STARTUPS AND STANFORD UNIVERSITY

August 2017

An analysis of the entrepreneurial activity of the Stanford community over 50 years.

Hervé Lebret

Stanford University is one of the best universities in the world. Its beautiful campus in the middle of Silicon Valley welcomes brilliant students in all fields of sciences and humanities as well as the best professors and researchers. Nearly as well-known, the university has been at the origin of some of the most famous startup success stories such as Hewlett Packard, Sun Microsystems, Cisco, Yahoo, Google, VMware, Instagram or YouTube, just to name a few. Entrepreneurship is however much more than story-telling and indeed Silicon Valley has been a huge terrain for academic research in economics, entrepreneurship and innovation. Stanford University may have been less so. This report analyzes more than 5'000 companies and also more than 5'000 founders with the ambition to give a renewed point of view on this unique creation of value.

Entrepreneurship, Startups and Spinoffs

Entrepreneurship and Innovation have probably become an important topic of research with seminal work of Joseph Schumpeter, the "Prophet of Innovation" [1] and his concept of Creative Destruction. His huge research corpus explored the surprising importance of small, but fast-growing firms in economics. Not all companies are startups or spinoffs. Indeed the definition of a startup is still not clear. According to Wikipedia, a startup company (startup or start-up) is an entrepreneurial venture which is typically a newly emerged, fast-growing business that aims to meet a marketplace need by developing or offering an innovative product, process or service. Although this can be seen as a good definition, Steve Blank, a Silicon Valley serial entrepreneur, has come with a more recent and probably better definition:

Startups are temporary organizations designed to search for a scalable and repeatable business model.

In complement, a University spinoff is a company founded by members of the university. Whether a spinoff is a startup or not depends upon its specific features. One can refer to Academic Entrepreneurship, one of the classical references about academic spinoffs [2].

Stanford University

Stanford University was founded in 1899. It would certainly be more artificial to give a birthdate for the startup phenomenon. Silicon Valley faces a similar challenge. Whereas 1957 is commonly accepted for the premier technology cluster, some experts claim that 1939 for the foundation of Hewlett Packard or even 1909 for the creation of Federal Telegraph in Palo Alto would be better foundation years. There is no doubt however that 1957 with the beginning of the space exploration, the development of the Cold War and the foundation of Fairchild Semiconductor, maybe the first startup ever, has been a critical year for technology innovation. In her remarkable book [3], Rebecca S. Lowen shows how Stanford was transformed thanks to the federal funding for science after Second World War without forgetting the central figure of Frederick E. Terman. The fact that Stanford is in the middle of Silicon Valley was certainly a strong reason for that transformation and success, but the argument could be reverted to explain the success of Silicon Valley thanks to Stanford, a kind of chicken and egg situation. It is worth mentioning though that the relationships between Stanford and Silicon Valley were complex and cannot be described by simple two-way flows [4].

Academic Startups and Spinoffs

In the decades following the 50s and 60s, startups and academic spinoffs have become an extraordinary phenomenon. A great even if not well-known analysis of Silicon Valley startups [5] shows that the region was home to more than 22'000 high-tech firms in 2003 and more than 29'000 such firms had been created during the 90s (with a sharp decline thereafter). Most universities have published some analysis on their startups, for example at MIT [6], at Stanford [7] or in Switzerland at ETH Zurich [8], [9] and EPF Lausanne [10]. In his analysis [7], Eesley claims that "39'900 active companies can trace their roots to Stanford. If these companies collectively formed an independent nation, its estimated economy would be the world's 10th largest. Extrapolating from survey results, those companies have created an estimated 5.4 million jobs and generate annual world revenues of $2.7 trillion."

This report analyzes the performance of more than 5'000 firms which have a link to Stanford University. For more information, go to section "About the Data" at the end of the report. Of course entrepreneurship is not only about technology companies, but in Silicon Valley, and in particular at Stanford, most companies are high-tech as shows figure 1. Also many firms are service companies with no product offering. About 30% of the firms studied here are in that situation (see Appendix for more graphics). Overall high-tech firms related to information technologies represent more than 50% of the sample. They include firms selling hardware (HW) products such as semiconductors, computers, telecom equipment and electronics as well as software (SW) including multimedia and Internet technologies. It must be mentioned here that Internet services are considered as part of these software firms (showing the difficulty in classifying firms by domain of activities)

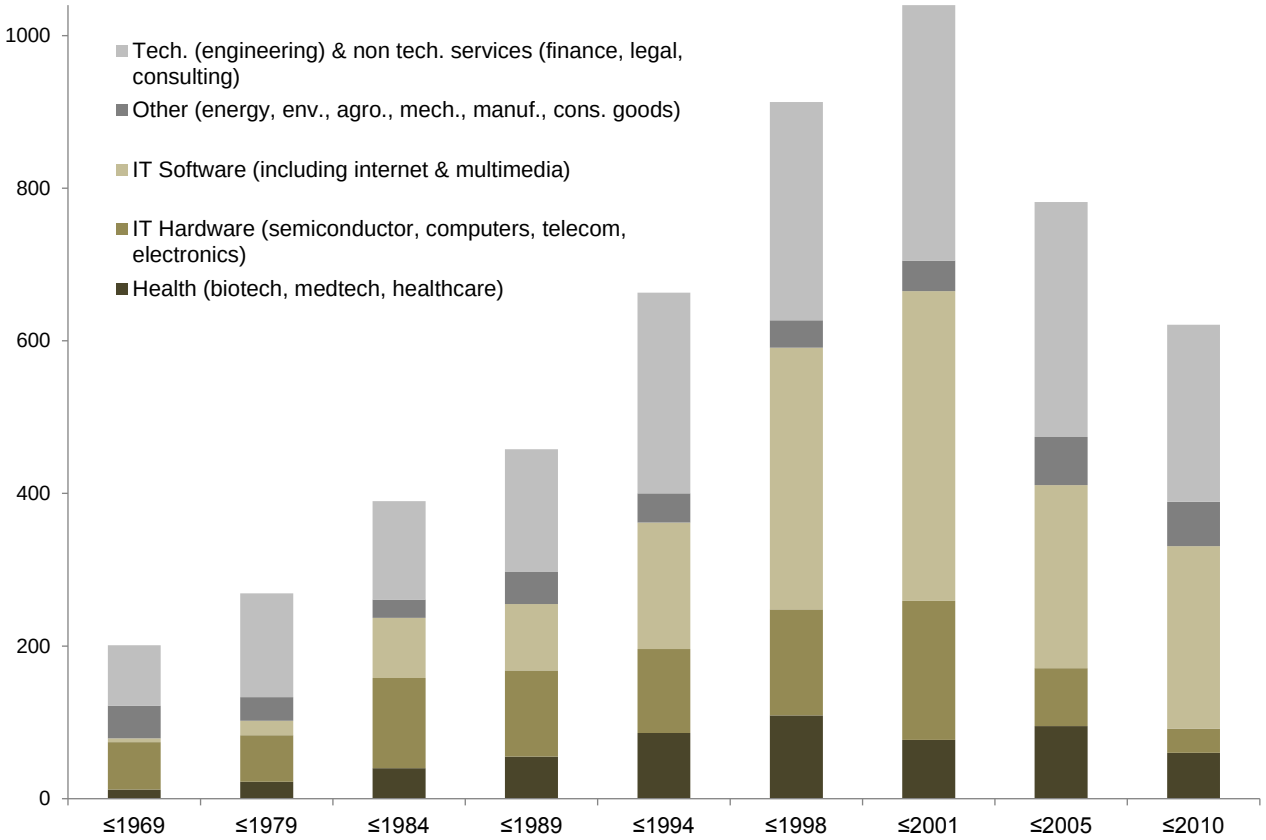

Figure 1: The Stanford startups by period of foundation and domains of activity

Status of Firms

Firms are not eternal and indeed their life expectancy is quite short. Zhang [5] shows that about half of both service and non-service firms had died 10 years after their creation. About a third of the firms had stopped their activities and surprisingly the ratio increases over time. The simplest explanations are either a bias in the database for early years or an increase in failure with the entrepreneurship fever which accompanied the Internet development. A quarter had been acquired (M&A) and a non-negligible part had gone public before at some point (6% in total). Another third was still private whereas a tiny 3% were publicly quoted.

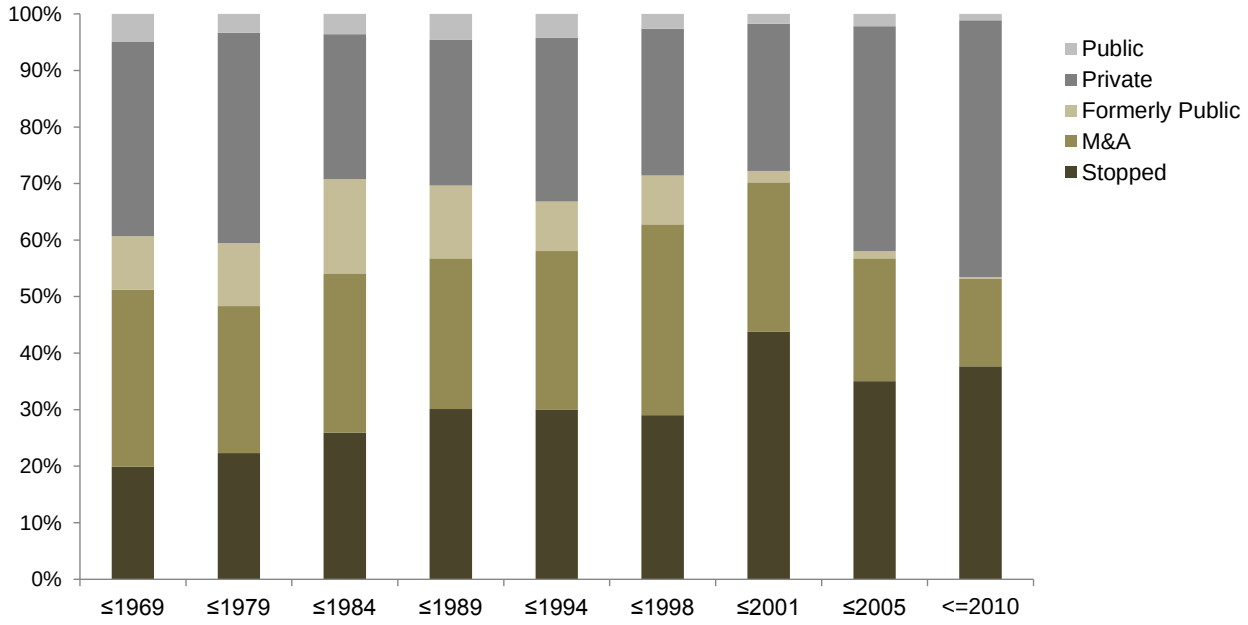

Figure 2: Status of firms with period of foundation

So what is the life expectancy of these firms as private companies? Figure 3 shows the results. An overall average of 6.9 years before a cessation of activity, 7.8 years before being acquired and 7.3 years before going public. (For public companies, the time span represents years from foundation to IPO). These averages hide however a regular decrease until 1998 with more stable values thereafter. Table i in Appendix adds more information with a more granular analysis by fields.

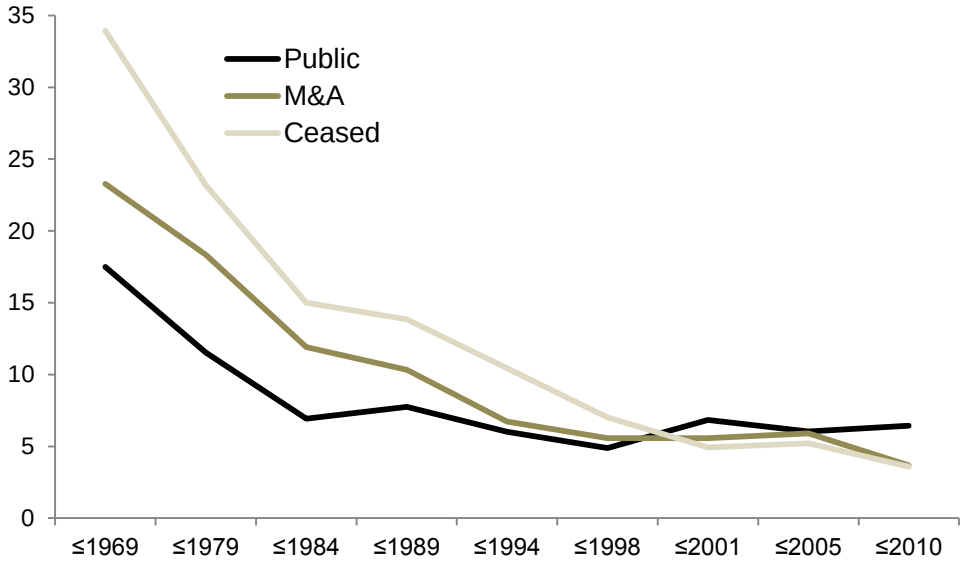

Figure 3: Average time (in years) before exit

Value Creation

Value creation is a difficult analysis to make for private companies. Most of these companies do not communicate about their numbers when they still exist and very little is known when they disappear. Public companies are much easier to analyze thanks to the documents they publish on a regular basis from their initial public offering (IPO) onwards. In-between some "relative" value creation is known when such companies are acquired with a disclosed value. A systematic analysis was done for public companies as well as for companies which had gone public at some point. The M&A transaction values were also compiled when publicly available.

Public Companies

There were 148 public firms as of July 2017. The following table describes some of their features.

Field of Activity	# of firms	Revenues 2016 ($B)	Income 2016 ($B)	Employees	Market Cap. July 2017 ($B)
Health (biotech, medtech, healthcare)	42	20.7	1.0	53'000	174
IT Hardware (semiconductor, computers, telecom, electronics)	50	263.7	33.0	757'000	662
IT Software (including internet & multimedia)	34	229.9	42.8	253'000	1'126
Other (energy, env., agro., mechanical, manuf, cons. goods)	11	61.2	4.9	263'000	119
Tech. (engineering) & non tech. services (finance, legal, consulting)	11	56.4	7.1	113'000	122
Total	148	632.2	89.0	1'440'000	2'205

Table 1: Value creation by public companies

Former Public Companies

There had been many more firms going public. In addition to the 148 existing public firms, another 333 had gone before being acquired (279), before stopping their activities (36) or becoming private again (18). The next table compiles the average value at the IPO and 12 months after the IPO.

Fields	# of firms	Value at IPO ($M)	Value 12 months after IPO ($M)
Health	97	202	179
IT Hardware	111	619	379
IT Software	102	906	1'048
Other	11	248	347
Tech. & non tech. services	12	333	393
Overall	333	563	521

Table 2: Average market capitalization of companies which went public

Values at IPO are not sufficient to describe the value creation and even if the value after 12 months is also a limited snapshot, it has the advantage of giving usually a more accurate picture of the real value creation.

Acquired Firms (M&A)

Most startups do not go public. Again about 3% are public and another 6% had been public at some point. Some stay private but many are also acquired. As of 2017, 1'419 firms (25% of the total) had been acquired. The known value of these acquisitions reaches the total amount of $92B. The acquisition value is known for 533 firms only which gives an average of $173M.

Fields	# of firms	M&A Value ($M)	Total M&A Value ($B)
Health	85	142	12
IT Hardware	195	217	42
IT Software	218	148	33
Other	12	127	1.5
Tech. & non tech. services	23	162	3.7
Overall	533	173	92

Table 3: Average and cumulative M&A transactions

Again Appendix further describes the data by field but also gives additional information about M&A transactions for companies which had gone public (see tables v to viii).

Venture Capital

Although not created in Silicon Valley, Venture Capital (VC) is co-substantial to the San Francisco Bay Area. Numerous books and articles (including academic ones) describe this very unique investment activity and one of the most accessible one is documentary film SomethingVentured [11]. However venture capital remains controversial in many places, even in Silicon Valley. Is it a necessary component of innovation and high-tech entrepreneurship? Is the value added just money or more? This is not the place to analyze what venture capital brings. Again here are some facts and figures.

In total, 1'676 firms had raised money from investors. This was mostly done with venture capital (1'614 used VC and only 62 firms did not have a VC identified). This is 24% of the full sample and more interestingly 1'597 startups out of the 3'103 of the health and information technologies fields (51%). In total, this means $12B for the Health sector, $22B for IT Hardware, $27B for IT Software and a smaller $3.6B for the other fields.

Fields	# of firms	Average Amount Raised ($M)	Total Amount Raised ($B)
Health	342	40	12.5
IT Hardware	503	47	22.1
IT Software	752	39	27.7
Other	50	73	3.2
Tech. & non tech. services	29	19	0.4
Overall	1'676	43	65.9

Table 4: Amounts of investments by fields

Can we bring some additional food for thought to the impact of venture capital? It is possible to compare the value creation by companies which raised venture capital and those which did not. For the

public companies 105 startups are identified with VC and 41 are not. In terms of job creation it is about 750'000 jobs for the ones which did not have VC. Hewlett Packard (244'000), Flextronics (200'000) and The Gap (135'000) are the main job creators for these. In comparison, 660'000 are currently employed by public companies which received venture capital. Google (74'000), Cisco (73'000) and Baidu (46'000) are among the most famous. The VC-backed companies generate however more revenues, profits and value for shareholders, but less than pro-rata their number.

Type of firms	# of firms	Revenues 2016 ($B)	Income 2016 ($B)	Employees	Market Cap. July 2017 ($B)
VC- backed	105	356	57	678'000	1'641
Non-VC backed	43	274	31	750'000	559

Table 5: Public companies and venture capital

The same analysis can be done for formerly public companies as well as for M&A transactions.

Type of firms	# of firms with an IPO	Market Caps after 12 m. ($B)	Average Value ($M)	# of M&A Transactions	M&A Value ($B)
VC- backed	267	157	589	717	70
Non-VC backed	66	15	243	700	21

Table 6: Past public companies, M&A transactions and venture capital

A different illustration is given by the following figure. Here the value creation sums the IPO and the M&A values of VC-backed companies, compared to the amounts raised by companies founded during the same period (these are possibly different companies). The M&A transactions include only companies which never went public and the public values are taken at IPOs to avoid possible double counting. The ratios are above 7x before 1998 and below 2x since 2001. This seems to indicate an evolution in value creation in recent years, despite an overall huge success for venture capital.

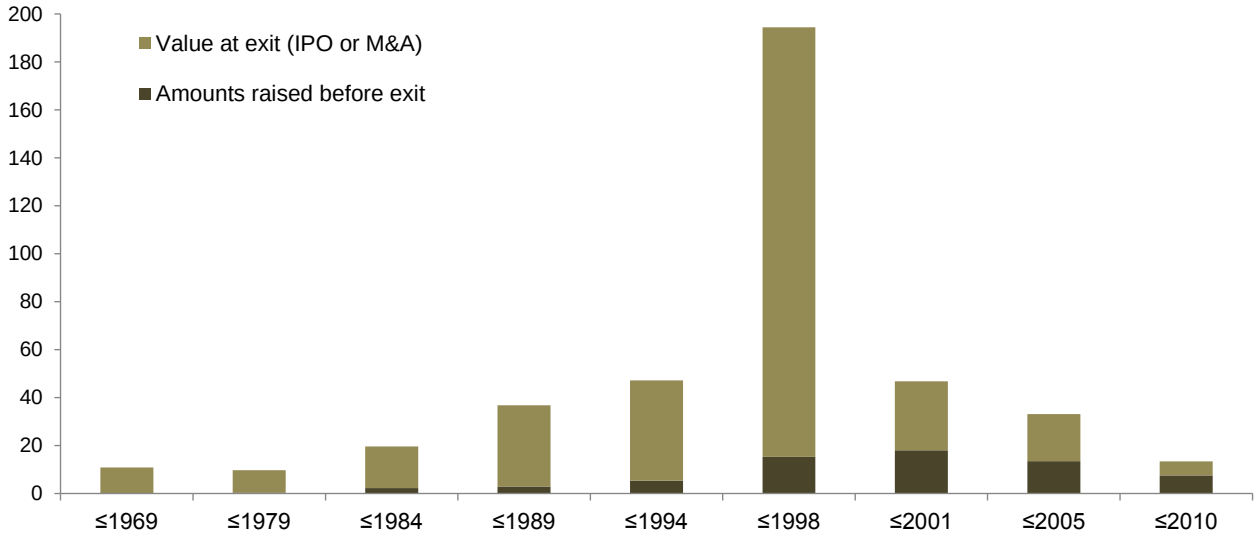

Figure 4: Value creation at exit vs. amounts raised (in $B)

Another interesting feature is the life expectancy of firms vs. venture capital as expressed next:

Type of firms	Overall	Public	Formerly public	M&A	Stopped
VC- backed	6.3	7.7	5.9	6.4	5.9
Non-VC backed	8.2	13	8.9	9.5	7.3

Table 7: Life expectancy of firms (in years) and venture capital

Active Venture Capitalists around Stanford

The database includes about 700 firms in the finance field, and about 200 venture capital firms. These include Alta Partners, Asset Management, Benchmark Capital, DFJ, Index Ventures, Khosla Ventures, Mayfield, MPAE, Sutter Hill, USVP. More importantly, more than 6'000 VC firms are mentioned in the 1'614 invested companies. The most active firms are given in the next table.

VC Firm	# Inv.	VC Firm	# Inv.
Kleiner Perkins Caufield & Byers	141	Sequoia Capital	125
New Entreprise Associates	114	Mayfield Fund	93
Draper Fisher Jurvetson	79	Institutional Venture Partners	65
Accel Partners	65	U.S. Venture Partners	56
Mohr Davidow Ventures	56	Menlo Ventures	54
Sutter Hill Ventures	53	Venrock Associates	50
InterWest Partners	48	Greylock Partners	48
Benchmark Capital	47	Morgenthaler Ventures	39
Norwest Venture Partners	37	Bessemer Venture Partners	36
Oak Investment Partners	35	Alta Partners	33
Hambrecht & Quist	31	August Capital	31

Table 8: Most active VC firms

This is a well-known fact: the density of the VC industry in Silicon Valley is an important networking element. Entrepreneurs, investors and managers are closely connected which makes Silicon Valley a unique entrepreneurial ecosystem.

Geography of Startups

The vast majority of firms is or was based in California as table 8 shows. Even if Silicon Valley was not specifically studied, it can be added that the majority is based around San Francisco. The rest of the USA adds another 1'438 firms. Eastern Asia counts 134 companies and Europe 123. 442 companies were not located (not all state corporation registries are open access) and another 143 are incorporated in Delaware, which does not mean a physical location in that state.

Geography	# Firms	Geography	# Firms
California	3'424	South & Central America	50
New York	171	Canada	17
Massachusetts	152	China	37
Washington	129	Taiwan	22
Texas	105	Hong Kong	22
Colorado	75	Japan	17
Illinois	67	Korea	9
Oregon	56	Other Asia & Oceania	27
Florida	35	Israel	12
Pennsylvania	30	Middle East & Africa	18
Arizona	29	United Kingdom	41
Other East Coast	204	France	24
Delaware	143	Germany	10
Other US States	242	Switzerland	10
Unknown	442	Other Europe	38

Table 9: Geography of startups

Spinoff or not Spinoff?

In a startup guide published in 2012, the Stanford Office of Technology Licensing (OTL) explained that "with all of this entrepreneurial activity, some people are surprised to learn that only about 8-12 of OTL's licenses per year (approximately 10% of its total licenses) are to start-up companies." Indeed, our database counts 222 spinoffs only, founded between 1965 and 2010.

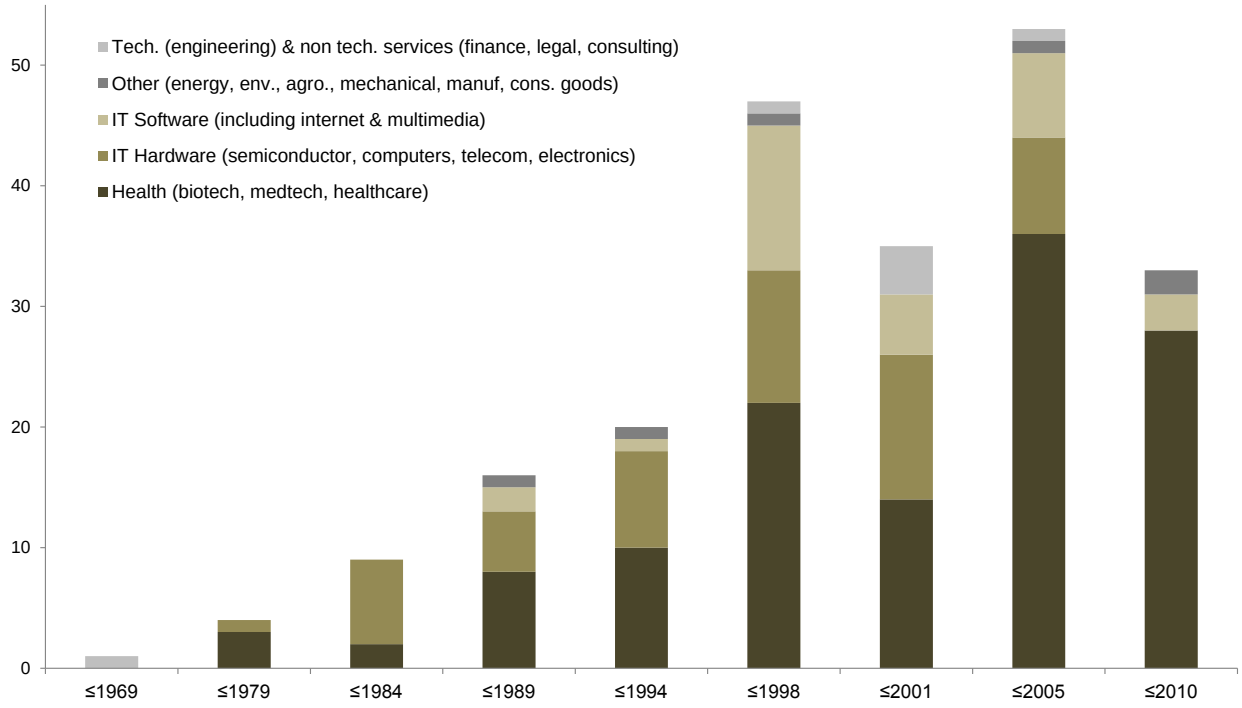

Figure 5: Stanford spinoffs by period of foundation and fields

Stanford OTL has a valid definition of spinoff, but it is possible to consider a broader definition. If a spinoff is an entity created from an institution, formal intellectual property (IP) is only one of the possible sources of creation. People creating a company during their activity at Stanford usually benefit from that environment even if they do not create formal IP. A famous example is the Google vs. Yahoo situation [16]: "*The Google and Yahoo! stories illustrate the application of Stanford's Patent and Copyright Policies to real-life examples. Jerry Yang and David Filo disclosed their software to Stanford, requesting that Stanford confirm that Stanford did not have an ownership interest in the technology. Yang and Filo were Ph.D. students at Stanford and had used Stanford computers (which is usually considered to be incidental use) to develop the software; their professors confirmed that their invention was not related to their university responsibilities as students. Based on this information, Stanford did not claim ownership to what became the Yahoo! search engine. In contrast, Sergey Brin and Larry Page had worked on a search engine for many years. Because the students had been paid by a government contract in the course of their research to satisfy their Ph.D. degree requirements, under both Stanford's Patent and Copyright policies Stanford had ownership to the software, that is, the written code. In addition, Stanford filed a patent on the method of ranking Web pages in order to improve searches. After trying to find the best licensee, Stanford determined that these inventors were in the best position to develop the invention effectively, and so Stanford licensed the technology to their company, Google."* There were other cases where the status as a spinoff was a source of heated debate. Again, this is not the place to develop the topic.

Founders

"Founders" does not have a strict definition and it even happens that some individuals claim to be founders of firms that other founders would not agree with. This being said, it should also be added that the data gathered here mostly include founders with a Stanford affiliation (see the section About the Data). However 55 Stanford spinoffs (out of the 222) do not even have any Stanford founders identified as the licensed intellectual property seems to be the only link with the university. Our database counts 5'181 unique individuals identified as founders.

Number of Stanford Founders per Firm

As an introduction to the founders' analysis, figure 6 shows the percentage of companies relatively to the number of founders. The reader should be cautioned again. The figure does not say that about or more than 80% of the companies only have one founder in all categories. It says that 85% of the companies only have one *Stanford* founder. A further analysis is shown in figure 7 and compares the number of founders with the amount of money raised, the value at IPO and M&A transactions as well as for public firms in 2016 their market capitalizations and employment. The data seems to confirm a fact that figure 6 did not show, that is more founders help in value creation. This seems to be particularly reinforced for the long term, i.e. existing public firms in July 2017.

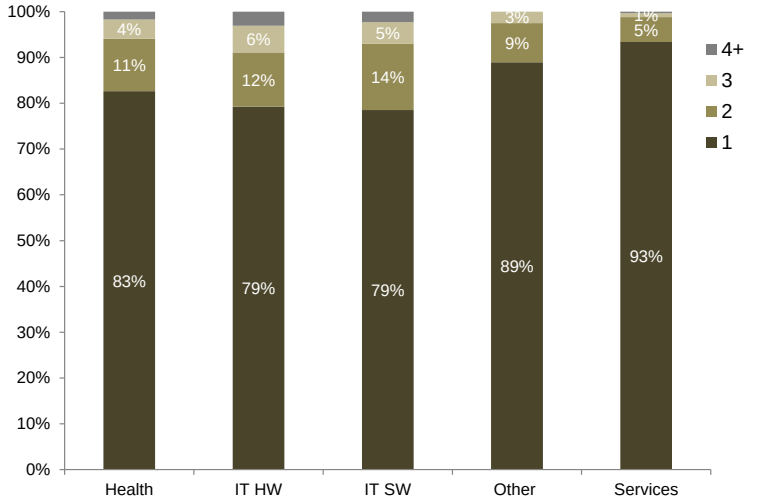

Figure 6: Ratio of number of Stanford founders in firms

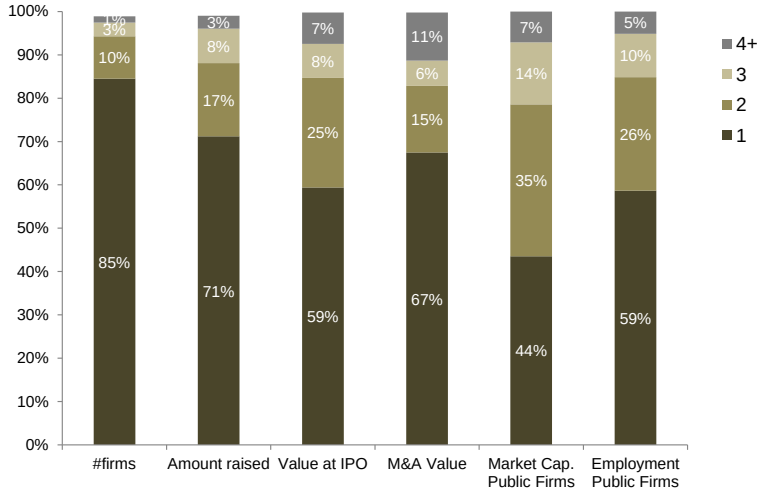

Figure 7: Ratio of number of Stanford founders in firms and value creation

Academic Background of Founders at Stanford

The Stanford background is illustrated by the next figure on founders. Again, this is limited by the fact that these are the Stanford affiliations only. A founder might have a PhD, MS, MBA or even professor position from another university. Figure 8 shows a close to equal balance between MBAs and Masters of Sciences (MS) and a smaller number of PhDs or professors except in the "deep" technology fields (HW or health).

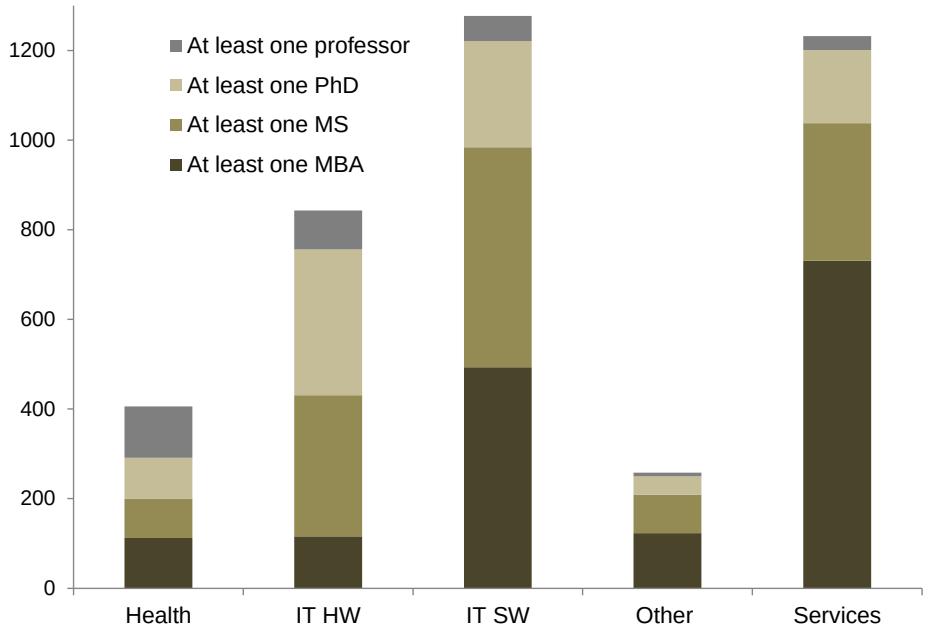

Figure 8: Background of founders

This section would deserve much more analysis, in particular because of the complexity of the associations of founders. However a simple description analysis of the value creation follows.

	#firms	Amount raised	Value at IPO	M&A Value	Market cap. of public firms	Employment of public firms
At least one professor	297	7.4	34.8	74.3	221	115'000
At least one PhD	857	16.4	67.5	107.5	288	148'000
At least one MBA	1'575	16.8	60.1	94.4	358	445'000
At least one MS	1'264	17.3	148	145	1'269	370'000

Table 10: Value creation ($B) and background of Stanford founders

Serial Entrepreneurs

The topic of serial entrepreneurs would probably require a dedicated study and the interested reader may want to read an earlier analysis from a subset of this database [14]. With 1'071 serial entrepreneurs, our database contains 80% one-time entrepreneurs and 20% multiple founders.

# firms by serial founder	# serial founders	# firms by serial founder	# serial founders
1	4'110	5	27
2	731	6	17
3	214	7+	7
4	75		

Table 11: Serial entrepreneurs

We will only mention some data about value creation from these two types of founders. The table gives the amount of money raised, the M&A and IPO values for one-time founders (Serial Index = 0) and for serial entrepreneurs with their 1st to 4th venture as well as above the 2nd one.

Serial index	Amount raised	M&A Value	Value at IPO	Value 12 m. after IPO
0	42	481	690	826
1	28	739	489	481
2	47	692	848	681
3	52	412	894	1'601
4	58	232	814	786
2+	51	591	848	809

Table 12: Average value creation ($M) and serial entrepreneurs

The table does not probably show enough and even if Appendix adds information, more research would be required. There might for example be a kind of trust effect in favor of successful serial founders that might create a bias in both investments and perceived value creation.

Entrepreneurship and Academic Life

A major question is the real impact of Stanford in that entrepreneurial activity. The report has already touched the topic through the spinoff definition. Another major element might have been addressed earlier in this report, i.e. the timespan between the academic position and the entrepreneurial activity. Figure 9 gives the number of firms founded vs. the number of years between the activity at Stanford and the foundation of the venture. The reason why the number is high for year 0 comes from the fact that professors and other Stanford employees contribute in a unique manner to that specific year.

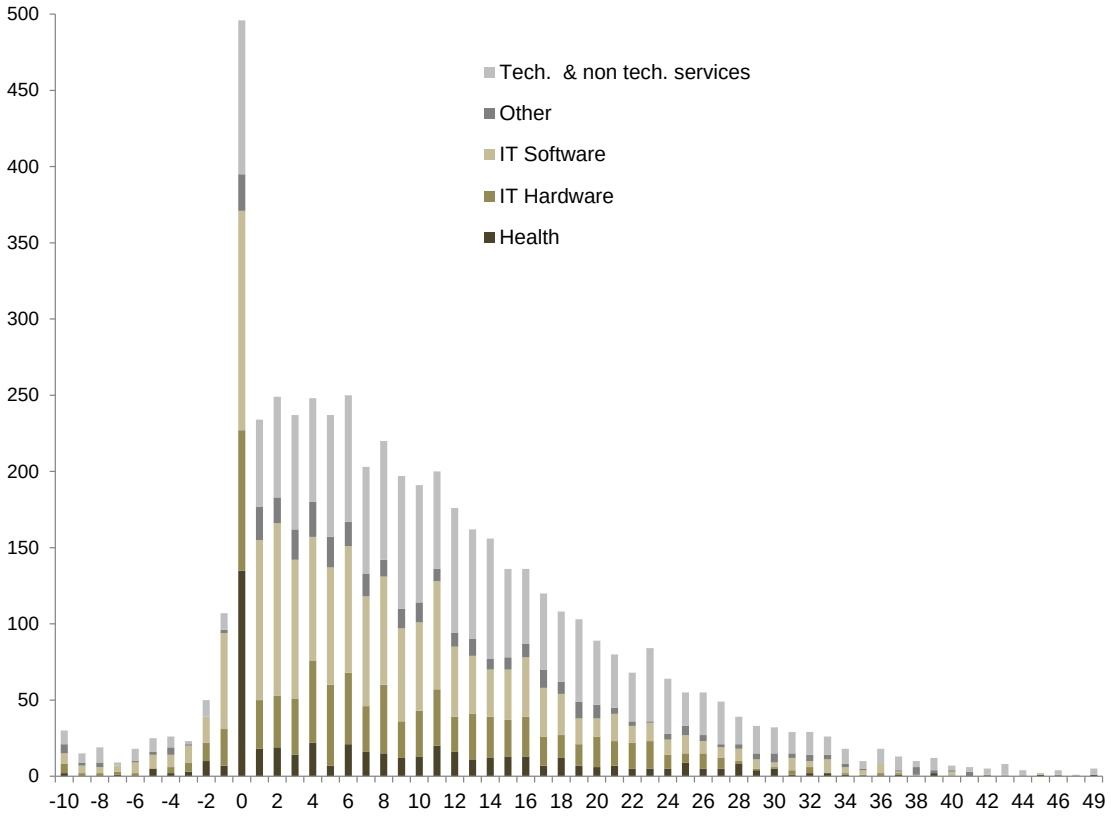

Figure 9: Years between academia and entrepreneurship

It remains difficult to say what the Stanford impact is. Certainly the direct impact decreases with years, with the possible remaining influence of the unique experience former students gained during their stay. Even in the first or second year after leaving, the influence remains high but then probably decreases sharply. Still, it is interesting to have a look at the value creation relatively to these years. The years have been grouped to give a similar number of firms per period, i.e. Y<0, Y0, then groups of increasing year spans. We illustrate this point with the amounts raised, M&A values as well as values at IPO, and finally current public companies market capitalizations and employment. It is quite interesting to notice that there is a clear value creation by firms founded during academic activity compared to future years.

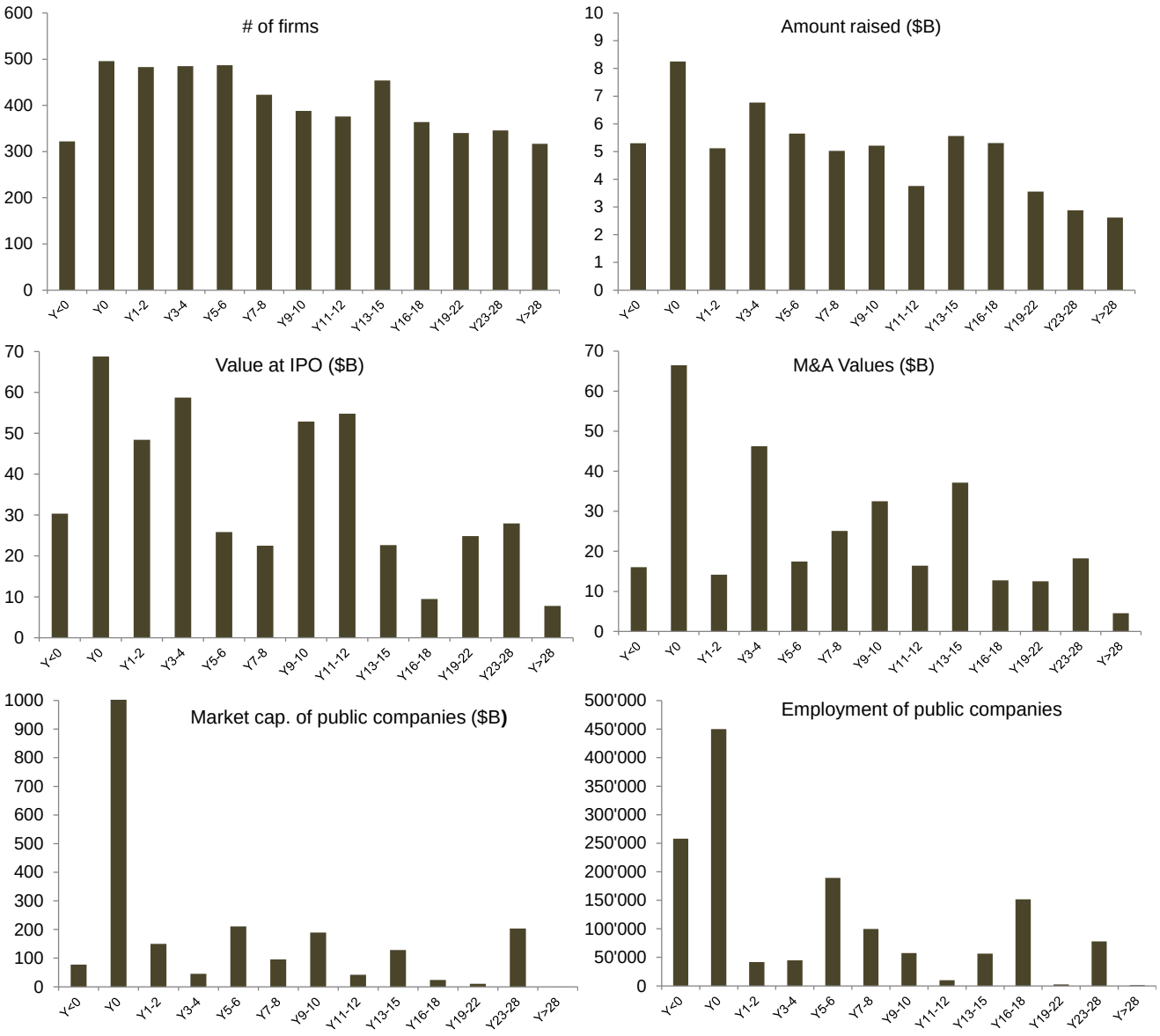

Figure 10: Value creation vs. years from academia to foundation

Conclusion

Let us begin this short conclusion with what this report is not. This is not a traditional research report and the information provided should be considered as a work in progress with a lot of possible research directions. Although Silicon Valley and Stanford are famous for many success stories, this report is not

about specific individual cases. There are also important topics which are not addressed, such as the role of minorities, gender and migrants in entrepreneurship.

The report does not analyze the Stanford ecosystem and how so much value creation was made possible. Technology clusters have been a much researched topic but there is still no recipe about how such successful ecosystems can be built. Even worse, it is not clear whether the value creation around Stanford is not just a combination of human (entrepreneurs', inventors', managers', investors' expertise and talent) and financial (research funding, corporate funding, venture capital) resources which slowly built an ideal and optimized culture targeting high-tech innovation, with a secondary-only role of institutions and support mechanisms.

There has always been a debate about how exceptional Silicon Valley and in particular Stanford was. Indeed, this huge value creation is mainly created by a small number of high-flyers and the failure rate remains high even in this highly successful region. The report still shows a higher than usual rate of success and a very high entrepreneurial activity in high-tech innovation. In 60 years, innovation accelerated and resources available increased decade after decade only slowed down slightly during regular crises such as the internet burst in the early 2000s and despite many predictions of the contrary. The region has always looked saturated in many dimensions and the flow of innovation has seemed to slow down recently, except in less technology-oriented ventures such as mobile and internet consumer services. How will it develop in the future is obviously impossible to predict. Human and financial resources will not disappear any time soon and the region stays a powerful magnet. Therefore a revisited analysis of the situation in a decade or so should be very interesting.

About the Data

The main source of raw data was the Wellspring of Innovation (web.stanford.edu/group/wellspring/), a web site last updated in 2011. The web site gives a list of more than 5'000 companies with their Stanford-affiliated founders. The only additional information it gives was the web sites of the corporations when available. The author also received in 2008 information on Stanford spin-offs and related companies from the Stanford Office of Technology Licensing. The raw output is a list of 5'658 companies with (after some analysis) 5'181 founders. Most of these companies were therefore founded before 2010, which is a sufficiently interesting element as the life expectancy of the sampled firms is about 7 years. The reader should be aware that the link between Stanford and these founders is very diverse. Some created their spin-off while at Stanford using intellectual property created during their professional activity in a Stanford laboratory, while others might have been students many years before creating their firm, in a field which might have no link with their Stanford diploma.

All additional data was obtained by the author from a variety of sources, mostly public ones. In addition to individual web pages of companies and founders, these sources include the sites for corporate entity search of the Secretary of States (www.secstates.com) as well as foreign registers - more rarely though -, the Link Silicon Valley (www.linksv.com) dedicated to Silicon Valley companies, founders, investors and their relative connections, the Internet Archive (www.archive.org), the Securities and Exchange Commission (www.sec.gov) as well as the Wharton Research Data Services (www.whartonwrds.com) for public companies, Crunchbase (www.crunchbase.com) for private companies. For the founders the

main source of information was LinkedIn (www.linkedin.com) and the Stanford Alumni database (alumni.stanford.edu).

The work began in 2009 after the author wrote a first book about Silicon Valley [12]. That book contains a dedicated chapter to the spinoffs created at Stanford ISL – the Information Systems Laboratory. This initial work was followed by academic papers about Stanford startups [13], Serial entrepreneurs [14] and a slightly related study about the Age of founders [15]. The interested reader will find more information about all these sources in article [13]. The raw analysis was completed in July 2017, which represents the date of the status of all companies. The author must warn the reader that an analysis of such scale done by a single individual is subject to mistakes and inaccuracies. The author hopes that these possible mistakes are made unimportant with the amount of data collected. This remains a work in progress and all comments are more than welcome.

References

[1] Prophet of Innovation: Joseph Schumpeter and Creative Destruction. Thomas K. McCraw. *Harvard University Press, 2007.*

[2] Academic Entrepreneurship. University Spinoffs and Wealth Creation. Scott Shane. *New Horizons in Entrepreneurship series. Edward Elgar, 2004.*

[3] Creating the Cold War University. The Transformation of Stanford. Rebecca S. Lowen. *University of California Press, 1997.*

[4] Making Silicon Valley – Innovation and the Growth of High Tech, 1930-1970. Christophe Lécuyer. *The MIT Press, 2006.*

[5] High-tech Start-ups and Industry Dynamics in Silicon Valley. Junfu Zhang. *Public Policy Institute of California, 2003.*

[6] Entrepreneurial Impact: The Role of MIT. Edward Roberts and Charles Eesley, *February 2009.*

[7] Stanford University's Economic Impact via Innovation and Entrepreneurship. Charles Eesley, *October 2012.*

[8] The performance of Spin-off companies at the Swiss Federal Institute of Technology Zurich. Ingvi Oskarsson and Alexander Schläpfer, *October 2008.*

[9] Overview and analysis of the performance of Spin-offs at the Swiss federal Institute of Technology Zurich and their effect on the Swiss Economy. Vanessa Pinter. Editors: Dr. Matthias Hölling, Dr. Marjan Kraak, Dominik Wensauer, *January 2015.*

[10] Start-ups at EPFL, July 2017. short.epfl.ch/startup-report

[11] SomethingVentured co-produced by Paul Holland and Molly Davis, co-directed by Dan Geller and Dayna Goldfine*, 2011. www.somethingventuredthemovie.com*

[12] Start-Up: what we may still learn from Silicon Valley, Hervé Lebret*, CreateSpace, November 2007*

[13] Stanford University and High-Tech Entrepreneurship: an Empirical Study, Hervé Lebret, *Babson College Entrepreneurship Research Conference, 2010.*

[14] Serial Entrepreneurs: Are They Better? A View from Stanford University Alumni, Hervé Lebret, *Babson College Entrepreneurship Research Conference, 2012.*

[15] Age and Experience of High-tech Entrepreneurs, Hervé Lebret, *Journal of Business and Economics, vol.5, nb.12, pp.2327-2336. DOI: 10.15341/jbe(2155-7950)/12.05.2014/01.*

[16] Software Licensing in the University Environment. Katharine Ku, *2012.*
archive.cra.org/CRN/articles/ku.html

Appendix

The Fields of Activity

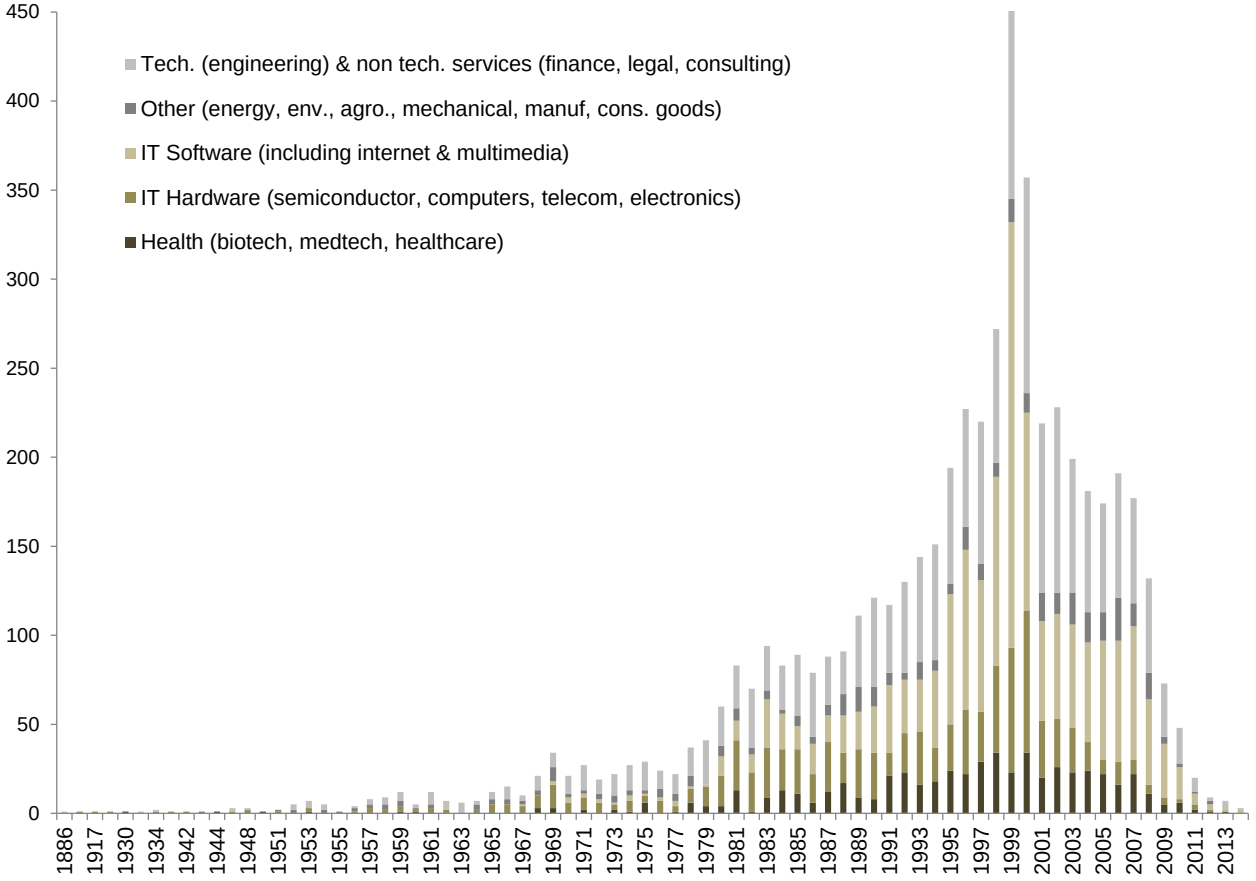

Figure i: The Stanford startups by year and fields of activity

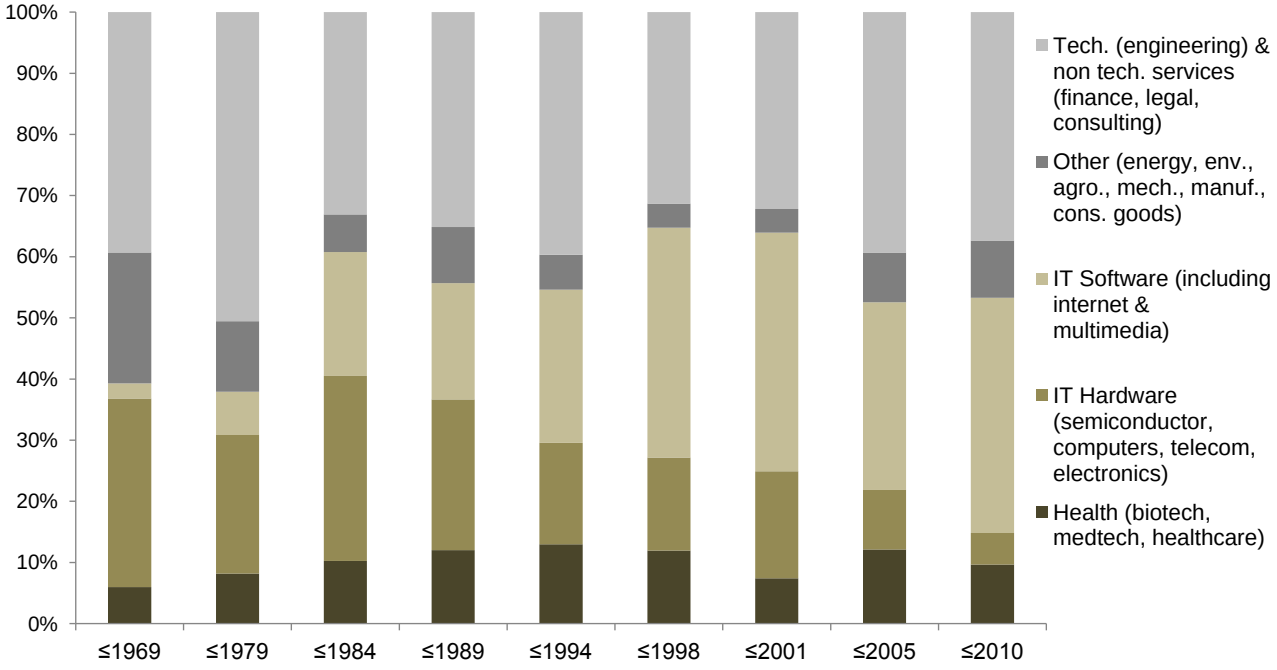

Figure ii: Ratio of Stanford startups by period of foundation and fields of activity

Life Expectancy and Fields of Activity

Field of activity	# Firms	Av. years to exit	Field of activity	# Firms	Av. years to exit
Biotechnology	258	6.6	Energy	83	10.6
Medtech	211	7.8	Environment	36	8.8
Healthcare	98	9.6	Mechanical	46	10.3
Semiconductor	136	7.4	Manufacturing	27	17.0
Computers	70	7.8	Multimedia	109	9.8
EDA software	38	6.4	IT	175	6.9
Telecommunications	307	6.1	Software	590	6.6
Electronics	335	10.2	Internet	745	4.0
Optics	31	8.4	Consumer goods	184	10.0
Entertainment	115	8.2	Education	121	7.1
Finance	698	9.1	Engineering	112	14.7
Law	74	10.9	Tech. services	114	9.3
Non tech. services	598	9.8	Consulting	160	8.3

Table i: Average time before exit vs. domain of activity

Value Creation of Public Companies at IPO

Fields	≤1969	≤1979	≤1984	≤1989	≤1994	≤1998	≤2001	≤2005	≤2010	Overall
Health	89	114	111	132	264	419	301	202	237	218
IT HW	127	93	206	214	553	2193	1329	3416	590	611
IT SW		56	104	767	736	2165	952	1793	866	1276
Other	70	50	61	1172	674	191	398	834	1152	578
Services	73	272	1008	2631	16	159	492	188		619
Overall	109	135	177	419	490	1743	884	1020	657	688

Table ii: Market capitalization at IPO ($M) by fields and periods of foundation

Fields	≤1969	≤1979	≤1984	≤1989	≤1994	≤1998	≤2001	≤2005	≤2010	Overall
Health	63	135	170	110	196	289	281	272	154	188
IT HW	121	74	225	175	671	1056	696	3723		430
IT SW		61	213	682	475	2993	751	1918	1160	1532
Other	126	129	67	1707	468	754	382	867	627	725
Services	384	263	1056	6679	13	144	469	350		1227
Overall	142	133	224	588	398	1914	632	1261	716	735

Table iii: Market capitalization 12 months after IPO ($M) by fields and periods of foundation

Fields	≤1969	≤1979	≤1984	≤1989	≤1994	≤1998	≤2001	≤2005	≤2010	Overall
Health	3	8	23	29	33	21	6	10	3	136
IT HW	20	14	37	29	19	21	8	2	1	151
IT SW		5	14	9	26	51	19	7	4	135
Other	5	1	2	6	2	1	2	2	1	22
Services	3	9	2	3	1	1	1	2		22
Overall	31	37	78	76	81	95	36	23	9	466

Table iv: Number of companies taken into account in tables ii and iii

M&A Values

Fields	≤1969	≤1979	≤1984	≤1989	≤1994	≤1998	≤2001	≤2005	≤2010	Overall
Health	360	212	684	105	103	68	94	186	106	142
IT HW	508	165	56	120	78	327	207	152	617	217
IT SW		415	115	133	150	133	121	172	213	148
Other	132		255	119	6	106		18		127
Services	122	719	78	39	156	178	67			162
Overall	356	265	144	116	113	182	158	167	234	173

Table v: Average M&A Values ($M) by fields and periods of foundation

Fields	≤1969	≤1979	≤1984	≤1989	≤1994	≤1998	≤2001	≤2005	≤2010	Overall
Health	1	4	4	9	16	24	8	14	5	85
IT HW	12	10	20	18	22	48	46	16	3	195
IT SW		2	10	11	23	83	38	27	24	218
Other	4		2	3	1	1		1		12
Services	4	2	5	2	5	2	3			23
Overall	21	18	41	43	67	158	95	58	32	533

Table vi: Number of companies for which M&A value is known

M&A Values of Companies which had been Publicly Quoted

Fields	≤1969	≤1979	≤1984	≤1989	≤1994	≤1998	≤2001	≤2005	≤2010	Overall
Health	3.9	0.7	1.9	0.3	1.9	0.5	2.7	0.5		1.3
IT HW	2.6	1.1	1.8	0.5	0.4	0.8	3.1	3.5		1.3
IT SW		0.5	0.5	2.0	1.5	1.9	0.6	9.9	2.1	1.7
Other	1.0		0.2	4.6		0.1	0.5			1.8
Services		0.4			0.7					0.4
Overall	2.7	0.8	1.5	0.9	1.5	1.3	1.4	5.0	2.1	1.5

Table vii: Average M&A Values ($B) by fields and periods of foundation

Fields	≤1969	≤1979	≤1984	≤1989	≤1994	≤1998	≤2001	≤2005	≤2010	Overall
Health	3	5	18	19	19	10	2	3		79
IT HW	10	9	24	17	6	14	3	1		84
IT SW		5	9	8	19	25	8	3	2	79
Other	1		1	2		1	1			6
Services		2	1		1					4
Overall	14	21	53	46	45	50	14	7	2	252

Table viii: Number of companies for which M&A value is known

Venture Capital

Fields	≤1969	≤1979	≤1984	≤1989	≤1994	≤1998	≤2001	≤2005	≤2010	Other	Overall
Health		6	16	20	35	52	52	60	33	33	40
IT HW	12	12	25	24	37	54	66	65	68	11	47
IT SW		9	12	30	20	39	35	55	47	59	39
Other	12	9		34	28	13	104	174	57		73
Services		20	21		1	24	12	21	43		19
Overall	12	10	21	24	30	45	47	62	48	40	42

Table ix: Average amount of venture capital raised by field and period of foundation

Fields	≤1969	≤1979	≤1984	≤1989	≤1994	≤1998	≤2001	≤2005	≤2010	Other	Overall
Health		9	25	43	60	61	40	61	31	2	332
IT HW	7	13	66	55	57	98	128	41	17	2	484
IT SW		3	20	23	64	177	213	117	107	2	726
Other	1	1	1	5	4	4	8	9	12		45
Services	1	3	2	0	4	3	10	2	2		27
Overall	9	29	114	126	189	343	399	230	169	6	1'614

Table x: Number of companies which raised venture capital

Serial Entrepreneurs

Serial index	Amount raised	M&A Value	Value at IPO	Value 12 m. after IPO
0	29	159	146	172
1	8	151	56	55
2	17	111	77	61
3	6	18	21	37
4	3	6	10	9
2+	29	148	118	112

Table xi: Total value creation ($B) and serial entrepreneurs

Serial index	Amount raised	M&A Value	Value at IPO	Value 12 m. after IPO
0	699	331	212	208
1	293	204	115	115
2	358	160	91	90
3	113	44	23	23
4	52	24	12	12
2+	569	251	139	138

Table xii: Number of firms counted for value creation and serial entrepreneurs

Startups and Stanford University

Startups have become in less than 50 years a major component of innovation and economic growth. Silicon Valley has been the place where the startup phenomenon was the most obvious and Stanford University was a major component of that success. Companies such as Google, Yahoo, Sun Microsystems, Cisco, Hewlett Packard had very strong links with Stanford but even these vary famous success stories cannot fully describe the richness and diversity of the Stanford entrepreneurial activity. This report explores the dynamics of more than 5'000 companies founded by Stanford University alumni and staff, through their value creation, their field of activities, their growth patterns and more. The report also explores some features of the founders of these companies such as their academic background or the number of years between their Stanford experience and their company creation.

About the author

Hervé Lebret has been working in the startup world for more than 20 years. Since 2005, he has been in charge of support to startup creation at EPFL, the Swiss Federal Institute of Technology in Lausanne. He was before with Index Ventures, a pan-European venture capital firm which invested in Skype, mysql, Numeritech, Virata, Genmab. He used that experience to write in 2007 the book "Start-Up, what we may still learn from Silicon Valley" and the blog www.startup-book.com. Since 2010, he has also been doing research on high-tech startups with a particular focus on Silicon Valley and Stanford University. Lebret was trained in science and engineering, he is a graduate of Ecole Polytechnique (1987) and Stanford University (1990). He did his PhD in 1994 on the topic of convex optimization and its applications, which he still teaches at EPFL in addition to teaching entrepreneurship. He was a researcher in applied mathematics until he switched to venture capital in 1997.