ALUMNI STUDIES

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Research focus:

Role of universities in fostering technology based entrepreneurship via students and alumni.

CONTENT

1. MIT and Tsinghua Alumni Surveys
2. Alumni Surveys as a Data Collection Methodology
3. Stanford Innovation Survey

I. MASSACHUSETTS INSTITUTE OF TECHNOLOGY AND TSINGHUA ALUMNI SURVEYS

MIT ALUMNI SURVEY

Research Questions

- (1) Who enters entrepreneurship and has this changed over time?

(2) How does the rate of entrepreneurship vary with changes in the entrepreneurial business environment?

MIT ALUMNI SURVEY

Findings

- Founding rates have grown dramatically
- Median age of first time entrepreneurs has gradually declined:
  - 1950: 40
  - 1990: 30
- Less women and more non-US citizens found companies

TSINGHUA ALUMNI SURVEY

- Same research questions as MIT survey
- Designed to be comparable to predecessor
- Challenge of tailoring survey to Chinese culture

II. ALUMNI SURVEYS AS A DATA COLLECTION METHODOLOGY

ADVANTAGES

- Long time horizon
- less success and survival bias
- effective tool for generation data outside the US
- access to pre survey data (grades/honors)

ADVANTAGES

- well-defined, homogeneous set of individuals
- higher response rates because of close ties to University
- control over the survey instruments and the definition of entrepreneurship

DISADVANTAGES

- representativeness
- possible response bias
  - through self-reporting
  - Data on many high-profile firms are not included

III. STANFORD INNOVATION SURVEY

STANFORD INNOVATION SURVEY

Content:

I. University and job background
II. Founders
III. Investors
IV. Board members

STANFORD INNOVATION SURVEY

- Items related to research question 2, measuring

1) involvement in networks with friends and family
   Q1.5 involvement with Stanford related networks and programs
   Q1.6 friends/family and entrepreneurship

STANFORD INNOVATION SURVEY

2) educational experiences
   - Q1.1 Universities
   - Q1.5 involvement with networks and programs
   - Q2.3 importance of entrepreneurial environment for attending Stanford

3) entrepreneurial interests and behavior
   - Q1.3 own innovation
   - Q2.0 and Q2.2 founding of company or similar
   - Q2.4 start-up experience
   - Q3.6 and Q3.7 motivation for founding a company

STANFORD INNOVATION SURVEY

Key findings from *Stanford University's Economic Impact via Innovation and Entrepreneurship*

- 29 percent of respondents are entrepreneurs (profit or nonprofit founders)
- 32 percent of respondents were investors, early employees or a board member in a startup at some point in their careers.

STANFORD INNOVATION SURVEY

- 25 percent of faculty respondents are founders
- Among entrepreneurs 55 percent reported choosing to study at Stanford because of its entrepreneurial environment

STANFORD INNOVATION SURVEY

Financial estimates:

- 40 000 companies founded by Stanford alumni
- 5.4 million jobs created
- annual revenue of $ 2.7 trillion
  (10th largest economy in the world)

METHODOLOGY

- Population:
  143,482 individuals—all living Stanford alumni, current faculty and selected (research) staff. Responses were received from 27,780 individuals, for a response rate of 19.5 percent
- Stanford School of Engineering
- Graduate School of Business
- School of Humanities and Sciences
- School of Medicine, the Law School
- School of Education
- School of Earth Sciences

INDIVIDUAL RESPONSE RATES

Use of response rate differences by gender, school and graduating class to correctly weight the estimates.

Women: 19%
Men: 19%

Business: 23%
Earth Sciences: 30%
Education: 30%
Engineering: 22%
Law: 20%
H&S: 13%
Medicine: 27%

MULTIVARIATE REGRESSION

	Pr(respond)	Pr(respond)	Pr(respond)	Pr(respond)
Gender (female=1)	1.051**			1.143
	(0.018)			(0.514)
Earth Sciences			1.074	0.535
			(0.053)	(0.550)
Education			1.183***	0.662
			(0.039)	(0.905)
Engineering			0.883***	0.280
			(0.020)	(0.236)
Law			0.741***	0.565
			(0.027)	(0.185)
Medicine			1.698***	0.170
			(0.048)	(0.162)
Humanities & Sciences			0.508***	
			(0.011)	
Graduation Year		0.991***		
		(0.000)		
Gender*Graduation year FE				YES
Gender*school FE				YES
Graduation Year FE				YES
Constant	0.141***	5.69e+06***	0.292***	0.273
	(0.001)	(5,022,770)	(0.006)	(0.223)
Observations	133,916	139,004	143,632	70,926

*** p<0.001, ** p<0.01, * p<0.05

- Women 5.1 % more likely to respond
- Those in more recent graduation years were 0.9 % less likely to respond

ESTIMATION METHODS

Done in analogy to 2011 Dun & Bradstreet databases

Based on three assumptions between respondents and non-respondents:

1. proportion of entrepreneurs is the same
2. equally successful
3. entrepreneurs responded with information about all of their founding attempts

ESTIMATION METHODS

ESTIMATION METHODS

As in all surveys, a large segment of the alumni population did not respond. Therefore, estimation of the total impact of Stanford alumni entrepreneurs requires extrapolation to account for non-respondents. To give an accurate estimate of the entrepreneurial activity of those who did not respond, a scale factor was used. Since Stanford has data from the 2011 surveys with adjustments from the 2011 Dun & Bradstreet databases, the appropriate scale factor was determined based on the particular statistic or question being answered. Details about how specific scale factors were calculated are found at the end of this section.

The scaling method is based on three assumptions:

- The proportion of entrepreneurs among the respondents is the same as the proportion of entrepreneurs among the non-respondents.
- Respondent entrepreneurs are equally successful as the non-respondent entrepreneurs.
- Entrepreneurs responded with information about all of their founding attempts.

HOW WRONG …?

How wrong could these estimates be? Despite reasons that point to a potential under-estimation, there are remaining concerns about an overly optimistic estimation. For example, one might disagree with our assumptions and argue that the proportion of entrepreneurs among respondents is higher than that among non-respondents because it is more likely for an entrepreneur to respond to an "innovation survey". One might also argue that our respondent entrepreneurs are on average more successful than non-respondent entrepreneurs. While it is difficult to precisely determine the non-respondents' entrepreneurial performance, we provide

First, to address the potential difference in likelihood to be an entrepreneur, we assume that a non-respondent is 75% as likely to be an entrepreneur as a respondent. This new assumption reduces the scale factors across the board and leads to a tally of 4.2 million jobs created and total annual revenues of $2.1 trillion. The new figures are about 20% less than our main results -- 5.4 million jobs and $2.7 trillion in revenues. Second, to address the potential difference in entrepreneurial success between respondents and non-respondents, we further assume that non-respondent entrepreneurs generate 75% as much revenue and employ 75% as many people as respondent entrepreneurs. This brings our results down to 3.4 million jobs created and $1.7 trillion in revenues, which are about 35% less than the main results.

ESTIMATION METHODS

Why the estimates are rather conservative:

NOT included in the database are Google, Hewlett-Packard, eBay, Cisco, Yahoo!, NVIDIA, …

Some alumni indicated having started more than six firms

Firms that were partnerships, LLCs, informal ventures or non-profit ventures are included in the dataset, but were not included in these aggregate numbers.

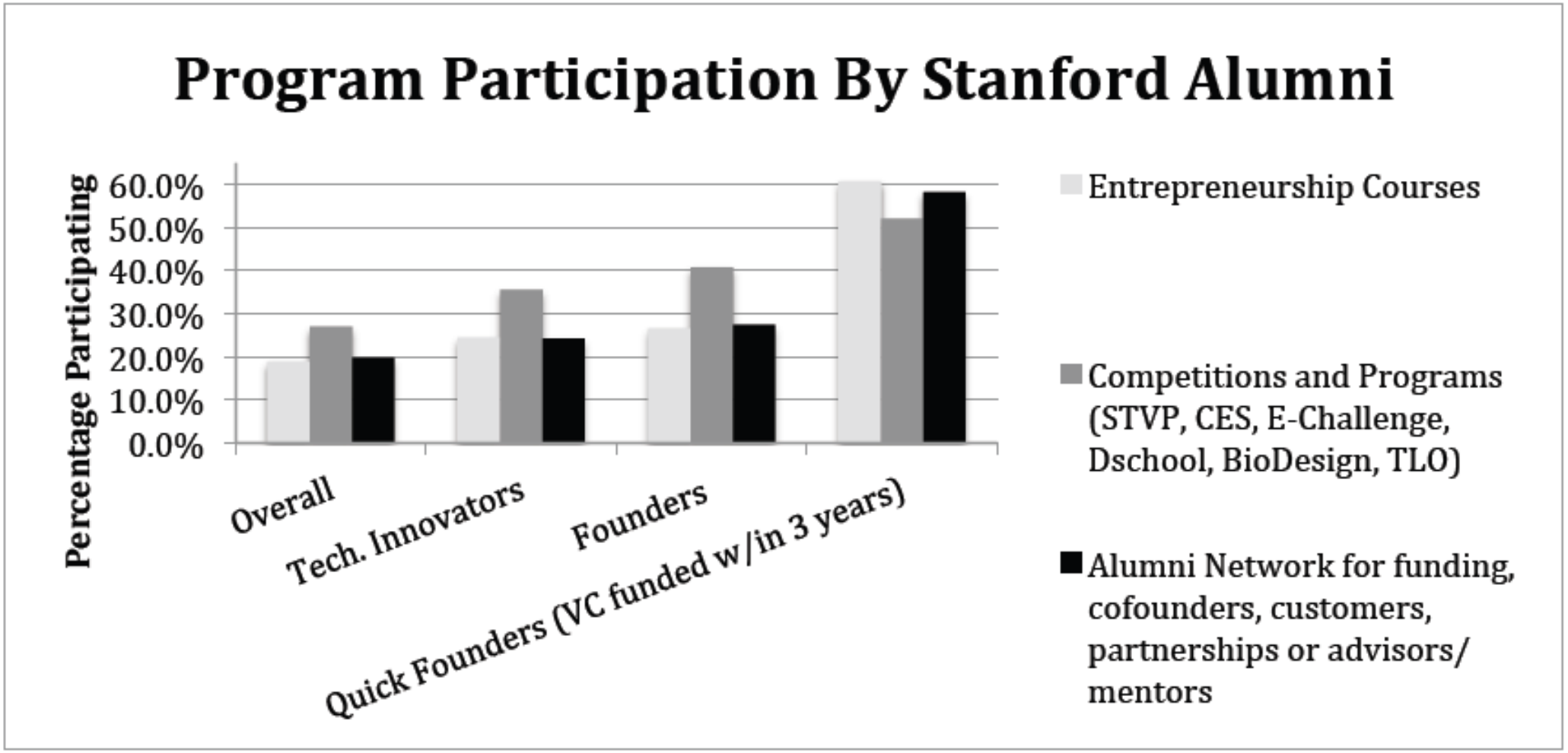
STANFORD INNOVATION SURVEY

Stanford approach:

- encouraging networks and interdisciplinary
- testing ideas by research and prototyping
- entrepreneurship programs (LaunchPad, …)
- connection to experienced entrepreneurs

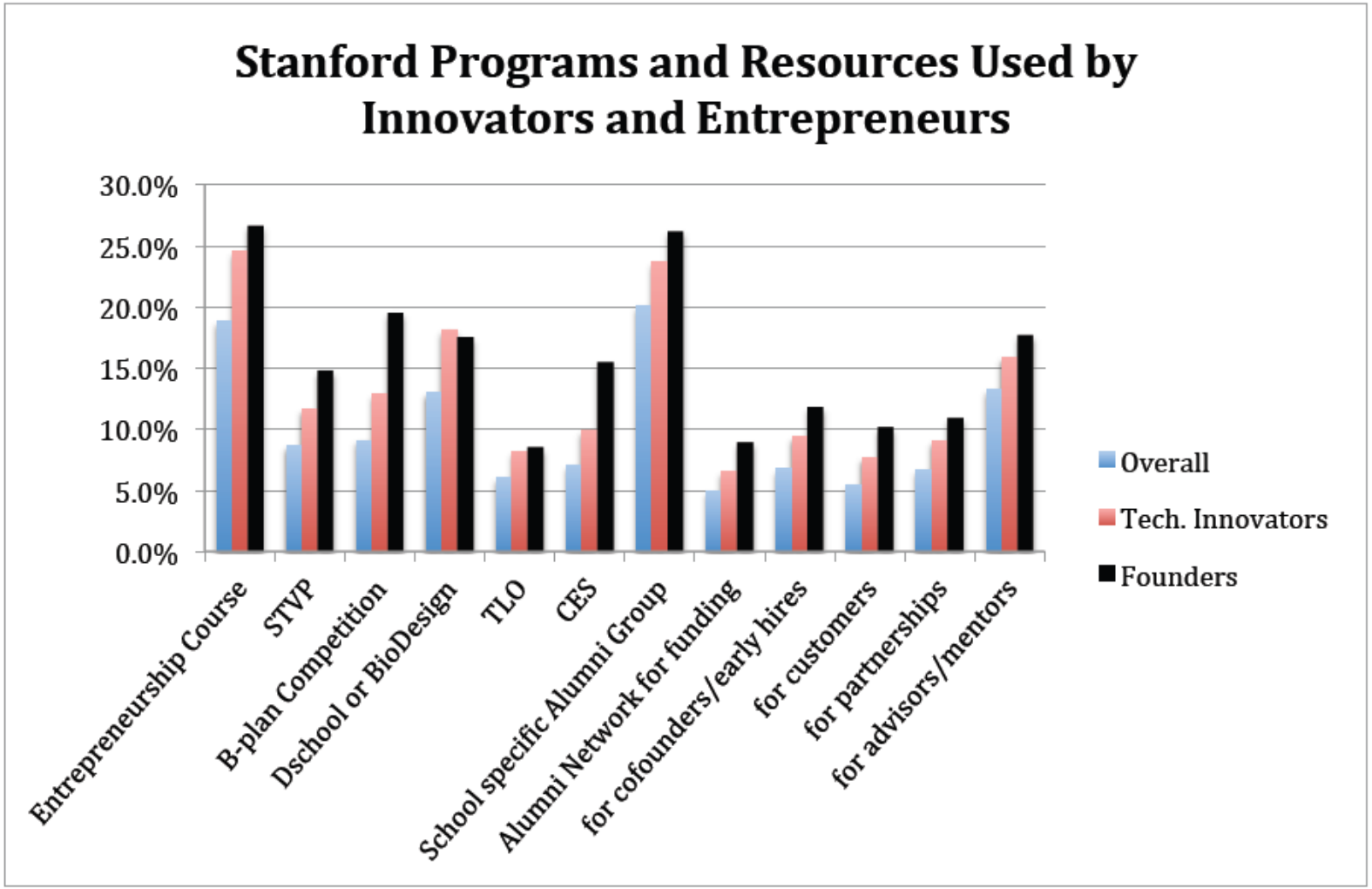
STANFORD INNOVATION SURVEY

Figure 14



STANFORD INNOVATION SURVEY

Figure 16



STANFORD INNOVATION SURVEY

Table 7: Role of Stanford

	Overall	Tech. Innovators	Founders
Worked with Faculty	67.9%	68.2%	65.5%
Entrepreneurship Course	18.9%	24.5%	26.7%
Stanford Tech. Ventures Program	8.7%	11.7%	14.8%
Research	57.6%	57.4%	54.5%
Student Groups	62.9%	63.1%	62.3%
International Study Abroad	20.7%	19.0%	20.3%
B-plan Competition	9.1%	12.9%	19.5%
d.School or BioDesign	13.0%	18.1%	17.5%
TLO	6.0%	8.2%	8.5%
Center for Entrep. Studies (GSB)	7.0%	9.9%	15.5%
SAA	61.4%	64.5%	65.6%
Alumni Regional Club	34.4%	36.4%	38.7%
School specific alumni group	20.1%	23.7%	26.2%
Alumni network for funding	4.9%	6.5%	8.9%
for cofounders/early hires	6.8%	9.4%	11.8%
for customers	5.5%	7.7%	10.2%
for partnerships	6.7%	9.1%	10.9%
for advisors/mentors	13.3%	15.9%	17.7%
School Career Center	37.7%	39.1%	34.2%

STANFORD INNOVATION SURVEY

Practical lessons learned:

- Customer support through the Pacific Consulting Group or use of survey software Qualtrics
- Estimated costs: $ 75-100k
- To prevent bias name study alumni study rather than entrepreneurship study
- Use access to alumni data (gender, degree, graduation year) for personalized emails

PERCENTAGE OF ENTREPRENEURS

I. Exec sum: The report on 2011 survey estimates that 39,900 active companies are founded by Stanford alumni
II. A Stanford alumni entrepreneur finds on average two companies
III. 39900/2 /143,482=13,9% p102:

For most items (revenues, employees, etc.), respondents provided data on each of the firms founded (up to six firms). For items where data was only provided on one of several companies founded, a multiplier of 2.003 was used, since this is the number of companies on average each entrepreneur has founded (40 percent of Stanford's entrepreneurial alumni are repeat/serial entrepreneurs). For example, of 100 alumni entrepreneurs, on average 200 companies were founded during their careers. Also, the

SOURCES:

- Charles E. Eesley. “Alumni Surveys as a Data Collection Methodology - Discussion of alumni surveys, their use and limitations”
- Charles E. Eesley. “ Stanford University’s Economic Impact via Innovation and Entrepreneurship” (October 2012)
- Stanford_Alumni_Innovation_Survey_Report_3-2-13
- Documentation of Stanford Alumni survey http://epicenter.stanford.edu/resource/alumni-innovation-survey