Venture Capital and the Economics of Innovation

Lecture 2

What Venture Capitalists Do

Why Does Venture Capital Matter?

Comparison of Publicly Traded Firms in the United States, Based on Whether Backed by Institutional Venture Capital Investors

	VC-Backed IPOs	*All IPOs*	*VC-Backed as a % of all*
Total number of non-financial IPOs between 1995 and 2019	1,930	4,109	47.0%
Number of firms still public at 12/31/2019	582	1,044	55.7%
Share of IPOs that were still public at 12/31/2019	30%	25%	
Key statistics as of December 31, 2019 for firms still public (all figures millions USD, except number of employees)			
Total enterprise value	4,844,717	7,129,838	67.9%
Total market capitalization	4,922,394	6,462,409	76.2%
Global employees	2,279,715	5,336,394	42.7%
Total revenue	1,157,679	2,171,239	53.3%
Net income	53,082	98,554	53.9%
R&D expenditure	148,388	167,442	88.6%

Source: IPO data from SDC Platinum (accessed 01/08/2020); company-level stastics from Standard and Poor's Capital IQ (accessed 04/24/2020)
Note: This table reports statistics for the sample of publicly traded firms that had an initial public offering (IPO) between 1995 and 2018 and were still public on December 31, 2019, further conditioning on those that were founded after 1980 and were not financial firms. It compares statistics for firms that were backed by venture capital firms prior to their IPO with those that were not. IPO data are drawn from Refinitiv's SDC Platinum database, with data for key statistics drawn from S&P's Capital IQ database. All attributes are measured as of December 31, 2019.

(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), Table 1, p. 240)

"Entrepreneurship as Experimentation"

"**Entrepreneurship is fundamentally about experimentation because the knowledge required to be successful cannot be known in advance or deduced from some set of first principles**. As Hayek (1948) put it, 'the solution of the economic problem of society is...always a voyage of exploration into the unknown." For entrepreneurs, it can be virtually impossible to know whether a particular technology or product or business model will be successful, until one has actually invested in it."

(W. R. Kerr, Nanda, R., Rhodes-Kropf, M., "Entrepreneurship as Experimentation," *Journal of Economic Perspectives*, 28:3, Summer 2014, pp. 25-48 p. 25)

VC Returns Are Hugely Skewed

"[T]he actual distribution of **returns in such ventures has a low median value but very high variance**. Most new ventures fail badly, but some turn out to be wildly successful. Second, even for professional investors or managers making resource allocation decisions, it is impossible to know in advance which ideas will work….[V]enture capital investors make their returns on the one investment out of many that turns out to be a wild success like Google or Airbnb. The vast majority of venture capital investments, however, return less than the face value of the investment."

(Kerr, et. al, "Entrepreneurship as Experimentation," p. 25)

Two Modes of Experimentation: I - At the Level of the Economy

"[I]t is important to separate two frames of reference regarding experimentation. The first relates to **economic experimentation in a Darwinian sense**, which is the natural starting point for most economists. In this conceptual model, **new ventures compete with existing products and technologies, and the ensuing competition leads to the survival of the fittest**, just as Google surpassed its early rivals due to its superior technology. This competition can be described as **experimentation at the level of the economy**. In settings where the best approach among several options is unknown, a great benefit of market-based economies is that winners are often chosen by consumers and competition."

(Kerr, et. al, "Entrepreneurship as Experimentation," p. 26)

Two Modes of Experimentation: 2 – At the Level of the Venture

"[A] second reference point emphasizes that we should be cautious of assuming that market-based mechanisms can always serve as a guiding hand with respect to experimentation….

"**In an entrepreneurial setting, where the benefit of pursuing different approaches is not clear and the costs of tests are expensive, each individual endeavor is also engaged in a process of experimentation**. As these experiments provide information about the likelihood of ultimate success, entrepreneurs and investors gain information about whether to continue the project. However, the investment and continuation decisions for entrepreneurs are often not made in a competitive Darwinian contest, because the decisions to invest further or shut down a firm are often made by only a few investors, well before startups can compete in the product market or have positive cash flow. Moreover, the decisions are made by discrete individuals, often in venture capital firms or other early-stage financing vehicles, whose actions are impacted by a myriad of incentive, agency, and coordination problems. Thus, **the extent to which the best idea goes forward may depend on factors such as the organizational structure or incentive system of the firm where the investor is based, available information sets (for example, access to certain networks), coordination costs, and other such frictions**."

(Kerr, et. al, "Entrepreneurship as Experimentation," p. 27-8)

A Misleading Illustration

"Crucially, **experimentation offers more than just a possibility of higher returns—it also allows entrepreneurs and investors to pursue projects that are not feasible in an all-or-nothing bet**. For example, consider a project that requires $110 to commercialize and will be worth $0 with 99 percent probability or $10,000 with 1 percent probability. This project will not be pursued, because its expected value is negative (−$10). But **imagine we can conduct an experiment that will reveal if the project has a 10 percent chance of working**. (Suppose further that the probability of the experiment having a positive outcome is only 10 percent, so that in this example the 1 percent chance of overall success is unchanged.) If the experiment gives a positive signal, the project has a larger expected value of $890. Thus, **as long as the experiment costs less than $89 (10 percent×$890), the experiment should be conducted**, with the project then being either shut down or commercialized based upon the results."

(Kerr, et. al, "Entrepreneurship as Experimentation," p. 28-9)

Experimentation and VC Contracts

"In addition to focusing on specific sectors, **venture capital structures and contractual choices also address experimental challenges**. For example, in a way that is similar to our earlier numerical example, venture capital investors provide staged financing to startup companies that tie each financial infusion to milestones—points at which information is revealed about the quality of the project. **This structured financing builds real options by matching the amount of money raised in each round to the specific uncertainty that needs to be resolved with that round of funding: for example, proof that the technology works, that consumers will buy the product, and so on**. The most successful investors and entrepreneurs are able to identify the most important uncertainties facing a new idea and experiment in a way that resolves the greatest proportion of the uncertainty around them effectively and quickly."

(Kerr, et. al, "Entrepreneurship as Experimentation," p. 33)

Experimentation and Types of VC Investment

"Thus, venture capital firms need to experiment, and many aspects of their business model facilitate or emphasize this experimentation. One example is their **focus on sectors that are capital-efficient for both experimentation and subsequent scaling and that can generate large returns for the successful investments in a short period of time**. Under these conditions, most notably associated with information technology investments, venture capital firms can run initial **experiments of manageable financial sizes and then fund the winners to completion. The corollary to this…is that venture capital activity is concentrated in a narrow range of technological opportunities**. **Some sectors, like renewable energy production, need to be proven at large scale to demonstrate technical feasibility and unit economics**. Commercializing such ventures requires building large manufacturing plants and hence is significantly more capital intensive, and takes much longer. **Following a brief period where venture capitalists invested heavily in biofuel and solar technologies only to learn these lessons the hard way, they have largely shied away from funding renewable energy production startups**, instead devoting their attention within clean energy to startups commercializing energy efficiency, smart grid, and other software technologies."

(Kerr, et. al, "Entrepreneurship as Experimentation," p. 33)

Limited Scope of VC Investments

"…[P]rofessional venture capitalists have concentrated their activities and earned their returns in a very small number of industrial domains….**The ICT and biomedical sectors together have consistently accounted for 80 percent of all dollars invested by venture capitalists**. The standard deviation of the time series is only .09 over the period. In chapter 2, I discussed **the extraordinary endowment that federal funding of scientific research and technological development provided to the nascent venture capital industry, with the Defense Department as a customer for the products of ICT**.

"**Biotechnology, too, was fostered by research funding from the NIH**. This history is central to addressing a question that should have been confronted—but very rarely has been—by anyone who evaluates the phenomenon of the venture capital industry of the past generation. Just **why has it been in the world of information technology and, secondarily, biomedicine that venture capitalists have been so successful**, in striking contrast with the nearly continuous record of failure across so many other frontiers of scientific discovery and technological innovation? In brief: **only in these sectors of research did the state invest at scale in the translation from scientific discovery to technological innovation.** Through the Defense Department and the NIH, that is, the federal government funded construction of a platform on which entrepreneurs and venture capitalists could dance."

(Janeway, *Doing Capitalism*, pp. 96-7)

Limited Scope of VC Investments: The Data

Amount ($billion)	1980	1985	1990	1995	2000	2005	2010	2015	2019
ICT	0.2 (44%)	1.9 (70%)	1.4 (53%)	4.0 (54%)	75.4 (75%)	13.6 (60%)	10.8 (49%)	42.1 (71.2%)	
Healthcare/ Biotech	0.1 (16%)	0.4 (13%)	0.7 (26%)	1.8 (23%)	7.6 (8%)	6.6 (28%)	6.3 (29%)	10.9 (18.4%)	
Other	0.2 (39%)	0.4 (16%)	0.5 (20%)	1.6 (21%)	17.6 (17%)	2.7 (12%)	4.9 (22%)	6.1 (10.3%)	
Total	*0.5*	*2.6*	*2.6*	*7.4*	*100.5*	*22.9*	*22.0*	*59.1*	

Source: NVCA Yearbook 2016

ICT						11.2 (60%)	12.4 (40%)	34.5 (42%)	48.7 (34%)
Healthcare/ Biotech						7.0 (17%)	9.1 (29%)	18.2 (22%)	29.5 (21%)
Other						5.4 (24%)	9.8 (31%)	30.1 (36%)	65.3 (46%)
Total						*23.6*	*31.3*	*82.8*	*143.5*

Source: NVCA Yearbook 2019
NOTE: Shift in NVCA data source from Thomson Reuters to Pitchbook
Pitchbook data includes corporate VC: 2005 - $6.0B. 2010 - $7.8B, 2015 - $31.2B, 2016 - $30.3B

VC and Software: Open Source and Cloud

"The maturation of the **open source software** movement;

"The emergence of "**the Cloud**" as an abstracted computing environment for development and deployment….

"…[T]ogether, [these] mean that **the absolute and, even more, the risk-adjusted cost of launching a new offering has been radically reduced**. With software tools available for free and computing resources available for rent, **the upfront cost of building enterprise-class software has declined by a decimal order of magnitude**….And agile development of programs that have been broken down into discrete deliverables radically increases the likelihood that what is being coded will actually work and satisfy the target customer's expectations. **Moreover, cloud-hosted business software requires minimum friction in deployment** and lends itself to the delivery of rapid bug-fixes, performance improvements and incremental functionality without the technical and marketing risks to customers and vendors alike of major, discrete releases delivered after intervals of a year or more. **Above all, of benefit to suppliers and users alike, only one version of the software exists at any time.**"

(Janeway, *Doing Capitalism*, pp. 146-7.)

VC Response: "Spray and Pray"

…[T]he venture capital investment model has evolved in fundamental ways over the last decade, particularly in the early stage financing of software and service oriented startup ventures. For these sectors**, we document an increased prevalence of an investment strategy that has been colloquially referred to as "spray and pray,"** where early stage investors provide a little funding and limited governance to an increased number of startups, most of which they abandon after their initial investment. **The "spray and pray" investment approach is a significant shift away from the traditional value-added `governance' in the early stages of a venture's life** and is particularly significant because venture capital investors are not just passive, but typically play a central role in monitoring and governing new ventures through a successful exit."

(M. Ewens, Nanda, R. and Rhodes-Kropf, M., "Cost of Experimentation and the Evolution of Venture Capital," NBER Working Paper 24523, April 2018, p. 2.)

The Case of Biotechnology

"**From 1975 to 2004, . . . while revenues have grown exponentially, . . . profit levels essentially hover close to zero** throughout the life of the industry. Furthermore, the picture becomes even worse if we take the largest and most profitable firm, Amgen, out of the sample. Without Amgen the industry has sustained steady losses throughout its history . . . The analysis includes no privately held firms, almost all of which lose money. Therefore, the data presented here are just for the most profitable part of the industry populations.

"…[T]he average time to first year of positive cash flow [from date of IPO] was approximately eleven years."

(G. Pisano, *Science Business: Promise, reality and the Future of Biotechnology*, (Boston: Harvard Business School Press, 2006) p. 117.)

Biotechnology IPOs: 1

"…[T]hrough the early years of this century the returns venture capitalists have earned from biotech compare reasonably well with the returns from information and communications technologies (ICT). And, unsurprisingly, these returns have been a function of access to the IPO market. There have been **more than ten IPOs for biotech companies in fifteen of the thirty years since 1980**, with hot activity clustered in 1983, 1991–1993, 1996–1997, and 2000. Remarkably, from 2004 to 2007, relatively dismal years for venture-backed IPOs, there were seventy-seven biotech IPOs, substantially more than the aggregate of all the ICT sectors combined. And **since the Global Financial Crisis, biotech IPOs have routinely accounted for more than half of all VC-backed IPOs**."

(Janeway, *Doing Capitalism,* citing: National Venture Capital Association, *2017 Yearbook* , p. 51)

BioTech IPOs - 2
US IPOs by Sector: 2004-2018

US VC backed IPOs by Sector (Company Count)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Commercial Services	6	5	5	6		1	4	4	2	3	1	3	1	2	1
Consumer Goods & Recreation	4		1	1					1	3	2	3		1	
Energy	1		2	2				4	4	2	1	1			1
HC Devices & Supplies	16	8	9	13	3		1	3	4	8	15	9	4	5	10
HC Services & Systems	1	2	1	5	2		1	3	2	3	7	5	3		
IT Hardware	11	5	5	22		2	5	5	5	8	5	3	6	5	1
Media	1		3	1	1	1	1	1	2	1	1			2	1
Other	11	6	9	11	3	2	9	3	6	4	9	2	1	9	8
Pharma & Biotech	22	12	21	17	1	3	14	8	14	38	63	40	20	23	48
Software	8	5	4	12	2	2	6	13	22	17	21	13	8	11	15

NVCA Yearbook 2019

Pisano's Explanation

"While the aggregate returns to biotechnology are poor, **investors are focusing on the "tails" of the distribution**. The phenomenal stock returns for a company like Amgen provide a beacon for investors . . . Never mind that the probabilities are very low and, on a risk adjusted basis, it may not be a good bet. The promise is there."

(Pisano, *Science Business,* p. 129.)

Janeway's Explanation

"**When a target molecule is identified as a potential therapeutic response to a disease state, the population of potential patients--the "addressable market"—is known**. So is the approximate charge per treated patient based on drugs already in the market. And because demand is funded by third party payers and is consequently inelastic, a plausible projection of revenue can be projected contingent, of course, on successful clinical trials and approval by the Federal Drug Administration.

Thus, **a biotech start-up is unique: only in this instance is it possible to estimate a fundamental value, the present value of the net cash flows from the investment—*if*, and it is a huge if—the scientific and regulatory hurdles to market entry are overcome**. The fact that investors have repeatedly chosen to bet on that contingency demonstrates, as well, the weight that the risks of marketing bear versus scientific and technological risks: the biotech exception exemplifies the value attached to the minimization of marketing risks in a domain where scientific and technological risks are enormous.

(Janeway, *Doing Capitalism*, p. 100.*)*

Market Risk and Expert Evaluation : 1

"Our empirical analysis uses panel data at the mentor-venture level to examine how mentors express interest. We first show that mentors are selective in their expressions of interest and do not express interest at random. **The average mentor expresses interest in only 4.4 percent of the summaries that he or she reviewed**. Mentors are systematically more likely to express interest in ventures in the industry sector where their own experience is concentrated. They are also more likely to express interest in ventures whose summaries indicate evidence of equity funding, plans for intellectual-property (IP) protection, or origins in academic research. None of the reported characteristics of the founding team has a significant influence on mentor interest.

"**We use a venture's subsequent achievement of commercialization as a proxy for unobserved venture quality**. Controlling for the observed venture-summary characteristics and including mentor fixed effects, we find a positive and statistically significant relationship between mentors' expression of interest and ventures' subsequent achievement of commercialization**. Ventures that subsequently achieved commercialization are 11 percent more likely to elicit mentor interest at VMS entry**….

(L. Scott, Shu, Pia, and Lubyinsky, R.M., "Entrepreneurial Uncertainty and Expert Evaluation: An Empirical Analysis," p. 3, *Management Science*, forthcoming, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2638367)

Market Risk and Expert Evaluation: 2

"The industry sector in which a venture plans to operate may also affect the nature of the uncertainty it faces at an early stage and consequently the feasibility of idea screening. For instance, **a venture that plans to develop a new treatment for an existing medical condition may face high technological and regulatory uncertainty, but the potential market may be known and well understood**. In contrast, **a venture that aims to develop a new consumer product may face minimal technological barriers, but may need to identify or even create new market demand**….[We] interact subsequent commercialization with a venture's sector, as classified based on the value proposition described in the venture summary. **We find that the estimated relationship is weak and insignificant for ventures in the consumer products, consumer web/mobile, or enterprise software sectors. By contrast, it is positive and significant for ventures in the hardware/energy or life sciences/medical devices sectors**.

(Scott et. al., "Entrepreneurial Uncertainty," p. 22.)

VC and Materials Science

"…[T]here is no successful record of venture investment in industries **derived from materials science**. Plastics, the iconic touchstone of entrepreneurial possibility in the classic 1967 movie *The Graduate,* was no place for a venture capitalist….[I]t took DuPont and General Electric each at least twenty years and more than $1 billion of then-current dollars to commercialize the new generation of engineered plastics. That history is in the process of repeating itself in the domain of nanoscience and nanotechnology: again, **it will require the ability to mobilize very large financial resources over decades to identify what potential applications serve economic needs and to work down the learning curve to reliable and efficient production**—both tasks appropriate for established businesses, not start-ups. "

(Janeway, *Doing Capitalism*, p. 98)

VC and CleanTech

"Innovation in clean technology poses challenges that may be fundamentally different from those VC-backed startups are best suited to overcome. In developed nations, the types of clean technology innovations being supported by federal backing of **VC-backed "Schumpeterian ventures" must penetrate existing markets and displace incumbents that are characterized by three critical features. First, their scale is enormous and the fixed cost aspect of the installed capital stock make competition economically difficult** for emerging ventures and technologies that must compete with the variable cost of continuing operation of existing plants. **Second, the value of the existing global energy supply system (e.g., power plants, transmission lines, drilling rigs, pipelines, refineries, and coal mines) is estimated to be approximately $12 trillion**, with a typical asset turnover time of 30-40 years. The global energy demand system, including cars, trucks, planes, buildings, appliances and industrial equipment, represents an even greater amount, with turnovers ranging from 5-7 years for appliances to 80 years or more for buildings. **Third, regulations both structure energy markets at the municipal, state, federal, and international levels as well as subsidize incumbent technologies and institutions**. This constrains the emergence of new technologies, but also the new business models best able to exploit them."

(Hargadon and Kenney, "Misguided Policy?" *California Management Review*, Vol. 54, No. 2 (Winter 2012), p. 128)

The Next Tech Revolution: Where is VC?

US VC CleanTech Investments by Year

	Capital Raised ($M)	# of Deals Closed	Average Capital Raised ($M)
2004	30.0	2	15.0
2005	2.7	1	2.7
2006	7.9	1	7.9
2007	70.5	3	35.3
2008	234.3	5	46.9
2009	180.5	8	25.8
2010	13.5	5	3.4
2011	61.9	9	7.7
2012	88.6	12	8.1
2013	212.7	17	13.3
2014	35.5	10	3.9
2015	206.5	14	15.9
2016	63.0	16	4.2
2017	309.3	16	20.6
2018	127.9	34	4.7

(NVCA 2019 Yearbook, p. 14 Appendix)

VCs and Entrepreneurs: The Skew in Exit Value

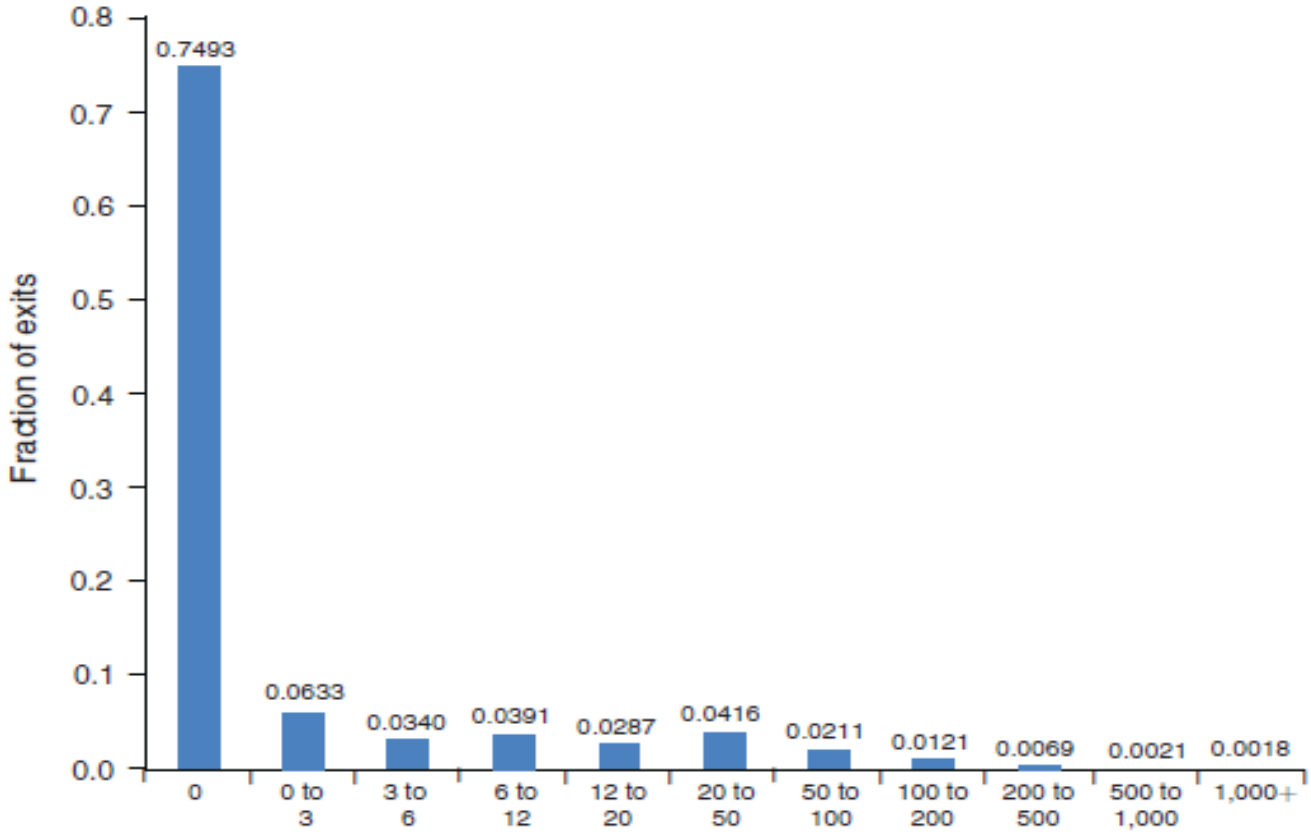

FIGURE 2. MARGINAL DISTRIBUTION OF EXIT VALUE

(R. E. Hall and Woodward, S., "The Burden of the Nondiversifiable Risk of Entrepreneurship," *American Economic Review* 100 (2010), Figure 2).)

The Entrepreneur's Bears the Risk

"**[D]espite the chance of making hundreds of millions of dollars in a startup, the economic advantage of entrepreneurship over an alternative career is not substantial**. The burden of the idiosyncratic risk of a startup falls most heavily on those with low initial assets. The entrepreneur with less than a million dollars of initial assets faces a heavy burden from the risk and has a lower certainty equivalent wealth than the nonentrepreneur….

"**At the standard value of the coefficient of relative risk aversion, 2, the advantage of the entrepreneurial opportunity is generally small or negative**—deeply negative if the nonentrepreneurial opportunity pays $2 million per year. In our base case, with nonentrepreneurial compensation of $300,000 per year before tax and $1 million in assets, the advantage of the entrepreneurial opportunity is only $0.2 million. The incentive is not impressive for larger asset holdings. With higher compensation at the nonentrepreneurial job, the advantage disappears unless the individual is quite rich."

(Hall and Woodward, pp. 1177-8)

Or Does S/He?: 1

"[W]e find that founder cash compensation is minimal at the birth of ventures. Second, however, **we find that cash compensation changes substantially with respect to financial and product market milestones that signal the resolution of uncertainty**. For example, total cash compensation is under $115,000 for pre-revenue firms on average, but jumps to nearly $250,000 annually for firms with between $0 and $10 million in revenue. This reflects what appears to be a transition in the contract between investors and CEOs, as cash pay is commensurate with firm size. For firms with between $10 million and $25 million in revenue, average CEO compensation exceeds $ 300,000 dollars annually; average cash compensation is $450,000 for firms with greater than $50 million in revenue. Third we highlight that revenue and product milestones are generally achieved within a short-time since the birth of the form, at which point cash compensation grows rapidly. For example, **we show that within 3 years since firm birth, 80% of the founder CEOs in our sample have either exited or have achieved the product-market and operating milestones that signal a transition to a professional" contract. Within 5 years, this number is nearly 100% of CEOs**."

(M. Ewens, Nanda, R., and Stanton, C., "The Evolution of CEO Compensation in Venture Capital Backed Startups," September 2019, p, 3)

Or Does S/He?: 2

"…[W]e note that it is not the initial level of cash compensation, but rather the speed with which milestones are achieved (and hence uncertainty resolved) that determines the extent of risk facing entrepreneurs. We apply this insight to Hall and Woodward's (2010) analysis of the risk facing entrepreneurs, examining the degree to which risk averse individuals may still find it attractive to "experiment" with trying VC-backed entrepreneurship. Applying our milestone-based change in cash compensation to the Hall and Woodward consumption-saving problem, we find that the rapid transition to higher compensation improves the certainty-equivalent value of entrepreneurship. In our analysis, the certainty equivalent is positive for nearly all reasonably risk-averse potential founders. This is because the minimal cash compensation for entrepreneurs is temporary and coincides with an exploration stage early in the life of the firm; thereafter venture contracts provide valuable liquidity for entrepreneurs. Our estimates suggest that fewer than 1% of all individuals in the population would have a negative certainty equivalent from entering the types of VC-funded technology firms in our sample."

(Ewens, et. al., "Evolution of CEO Compensation," pp. 3-4.)

Sourcing

"[M]ost VC deal flow comes from the VCs' networks in some form or another. Over 30% are generated through professional networks. Another 20% are referred by other investors and 8% from a portfolio company. Almost 30% are proactively self-generated. **Only 10% come inbound from company management**. These results emphasize the importance of active deal generation. **Few VC investments come from entrepreneurs who beat a path to the VC's door without any connection**. Finally, a recent trend in the VC industry is so-called quantitative sourcing, where VCs quantitatively analyze data from multiple sources to identify opportunities likely to have high returns, and seek out investment positions in those rms. Few VC firms in our sample use this method.

"There is some variation across stage. **Later-stage investors are more likely to generate investment opportunities themselves compared to early-stage investors. Early-stage investors are more likely to be referred deals by portfolio companies and to invest in deals that are inbound from management**. At the same time, there is little difference between the pipeline sources of high and low IPO subsamples, suggesting that the type of the sources is less important than sometimes claimed. **It may also be the case that the critical differentiating factor for the high IPO firms is the quality of their referral network**."

(Gompers, et. al., p. 15)

Selection: The Deal Funnel

Table 6: Potential Investments that Reach Each Stage of the Deal Funnel

The first panel shows the median number of potential investments reaching each stage of consideration, among investments considered in the past twelve months. The second panel reports the average number of deals at each stage for every closed deal.

		Stage		Industry		IPO Rate		Fund Size		Location		
	All	Early	Late	IT	Health	High	Low	Large	Small	CA	OthUS	Fgn
Median number of potential investments reaching stage												
Considered	200	250**	100**	275	185	253	150	200	180	200	150	200
	(24)	(40)	(33)	(69)	(66)	(53)	(53)	(38)	(35)	(39)	(43)	(53)
Met management	50	60	40	100***	40***	60	40	50	44	90**	43**	50
	(2)	(18)	(8)	(16)	(9)	(20)	(7)	(13)	(6)	(23)	(6)	(5)
Reviewed with partners	20	20	20	30**	15**	20	20	20	20	23	20	20
	(1)	(2)	(4)	(5)	(4)	(3)	(3)	(2)	(2)	(4)	(3)	(3)
Exercised due diligence	12	13	12	15	10	15	11	15*	10*	15	12	10**
	(2)	(3)	(3)	(3)	(2)	(2)	(2)	(2)	(2)	(3)	(2)	(1)
Offered term sheet	5.5	5.0	6.0	7.0	5.0	5.0	5.5	5.5	5.0	6.0	5.0	5.5
	(0.5)	(0.7)	(0.7)	(1.0)	(0.7)	(0.8)	(0.6)	(0.6)	(0.5)	(0.8)	(0.6)	(0.5)
Closed	4.0	4.0	3.0	5.0***	3.0***	3.5	4.0	3.5	4.0	4.0	3.5	4.0
	(0.4)	(0.7)	(0.3)	(0.3)	(0.5)	(0.6)	(0.7)	(0.6)	(0.5)	(0.8)	(0.6)	(0.5)
Potential investments reaching stage per closed deal												
Considered per close	101	119	94	151**	78**	121	107	111	96	115	87	110
	(7)	(14)	(17)	(22)	(10)	(15)	(13)	(11)	(9)	(15)	(9)	(12)
Met management	28	34	24	50*	20*	45*	23*	37**	21**	46***	22***	23
	(3)	(7)	(3)	(13)	(3)	(11)	(2)	(6)	(2)	(10)	(2)	(2)
Reviewed with partners	10	11	10	13	11	15*	8*	11	10	10	12	8
	(1)	(3)	(2)	(5)	(3)	(4)	(1)	(1)	(2)	(1)	(3)	(1)
Exercised due diligence	4.8	4.6	4.4	5.3	5.3	6.3***	4.1***	5.3*	4.4*	5.2	5.4	3.7**
	(0.3)	(0.4)	(0.4)	(0.6)	(0.6)	(0.7)	(0.4)	(0.4)	(0.4)	(0.3)	(0.5)	(0.4)
Offered term sheet	1.7	1.5***	2.3***	1.6	1.6	1.8	1.7	1.7	1.7	1.7	1.8	1.6
	(0.1)	(0.0)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Number of responses	442	195	76	106	64	118	119	205	238	125	180	155

(Gompers et. al., p. 44.)

Factors for Investment Selection

"[T]he VCs ranked the management team (or jockey) as the most important factor. The management team was mentioned most frequently both as an important factor (by 95% of the VC firms) and as the most important factor (by 47% of the VCs). Business (or horse) related factors were also frequently mentioned as important with business model at 83%, product at 74% market a 68% and industry at 31%. **The business related factors, however, were rated as most important by only 37% of the firms**. Fit with the fund was of some importance. Roughly one-half of the VCs mentioned it as important and 14% mentioned it as the most important. **Valuation and VCs' ability to add value were each mentioned by roughly one-half of the VCs, but were viewed as most important by fewer than 3% overall**.

"There is some interesting cross-sectional variation. **The team is more likely to be the most important factor for early-stage investors and IT investors than for late-stage and healthcare investors**. Business related factors are more likely to be most important for late-stage and healthcare investors. Indeed, **the Health subsample is the only one that did not overwhelmingly chose team as the most important factor**. Valuation is also more important, both as a factor and as the most important factor for late-stage investors."

(Gompers, et. al., p. 18)

Factors for Success

Table 26: Factors That Contributed to Successful Investments

The percentage of respondents who marked each factor as important (top) and as most important (bottom) to the success of startups.

		Stage		Industry		IPO Rate		Fund Size		Location		
	All	Early	Late	IT	Health	High	Low	Large	Small	CA	OthUS	Fgn
Important factor												
Team	96	96	94	94	96	97	96	96	96	96	95	97
	(1)	(1)	(3)	(2)	(2)	(1)	(2)	(1)	(1)	(2)	(1)	(1)
Business model	60	55***	73***	63***	32***	53	56	63	58	59	60	61
	(2)	(3)	(5)	(4)	(5)	(4)	(4)	(3)	(3)	(4)	(3)	(3)
Technology	59	60	52	53***	79***	62	58	58	59	67*	58*	53*
	(2)	(3)	(5)	(4)	(5)	(4)	(4)	(3)	(3)	(4)	(3)	(4)
Market	34	34*	44*	42	36	37	30	36	33	39	36	31
	(2)	(3)	(5)	(4)	(5)	(4)	(4)	(3)	(3)	(4)	(3)	(3)
Industry	59	54**	68**	59	48	50*	59*	58	60	59	60	57
	(2)	(3)	(5)	(4)	(5)	(4)	(4)	(3)	(3)	(4)	(3)	(4)
Timing	67	64	62	69**	55**	70	65	67	66	71	65	65
	(2)	(3)	(5)	(4)	(5)	(4)	(4)	(3)	(3)	(4)	(3)	(3)
Luck	56	61***	38***	63*	51*	56	58	53	58	64**	51**	55
	(2)	(3)	(5)	(4)	(5)	(4)	(4)	(3)	(3)	(4)	(3)	(4)
Board of directors	29	32	24	26	27	25	33	25**	34**	31	31	26
	(2)	(3)	(5)	(4)	(5)	(3)	(4)	(3)	(3)	(4)	(3)	(3)
My contribution	26	25	25	25	23	17	23	20***	30***	27	25	25
	(2)	(3)	(5)	(4)	(5)	(3)	(3)	(2)	(3)	(3)	(3)	(3)
Most important factor												
Team	56	64***	42***	55*	42*	53	59	52*	59*	55	55	60
	(2)	(3)	(5)	(4)	(5)	(4)	(4)	(3)	(3)	(4)	(3)	(4)
Business model	7	4***	18***	8	3	6	6	8	7	6	8	7
	(1)	(1)	(4)	(2)	(2)	(2)	(2)	(2)	(1)	(2)	(2)	(2)
Technology	9	6	11	7***	31***	11	10	10	9	9	9	10
	(1)	(2)	(3)	(2)	(5)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Market	2	1*	4*	0*	3*	4	2	3	1	2	2	2
	(1)	(0)	(2)	(0)	(2)	(2)	(1)	(1)	(1)	(1)	(1)	(1)
Industry	7	6	10	6	6	6	8	8	6	6	7	6
	(1)	(2)	(3)	(2)	(3)	(2)	(2)	(2)	(1)	(2)	(2)	(2)
Timing	12	11	11	16*	7*	7	9	10	13	11	11	11
	(1)	(2)	(3)	(3)	(3)	(2)	(2)	(2)	(2)	(3)	(2)	(2)
Luck	6	7	5	6	3	8	6	7	5	11*	5*	3*
	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(1)	(2)	(1)	(1)
Board of directors	1	0	2	1	4	2	1	1	1	0	1	1
	(0)	(0)	(2)	(1)	(2)	(1)	(1)	(1)	(1)	(0)	(1)	(1)
My contribution	0	0	0	0	1	0	0	0	0	0	1	0
	(0)	(0)	(0)	(0)	(1)	(0)	(0)	(0)	(0)	(0)	(1)	(0)
Number of responses	513	225	84	120	78	131	141	236	281	145	206	182

(Gompers et. al., p. 57)

Forecasting

"To use financial metrics such as IRR or cash-on-cash multiples, investors need to forecast the underlying cash flows…. **20% of VC firms do not forecast company cash flows**. This seems surprisingly high, but matches the responses on other questions that suggest that many VCs rely on more qualitative factors.

"The prevalence of non-forecasting varies by the stage of company the firm targets. **While only 7% of late-stage funds do not forecast, fully 31% of the early-stage VCs report that they do not forecast cash flows**. Again, this is clearly not consistent with finance theory. On the other hand, this is understandable given that early-stage funds often invest in companies that are far from generating profit and, sometimes are not even generating revenue. **For such early-stage companies, forecasting and discounting cash flows arguably would generate very imprecise estimates of value.**

"We also ask about the extent to which portfolio companies meet their projections. **VCs report that fewer than 30% of the companies meet projections**. Consistent with greater uncertainty, early-stage VCs report their companies are less likely to meet projections (26%) than do late-stage VCs (33%)…."

(Gompers et. al., pp. 22-3)

Do VCs Matter at the Firm Level?

"The life-cycle dynamics of VC-funded versus non-VC-funded .rms are studied to understand the differences between them in terms of innovativeness, survival, and growth. Several key observations emerge. **First, despite the fact that VC-backed startups are subject to higher initial selection, failure rates, and dispersion in growth outcomes, they are much more likely than non-VC-backed ones to eventually land in the right tail of the firm size and innovation distributions**….

"**Second, the synergies between venture capitalists and entrepreneurs matter for how far a VC-backed startup can go. The empirical analysis suggests strong evidence of assortative matching between entrepreneurs and financiers**. the latter is composed of venture capitalists and others, such as banks. Startups that have more promising growth and innovation prospects tend to be funded by venture capitalists. Moreover, .rms backed by venture capitalists with more experience and higher funding capabilities also tend to achieve significantly higher growth.

"Third, VC involvement is critical for both firm-level and aggregate innovation. The data on firm-level patenting activity and patent quality reveals that VC disproportionately targets more innovative startups and spurs further innovation, with startups backed by more experienced venture capitalists engaging in better innovation….

(U. Akcigit, Dinlersoz, E., Greenwod. J., and Penciakova, V., "Synergizing Ventures,"NBER Working Paper 26196, August 2019, p. 2)

How Much Do VCs Matter?: 1

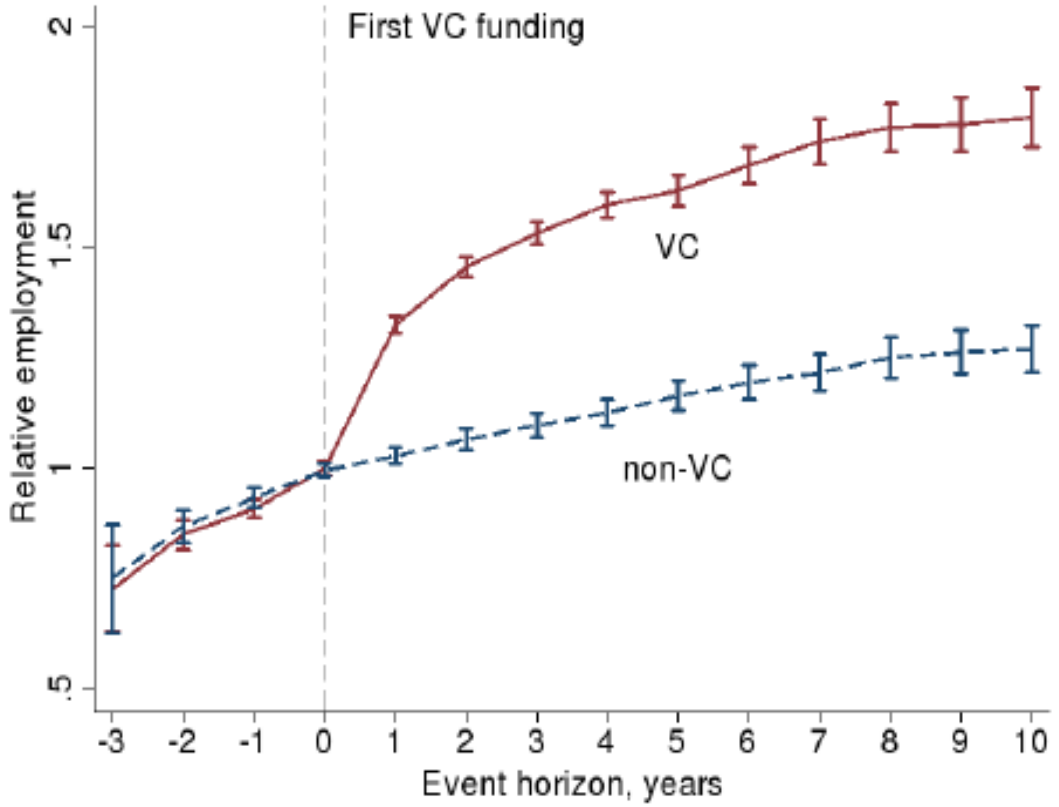

Figure 4: The evolution of average employment before and after first VC funding date: VC-funded firms versus non-VC-funded controls. The observations are relative to average employment (normalized to 1) for VC-funded startups in the year of first VC funding, $t = 0$.

(Akcigit, et. al., p. 13)

How Much Do VCs Matter?: 2

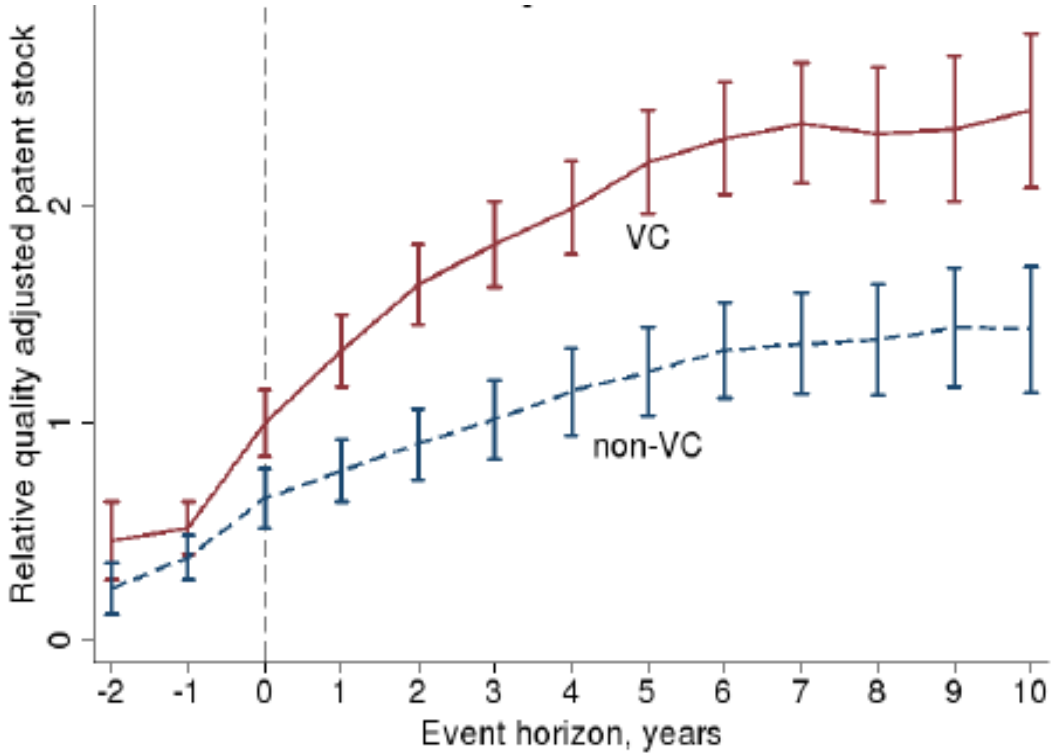

Figure 6: The evolution of the average quality-adjusted patent stock before and after first VC funding date: VC-funded firms versus non-VC-funded controls. The observations are relative to the average patent stock (normalized to 1) for VC-funded firms in the year of VC funding, $t = 0$.

(Akcigit et. al., p. 15)

High Quality VCs Matter More: 1

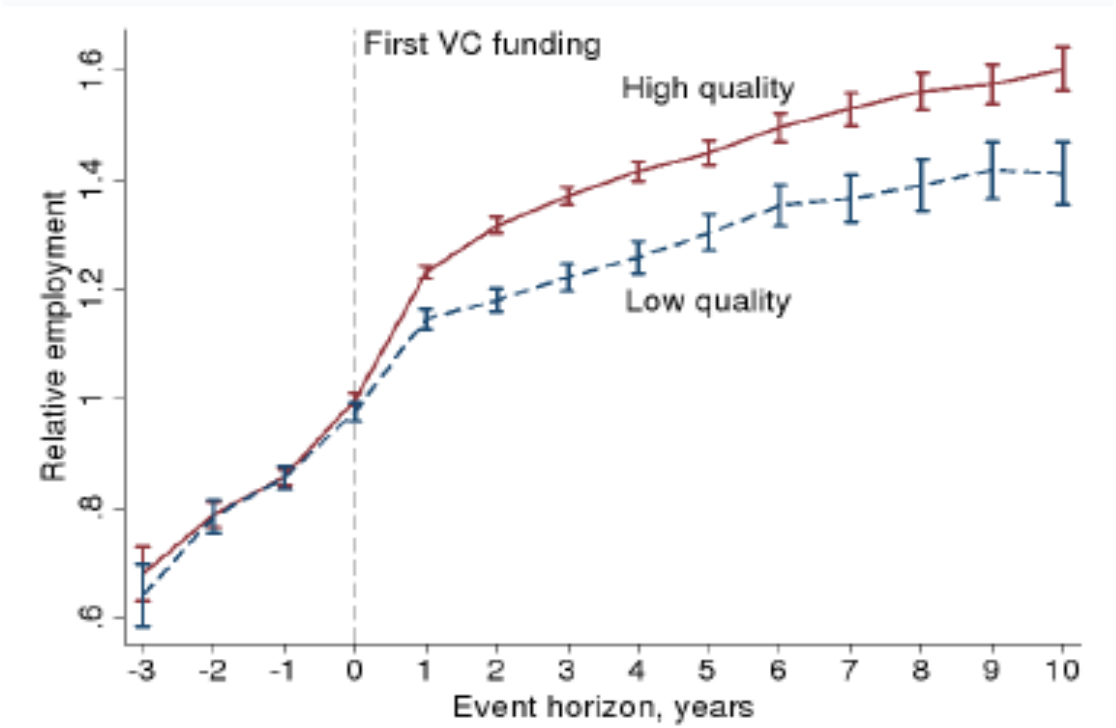

Figure 7: The evolution of average employment before and after first VC funding, by the quality of the venture capitalist. The observations are relative to the average employment (normalized to 1) for startups funded by high-quality venture capitalists in the year of first VC funding, $t = 0$.

(Akcigit et. al., p. 17)

High Quality VCs Matter More: 2

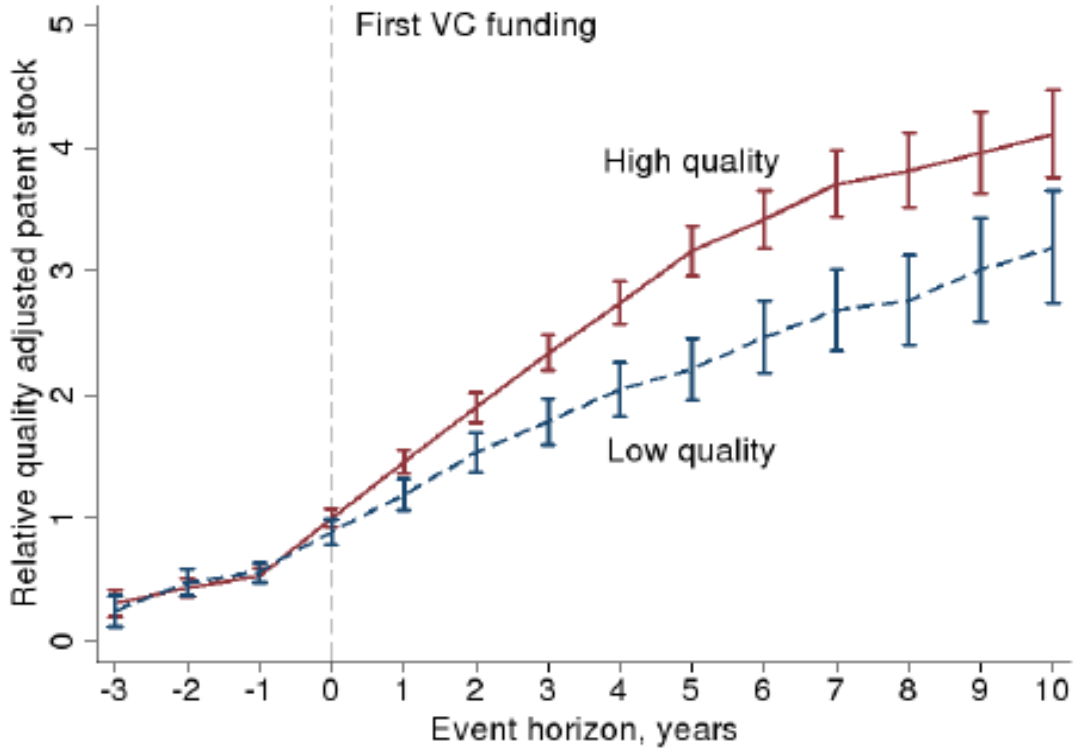

Figure 8: The evolution of the average patent stock before and after first VC funding, by the quality of the venture capitalist. The observations are relative to the average patent stock (normalized to 1) for startups funded by high-quality venture capitalists in the year of first VC funding, $t = 0$.