2 billion as the number of such transactions tripled from 15 to 49. And by Morgan Stanley's more inclusive reckoning, technology private placements have risen from \$9 billion and \$10 billion during the twelve months ended March 31, 2013 and 2014, respectively, to \$33 billion during the twelve months ended March 31, 2015."

(W. H. Janeway, "Unicorns: Why This Bubble is Different," Forbes.com, May 28,

2015, available at https://www.billjaneway.com/unicorns-why-this-bubble-is-different)

The Unicorn Bubble: The Supply Side

"As the complex of technologies that enable the development and delivery of disruptive services on the web have matured, the frictions that inhibit the growth of new companies have declined enormously. At start-up, the cost of introducing a new service is radically less than just 10 years thanks to open source (that is, "free") software tools and the availability of computing resources for rent as needed from Amazon and the other cloud suppliers. Marketing begins with social media and advances through search engine optimization (i.e., gaming Google for better placement). And the service is delivered over the web as, from the point of view of the user, the underlying IT disappears.

"So the number of Darwinian "hopeful monsters" grows while the potential scale of any one of them grows even more. It is radically less costly in time and money to reach users and for users to take advantage of the service. Before profits or even revenues are recorded, an exponential increase in the number of users serves to imply a boundless market for the emergent unicorn even before a model for revenue generation and a path to profitability has been demonstrated.

"This especially appears to be the case for the web-based, two-sided market platforms represented by Uber and Airbnb. Both the suppliers and customers enjoy virtually friction-free access to services – including endogenous measures of service quality – that have historically been provided through far less efficient means characterized by substantial information asymmetries."

The Unicorn Bubble: The Demand Side

"On the demand side, institutional investors have now been living with real interest rates close to zero for more than five years. Stock market returns have been attractive since recovery from the Global Financial Crisis was established and have averaged about 12% annually over the past five years. But the flow of new companies to the public markets, with the potential to deliver extraordinary growth and returns, has been highly constrained.

"For half a generation, since the last stock market bubble burst in 2000, the number of initial public offerings ("IPOs") for technology companies has been far below the quarterly average of the previous twenty years, 10-15 per quarter versus more than 30. One factor has been the extreme consolidation of the investment banking industry since that time, with access to the market dominated by a small number of dealers whose own economics dictate their interest only in large offerings, more than \$100 million.

"IPOs even at that scale limit the amount available to the major investing institutions, who can only accumulate meaningful positions by buying into a thin after- market, driving up the price against themselves. Under such circumstances, it appears rational for investors of this sort to make substantial commitments — many tens of millions of dollars — to offerings marketed as "pre-IPO" at valuations which are advertised as taking into account the post-IPO price increases."

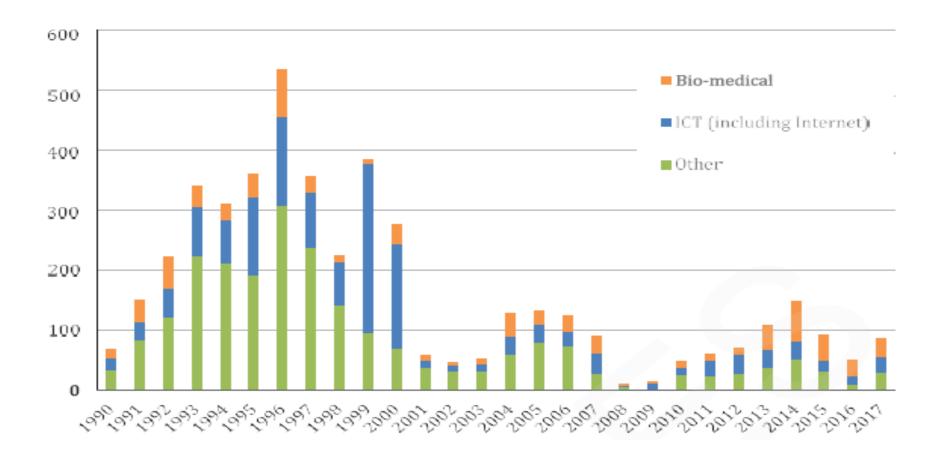
Venture Fund Performance (IRR) Relative to the IPO Market

The performance of the sample of venture funds, as measured by the IRR, is summarised by market and exit conditions indicators.

	Mean	Med.	St. Dev.	Skew	25 th Percent	75 th Percent	Max	Min
- Market Conditions < -1	22%	4%	52%	1.28	-15%	39%	141%	-30%
- Market Conditions = -1 to 1	51%	27%	77%	2.75	9%	65%	515%	-94%
- Market Conditions > 1	41%	20%	60%	2.52	10%	32%	256%	-10%
- Exit Conditions <2	19%	9%	42%	1.60	-7%	29%	155%	-34%
- Exit Conditions = 2 to 3	33%	24%	42%	1.93	11%	40%	237%	-94%
- Exit Conditions >3	106%	76%	110%	1.56	22%	167%	515%	-6%

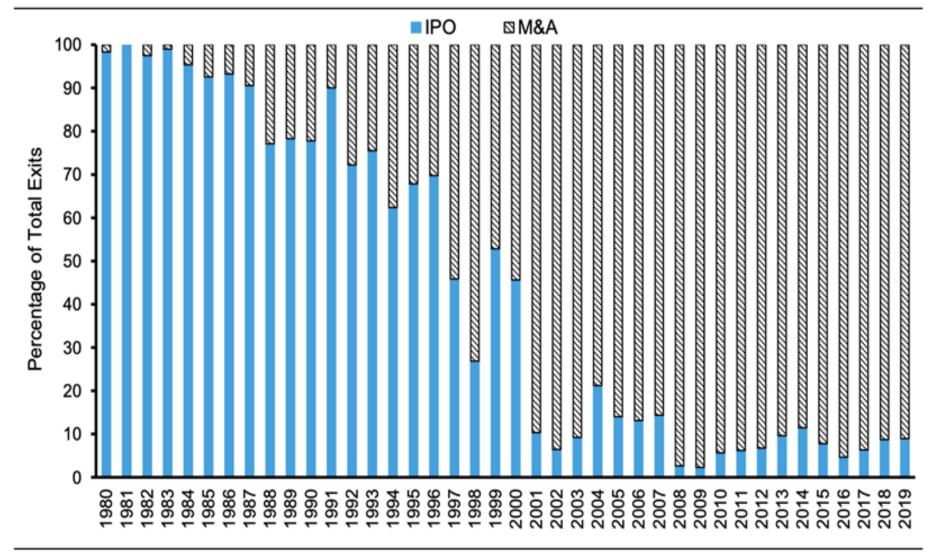
(Source: McKenzie and Janeway)

Decline in VC-backed IPOs: 1990-2017



(M. Kenney and Zysman, J., "Unicorns, Cheshire cats, and the new dilemmas of entrepreneurial finance," *Venture Capital*, Fig. 2, p. 4, available at https://doi.org/10.1080/13691066.2018.1517430)

Exhibit 37: Evolution of Exits for U.S. Venture Capital, 1980-2019



Source: NVCA 2010 and 2020 Yearbooks.

(Morgan Stanley, "Public to Private," Exhibit 37, p. 45..)

The Softbank Vision Fund

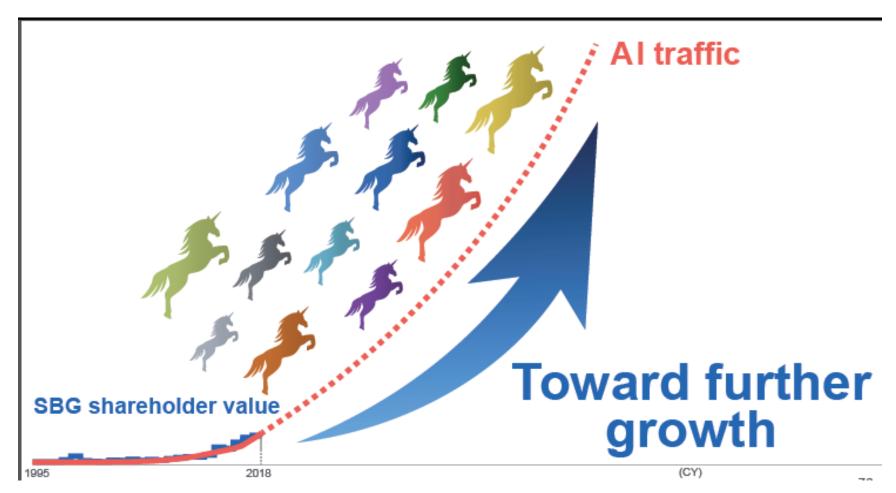
"In the summer of 2014, SoftBank founder Masayoshi Son attended a wedding on the coast of southern Italy that would change his company forever. But not in the way it seemed at the time....

"...[I]t was Mr Son's re-encounter with another India-born guest at the wedding that has turned out to be more significant. Rajeev Misra, who once helped SoftBank pull off a complex deal when he ran debt trading at Deutsche Bank, was within months wooed to work for his former client.

"Together they have created a \$100bn fund, the largest private pool of money ever raised, which has put SoftBank at the centre of dealmaking in every corner of the world. The so-called SoftBank Vision Fund has allowed Mr. Son to leapfrog a cliquey club of mainly Silicon Valley venture capital firms — something unthinkable just a few years ago. SoftBank is now competing against tech giants from the US and China for the most sought-after start-ups."

(A. Massoudi, Inagaki K., and Lewis L., "Softbank: inside the 'Wild West' \$100bn fund shaking up the tech world," Financial Times, June 20, 2018)

A Genuine Slide from the Pitch Deck for Vision Fund II



SoftBank shareholders push for answers on 'Nasdaq whale' bets

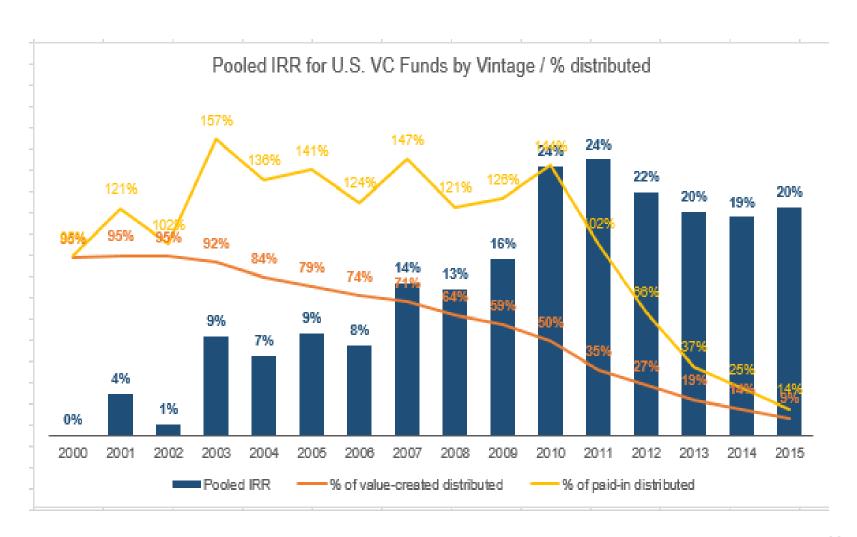
"SoftBank shareholders are calling on the technology conglomerate to reveal who is running the unit at the centre of its large US equity options trades, with nerves over an unexplained strategic shift stoking a 10 per cent decline in its share price.

"The FT has spoken to several large institutional investors since revealing last week that SoftBank had fuelled a long rally in tech stocks by placing billion-dollar bets on derivatives. The investors said that over the past few weeks — in some cases before the derivatives trades came to light — they had attempted to discover how the asset management unit was managed and, in particular, who was in charge of its day-to-day running. The investors said that despite those efforts, SoftBank has refused to disclose who was in charge beyond assuring them that Mr Son was closely involved....

"Rajeev Misra, who heads SoftBank's \$100bn Vision Fund, and Akshay Naheta, a former Deutsche Bank trader and a close ally of Mr Misra, are closely involved in the huge derivatives bets on selected US tech stocks, but Mr Son has driven the decisions behind the options trades, according to people with direct knowledge of the matter."

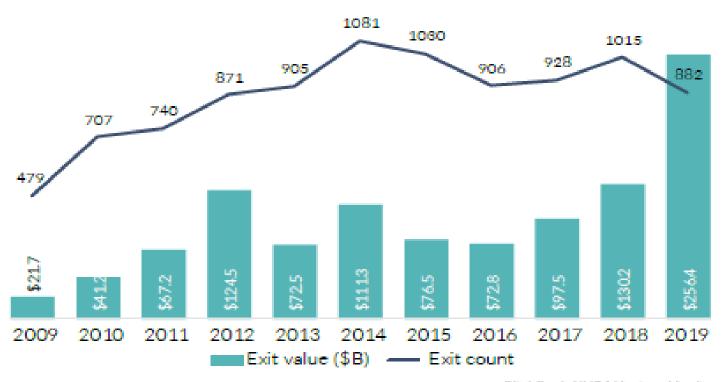
(Financial Times, September 9, 2020)

Recent VC Funds Reported Very High IRRs BUT almost all UNrealized



Exit Activity

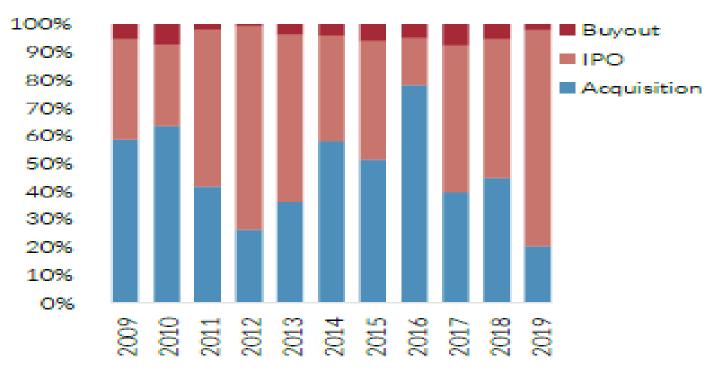
2019 sets huge new record year for VC exit value US VC exit activity



PitchBook-NVCA Venture Monitor

Driven by Unicorn IPOs

Massive IPOs drove banner year for VC exits US VC exits (\$) by type



PitchBook-NVCA Venture Monitor

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ECONOMY

Fed Approves Shift on Inflation Goal, Ushering In Longer Era of Low Rates

Chairman Jerome Powell says central bank has changed how it views trade-off between lower unemployment and higher inflation

(Wall Street Journal, August 27, 2020)

The First Fundamental Theorem of VC

"Cash and Control"

ABOUT *

ESSAY | VOLUME 166

UNIVERSITY of PENNSYLVANIA

LAW REVIEW

The Unicorn Governance Trap

By **RENEE M. JONES •** 166 U. Pa. L. Rev. Online 165 (2017)

Posted on Dec. 5, 2017

This Essay highlights emerging governance problems presented by persistent Unicorns. It argues that recent market trends and deregulatory reforms have weakened or eliminated the principal mechanisms that imposed discipline on start-up company founders. Recent scandals at prominent Unicorns suggest that investors have erred in placing blind faith in the honesty and capabilities of start-up founders. Policymakers should learn from these disasters and close regulatory loopholes that allow Unicorns to persist in limbo between private and public status for extended periods of time.

Part I provides an overview of how the IPO has shifted from the preferred exit strategy in the eyes of entrepreneurs to a regulatory morass to be shunned. It traces developments in the market for start-up company shares, and regulatory reforms that facilitated the proliferation of Unicorns. Part II highlights unique governance risks posed by Unicorns, addressing both societal and investor protection concerns. Part III offers suggestions on how to address Unicorn risks, and raises fundamental questions about the future of Unicorns in our economy.

The New Hork Times

Uber Investor Sues Travis Kalanick for Fraud

Aug. 10, 2017

Theranos Founder Elizabeth Holmes Indicted on Fraud Charges

June 15, 2018

Adam Neumann and the Art of Failing Up

WeWork's chief risk-taker found a kindred spirit with an open checkbook: SoftBank's Masayoshi Son. Now he's walking away from the wreckage with more than \$1 billion.

November 18, 2019

The Second Fundamental Theorem of VC

"Corporate Happiness is Positive Cashflow"

The Unicorn Bubble: Two Vulnerabilities

"...at the micro-level, to the 'marks to reality' generated by active trading markets for those that do go public."

"...at the macro-level, from a return to traditional levels of interest rates and credit spreads as the major central banks normalize credit spreads."

(Janeway, Doing Capitalism, 2nd. Ed., p. 34)

Concentration of Venture Capital

"Venture activity is concentrated. Yes, the National Venture Capital Association estimates that there were a little over 1,000 US venture capital funds in 2019. But a small number of large venture capital firms hold the vast majority of capital. To illustrate this point, we created a list of all institutional venture capital investors that made at least one investment into a US-headquartered startup in 2018. For these investors, we examined the total funds they had raised from 2014 to 2018: approximately \$284 billion raised by 985 investors. Looking at the concentration in the capital raised by these investors provides a good proxy for the concentration in assets under management across institutional venture capital investors. The top 50 investors, or about 5 percent of the venture capital firms, raised half of the total capital over this period."

(J. Lerner and Nanda, R., "Venture capital's Role in Financing Innovation: What We Know and How Much We Still Need to Learn," *Journal of Economic Perspectives*, Vol., 34, No. 3, (Summer 2020), p. 248)

VCs are (Extremely) Unrepresentative

Characteristics of Key US-based Investment Professionals in the 50 Largest Venture Capital Firms

	US-based partners	US-based partners with at least one board seat
Total number of Partners	416	265
Share male	82%	92%
Share attended top universities	59%	72%
Share with MBA from Harvard	12%	15%
Share with MBA from Stanford	9%	13%
Share located in Bay Area	69%	69%
Share located in Greater Boston	9%	11%
Share located in New York City	14%	11%
Average number of board seats held		6.1
Median number of board seats held		5

Source: Data are drawn from the PitchBook database. We first restrict investment professionals in these firms to titles that are one of Managing General Partner, Managing Partner, Founding Partner, General Partner, Senior Partner, or Partner and further restrict them to individuals based in the United States. In column 2, we examine a subset of these individuals who also sit on at least one board seat, as some of the firms in our sample have a larger number of individuals with a "Partner" title than those who make investment decisions or are actively involved in governing startups.

(Lerner and Nanda, Table 3, p. 250)

A Declining Emphasis on Governance?

"The third concern we highlight here has to do with the seeming decline in active corporate governance by venture capital funds. Venture capital has traditionally been a tough business, with onerous agreements in which firm founders gave venture capital firms significant stock ownership in exchange for funding. Moreover, this stock ownership was not just "paper rights": frequent turnover of management driven by venture capital was traditionally the rule. These patterns have changed dramatically in the past decade. Across the board, "founder friendly" terms appear to have replaced the more onerous provisions traditionally demanded by venture capitalists."

(Lerner and Nanda, p. 252)

The Perils of Success

"[A]s venture capital groups begin managing hundreds of millions or billions of dollars, substantial "economies of scale" appear: put another way, as a group becomes ten times larger, expenses increase much less than tenfold. As a result, management fees themselves become a profit center for the firm. These steady profits may create incentives of their own which may not be very appealing to investors. For instance, there will be an incentive to raise a larger fund at the expense of lower returns, which in turn may be tied to the greater concentration of capital held by a few investors; an incentive to put funds to work quickly and with a subpar amount of vetting so that a new fund can be raised sooner; and an incentive to focus on excessively safe investments that will not have as much upside but will pose less risk of a franchise-damaging visible failure."

(Lerner and Nanda, p. 254)