

Dear NBER Summer Institute audience,

Our paper is ready but in the process of clearing final hurdles before it can be publicly released and that we expect to post retroactively in the next few weeks. In the meantime, we have received authorization to post the slides.

Check back in early August for the actual paper...

We apologize for the delay.

Regards,

Pierre, Ben, Danny, and Javi

Age and High-Growth Entrepreneurship

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Any opinions and conclusions expressed herein are those of the authors and do not necessarily represent the views of the U.S. Census. All results have been reviewed to ensure that no confidential information is disclosed.

Question

When in life do people start firms and when do they start the most successful firms?

Is Youth Key to Entrepreneurial Success?



"Young people are just smarter."
(Zuckerberg)



"The cutoff in investors' heads is 32... after 32, they start to be a little skeptical."
(Graham)

Perceptions: Media, VC behavior

	TechCrunch Awards	Inc. and Entrepreneur Magazines	Sequoia	Matrix Partners
Mean	31.0	29.1	33.9	36.5
Median	30	27	33	36
(St. Dev.)	(7.1)	(7.0)	(8.7)	(8.6)
Observations	232	51	415	246
Period	2008-2016	2015	1969-2014	1948-2014
Sectoral Focus (top 5)	Education, Software, Social Media, Consumer Electronics, e-Commerce	Technology, Retail, Media, Consumer Goods, Food Delivery	Semiconductors, Networks, Task Mgmt Apps, Website Compilers, Cloud	Networks, Applications, Commerce, Platform/Infrastructure, Semiconductors/Materials

(Source: Biographical research using public records; not census data)

Why These Views?

Young people sometimes thought to have advantages in:

- 1) Deductive reasoning (e.g., Galenson and Weinberg 2005)
- 2) Transformative thinking (e.g., Planck 1949, Weinberg 2007)
- 3) Energy / Time (e.g. Jones et al. 2014)

...Yet key resources may accumulate with age

- Human capital, Financial capital, Social capital (e.g., Lazear 2004, Chatterji 2009, Jones 2009, Evans and Jovanovic 1989, etc.)

Existing Evidence: Age and Entrepreneurship

General entrepreneurship

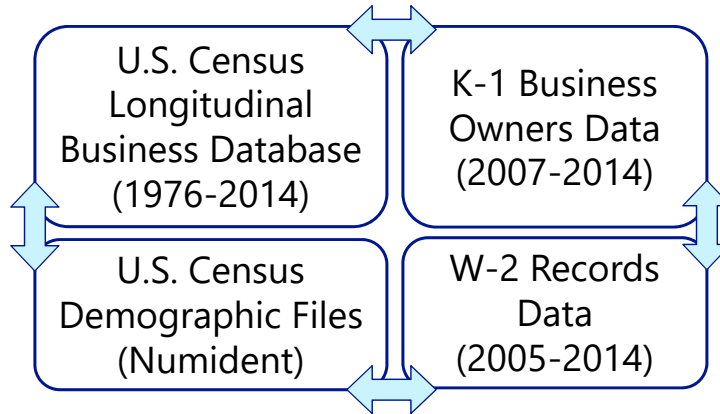
- Peaking 35-44 in EU telephone surveys (Kautonen et al. 2014) or studying Danish new ventures from 1995-2004 (Dahl and Sorensen 2012)

Tech entrepreneurship

- Wadhwa et al. (2008): Survey 502 technology firms with at least \$1 million in sales. Find mean founder age of 39
- Frick (2014): sample of 35 VC-backed "unicorns". Find mean founder age of 31.
- Ng and Stuart (2016): LinkedIn profiles and Angels List. Find peak founder age is 5 years after bachelor's degree.

Contradictory.
Selected samples
producing very
different results

Data: U.S. Administrative Databases



- + Patents via Longitudinal Linked Patent Business Database
- + Venture Capital data via VentureXpert & PCRI

Metrics for Growth-oriented Firms

Ex-ante

- "High-tech" industry
- Patenting firm
- VC-backed firm

Ex-post

- Growth: employees, sales
- Successful Exit: by acquisition or IPO

Mean Age of Entrepreneurs

New Firms* in U.S. (2007-2014)

All Startups

Mean	41.9
St. Dev.	(12)
Obs	2,658,000

But vast majority are restaurants, retail stores, nail salons, etc.

*non-farm economy, not sole props, at least one employee

What about Technology Entrepreneurs?

Age by Different Versions of "Tech"

New Firms in United States (2007-2014)

	All Startups	High Tech Employment	VC-backed Firms	Patenting Firms
Mean	41.9	43.2	41.9	44.6
St. Dev.	(12)	(11.5)	(10.6)	(11.3)
Obs	2,658,000	334,000	11,000	10,000

Among high tech, youngest mean founder ages are in computing related sectors (NAICS4), but still 39-40.

Are Founders Younger in
Entrepreneurial Hubs?

Age in Entrepreneurial Hubs

	All Startups	High Tech Employment	VC-Backed Firms	Patent Owner Firms
US (entire)	41.9 (12)	43.2 (11.5)	41.9 (10.6)	44.6 (11.3)
California	2,658,000 41.7 (12)	334,000 42.1 (11.3)	11,000 39.6 (10)	10,000 43.9 (11)
Massachusetts	374,000 41.7 (11.8)	61,700 43.2 (11.2)	4,000 42.3 (9.8)	3,000 45.3 (10.6)
New York	52,000 41.4 (11.6)	8,100 41.8 (11.6)	900 38.7 (10.1)	400 42.7 (11.4)
	276,000	22,600	800	600
Silicon Valley	41.6 (11.4)	41.5 (10.3)	40.2 (9.7)	44.3 (9.8)
	32,000	11,700	1,700	900
Entrepreneurial hubs	40.8 (11.3)	40.5 (10.6)	39.5 (9.8)	43.8 (10.2)
	23,000	9,300	1,900	700

Not Young...

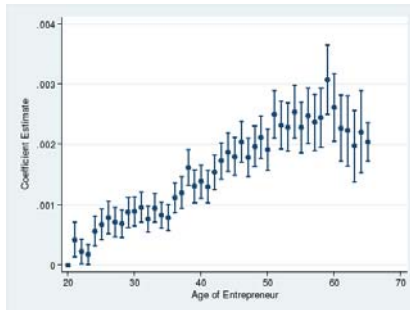
...though VC-backed ~ 4 years younger than patenting firms

What about the most successful entrepreneurs?

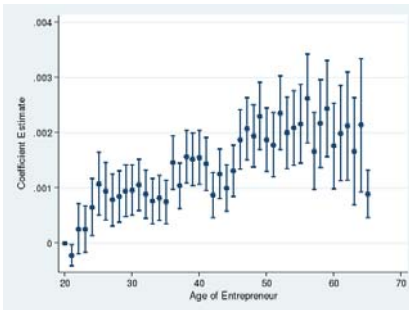
Age and Entrepreneurial Success

	All Startups	Top 10%	Top 5%	Top 1%	Top 0.1%	Successfully Exited Startups
US (entire)	41.8 (11.9)	41.6 (11.5)	42.1 (11.5)	43.7 (11.1)	45.0 (10.7)	46.7 (10.6)
California	1,079,000 41.4 (12.1)	126,000 41.4 (11.7)	62,000 41.6 (11.7)	13,000 42.3 (11.3)	1,700 43.5 (10.1)	4,000 46.6 (10.3)
Massachusetts	154,000 41.7 (11.6)	20,000 41.5 (10.9)	9,700 41.5 (10.7)	1,900 42.8 (10.3)	200 43.2 (10.6)	400 47.7 (9.5)
New York	20,000 41.5 (11.4)	2,700 41.4 (11.5)	1,400 41.8 (11.5)	300 42.5 (11.2)	60 44.2 (10.5)	100 46.2 (11.5)
Silicon Valley	104,000 41.7 (11.4)	9,400 41.8 (10.9)	4,300 41.4 (10.7)	800 41.9 (10)	110 44.3 (9.8)	300 47.2 (8.1)
Entrepreneurial hubs	12,000 41.2 (11.3)	2,100 40.9 (10.7)	1,200 40.6 (10.5)	300 40.9 (9.7)	40 42.6 (10.1)	60 46.7 (9.7)
	8,400	1,600	1,000	300	50	80

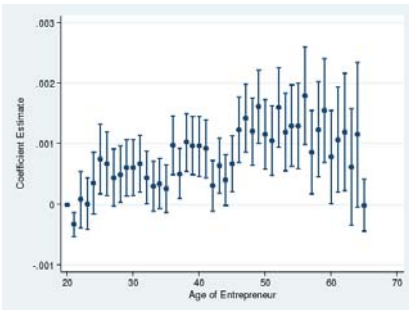
Likelihood of Extreme Success by Age, Conditional on Founding



Probability of Successful Exit (IPO or acquisition)



Probability of Top 0.1% Employment at 5 Years

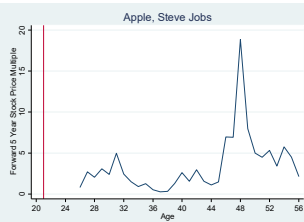


Probability of Top 0.1% Employment at 5 Years, Conditional on Industry

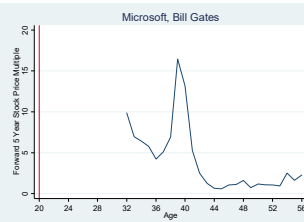
Discussion #1:

How might we reconcile peak in success later in life with examples of hyper-successful young founders?

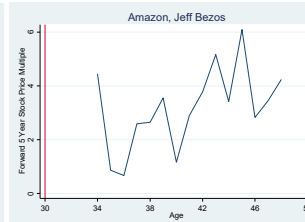
Jobs



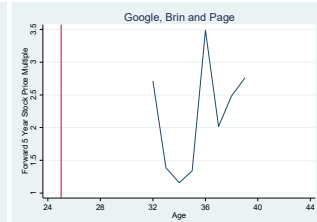
Gates



Bezos



Page/Brin



Extremely talented people may be talented enough to succeed when young, yet still peak in middle age.

(Source: Biographical research and stock price returns; not census data)

Discussion #2:

Resource Allocation

If there is a bias toward the young, how does that affect rate and direction of innovation?

- Thiel: "We wanted flying cars, instead we got 140 characters."

What are VCs doing?

- Do VCs make bad bets? (c.f., Kerr et al. 2014)
- Do young make better financial bargains for VCs?

Discussion #3 / Next Steps: What underlies age advantage?

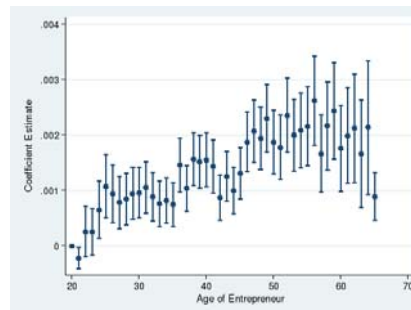
Human capital, financial capital, social capital...?

- Prior experience as entrepreneur
- Prior experience in sector
- Technical depth of founder
- External financing needs by sector, prior income of founder
- B2B vs. B2C orientation

+ Further work refining C-corps founders and extending sample back in time

Summary

- Mean age for founders is 41.9 for any type of firm
- Mean age for founders of most successful firms is 45.0
- Conditional on starting a firm, probability of extreme success is peaking in the age 45-59 range
- Contrary to common public perceptions and tension with VC behavior
- More work ahead to unpack age findings into underlying predictors of entrepreneurial success that vary over life cycle



Thank You

Youngest and Oldest Tech Sectors

Youngest Mean Founder Age (NAICS4, High Tech)

NAICS Code	Sector	N	Mean
5172	Wireless Telecommunications Carriers (except Satellite)	1,500	38.5
5182	Data Processing, Hosting, and Related Services	6,100	39.7
5112	Software Publishers	3,600	39.8
5415	Computer Systems Design and Related Services	100,000	40.1
8112	Electronic and Precision Equipment Repair and Maintenance	4,900	40.8

ICT!

Oldest Mean Founder Age (NAICS4, High Tech)

NAICS Code	Sector	N	Mean
4862	Pipeline Transportation of Natural Gas	50	51.4
3251	Basic Chemical Manufacturing	700	47.9
3255	Paint, Coating, and Adhesive Manufacturing	400	47.5
2111	Oil and Gas Extraction	3,100	47.5
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	400	47.3

~ Manufacturing

Focus on the Very Young

Under 30 vs over 30 founders

