

Investing in Innovation

A New Challenge (and Opportunity) for Investors

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Harvard Business School
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Agenda: Investing in innovation

- I. The increased importance of innovation.**
- II. Why investors are increasingly thinking about innovation.**
- III. The challenge of investing in innovation in private markets.**

The increased importance of innovation.

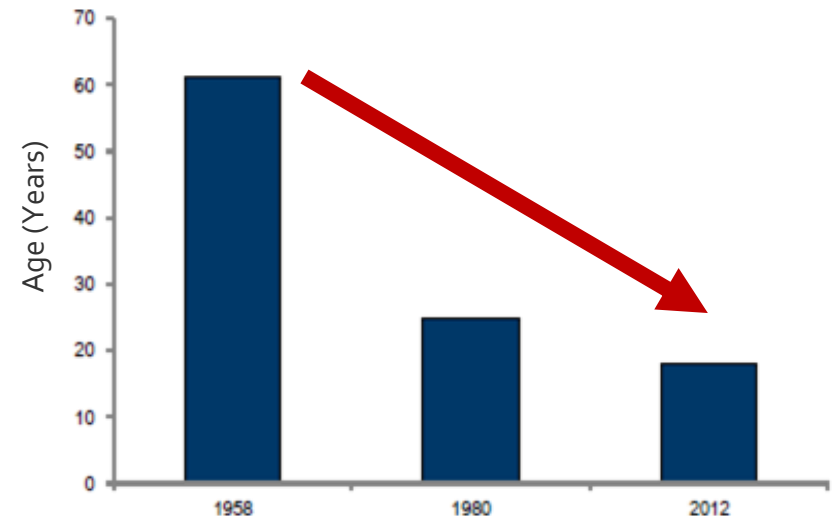
The importance of innovation

- **General agreement that innovation is good.**
- **But WHY?**
 - What does innovation offer?
 - Why do companies need to innovate?
 - How can investors take advantage of this innovation?
- **In this section, we highlight some of the answers to these questions.**
 - Before a longer discussion on investing in innovation.

Long-term survival is not the norm for companies (1)

- **Few companies survive over the medium term.**
- **And life span is decreasing!**
 - The average lifespan of a S&P500 company is less than 20 years...
 - From ~60 years in the 1950s.

Average Lifespan of S&P500 Companies



Source: Credit Suisse research presented on CNBC, <https://www.cnbc.com/2017/08/24/technology-killing-off-corporations-average-lifespan-of-company-under-20-years.html>, 2017.

Long-term survival is not the norm for companies (2)

S&P 500 Churn Over the Past Decade

Sample companies that have entered and exited the index since 2002

Entered the index:



Exited the index:



114.

Most long-surviving firms are in “unexciting” niches

The World's Oldest Businesses

Japan contains the oldest business in a variety of trades and industries

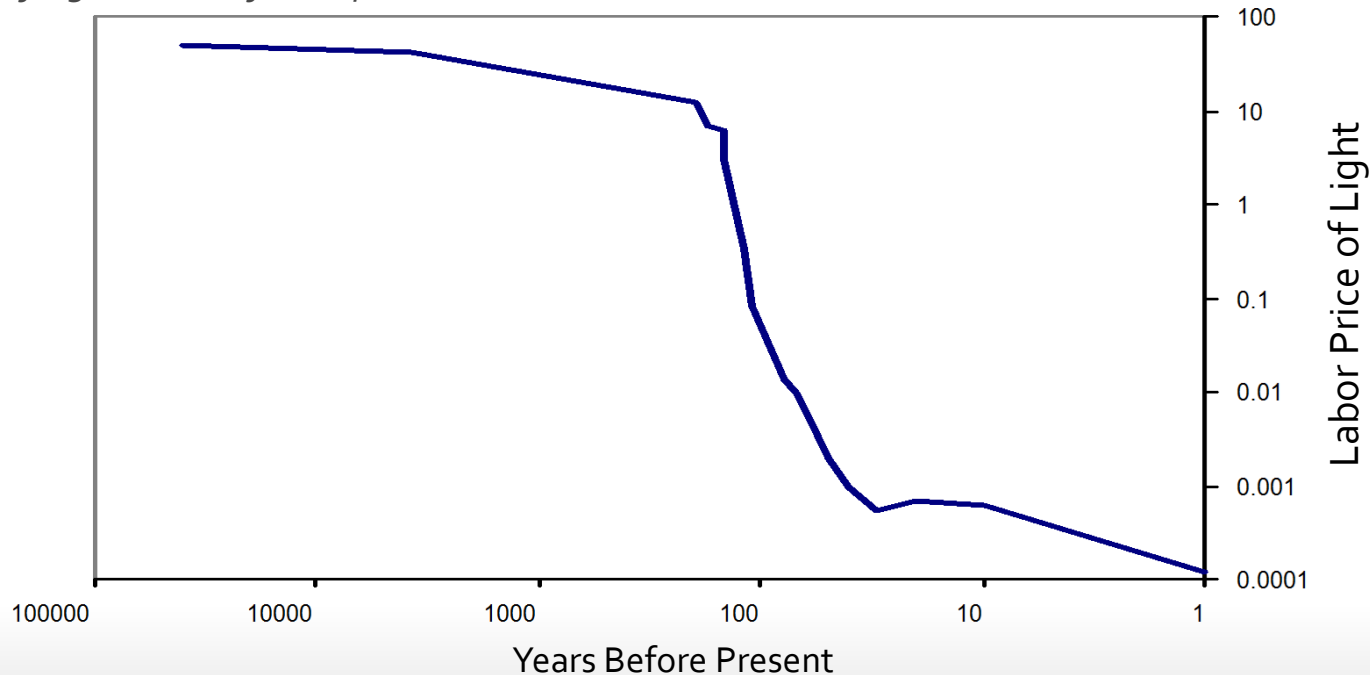
Type of Business	Name	Country	Year Founded
Oldest Hotel	Nishiyama Onsen Keiunkan	Japan	705
Oldest Machinery Company	TECH Kaihatsu	Japan	760
Oldest Restaurant	Stiftskeller St. Peter	Austria	803
Oldest Winery	Staffelter Hof	Germany	862
Oldest Religious Goods Company	Tanaka-Iga	Japan	885
Oldest Pub	Sean's Bar	Ireland	900
Oldest Confectionary	Ichimonjiya Wasuke	Japan	1000
Oldest Brewery	Weihenstephan	Germany	1040
Oldest Tea Company	Tsuen Tea	Japan	1160
Oldest Metalwork Company	Ito Tekko	Japan	1189
Oldest Sake Company	Sudo Honke	Japan	1141
Oldest Pharmacy	Sankogan	Japan	1319

Source: Zackery Crockett, <https://priceconomics.com/why-are-so-many-of-the-worlds-oldest-businesses-in/>, 2015.















However, some succeed dramatically!

- In the light bulb industry, GE maintained leadership for well over a century by constant innovation and reinvention.
 - Despite 100,000+ times reduction in the price of light over 130 years.

The Price of Light: Hours of Work per 1000 Lumen Hours



But most of top global companies by market cap (as of March 31, 2019) are young and innovative.

Rank by market cap*	Market cap (\$ MM)	Company	Location	Venture-backed?
1	904,860	 Microsoft		Yes
2	895,670			Yes
3	874,710	 amazon		Yes
4	818,160	 Alphabet		Yes
5	493,750	 BERKSHIRE HATHAWAY INC.		No
6	475,730	 f		Yes
7	472,940	 Alibaba Group		Yes
8	440,980	 Tencent 腾讯		Yes
9	372,230	 Johnson & Johnson		No
10	342,170	 ExxonMobil		No

*As of March 31, 2019.

Sources: Financial Times Global 500.

And many more aspiring to join them!



Uber



wework



stripe



airbnb

coinbase



slack



Innovation is the implementation of ideas.

Ideas are special things...

That enhance survival and growth of companies...

And create substantial value for investors.

So it is not surprising that investors are increasingly thinking about innovation.

Why investors are increasingly thinking about innovation.

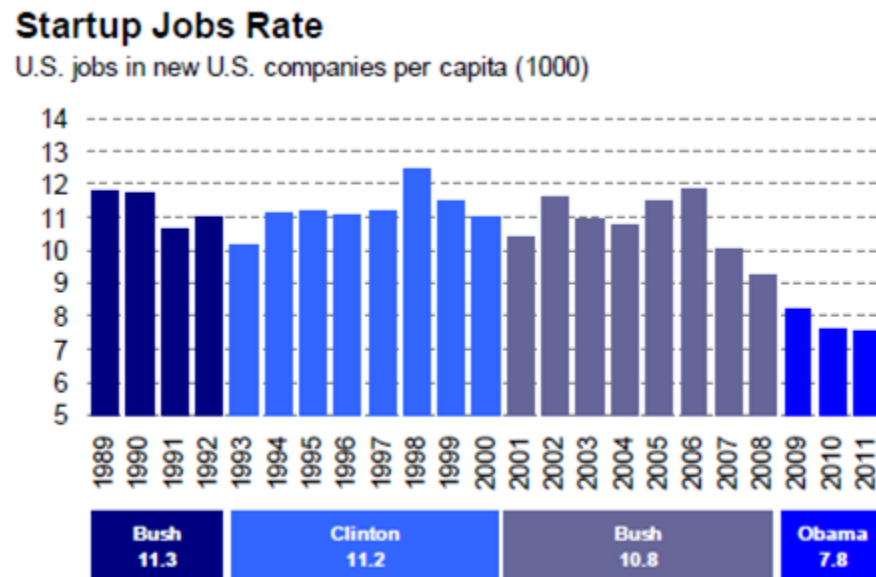
Big company R&D has given way to entrepreneurship.

- Innovation increasingly comes from young, small, and agile companies and entrepreneurs.
- Researchers looked at 100s of key innovations from 1950-2000.
 - Small firms contribute disproportionate share of major innovations.
 - Contribution was greatest in immature industries which were relatively unconcentrated.

Source: Acs & D. Audretsch, "Innovation in Large and Small Firms: An Empirical Analysis," *American Economic Review*, Vol. 48(4), 1988, pp. 678-690; Z. J. Reinganum, "The Timing of Innovation: Research, Development, and Diffusion," *Handbook of Industrial Organization*, Vol. 1, 1989, pp. 849-908.

Young companies create ideas...and jobs!

- These young, small companies have big impact not only on innovation but also on job creation.
 - A recent report shows that young firms have a huge advantage in job creation, for example.
 - Essentially **all growth in US jobs come from firms <3 years old.**



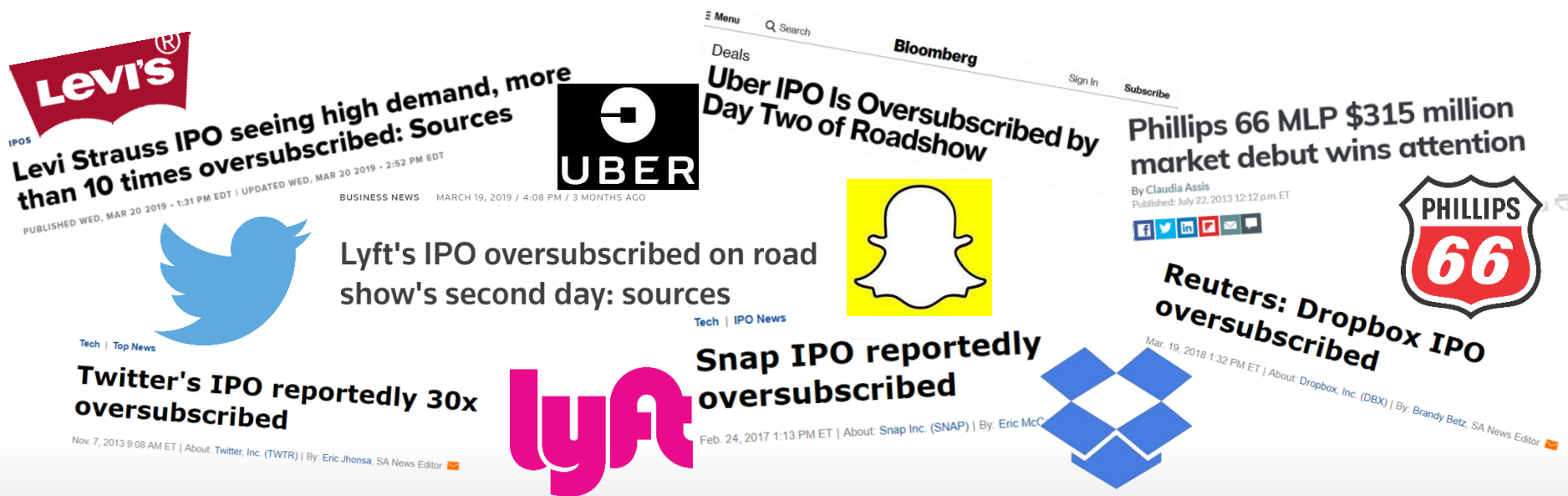
Sources: J. Haltiwanger et al., "Who Creates Jobs? Small vs. Large vs. Young," *NBER Working Paper Series*, No. 16300, 2010. C. Criscuolo, "The Dynamics of Employment Growth: New Evidence from 18 Countries," *OECD Science, Technology, and Industry Policy Papers*, Vol. 14, May 2014.

How to access these innovative companies?

- If an investor wants to invest in smaller, more innovative companies, how would they do it?
 1. Invest after the companies have gone public.
 2. Invest or co-invest when they are still private.

Popular public markets approach: IPOs

- Investors often attempt to access innovative companies through IPOs.
 - Generally by investing in VC-backed tech companies.
- Clearly, there is much interest in IPOs of trendy companies.



And how's that working?

- **Sometimes, this strategy goes well.**
 - Google, for example, has provided sustainable returns for its investors.
 - After an auction-style IPO in 2004, Google has continued to innovate and grow (sometimes by purchasing companies).

Alphabet (Google) Share Price



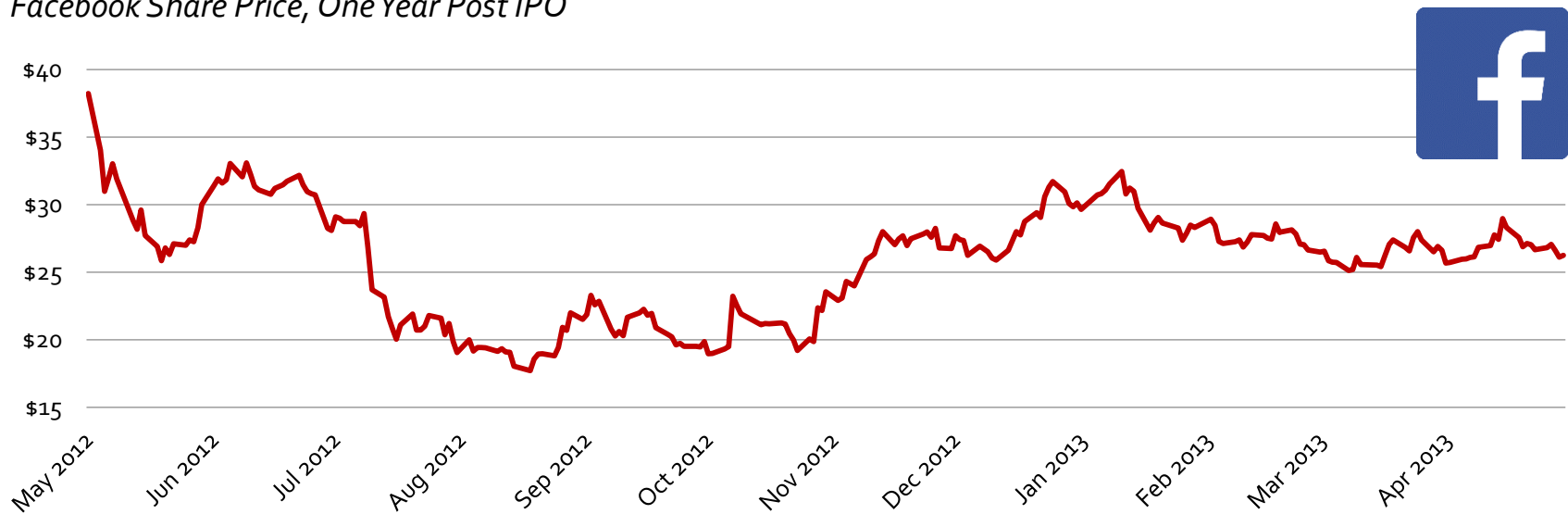
Sources: CapitalIQ

Other times, however, it can be disastrous.

- **Facebook's IPO is a good example.**

- It was fraught with allegations of hiding concerns about growth and reduced revenue projections.
- Its stock price plunged and remained depressed a year later.

Facebook Share Price, One Year Post IPO



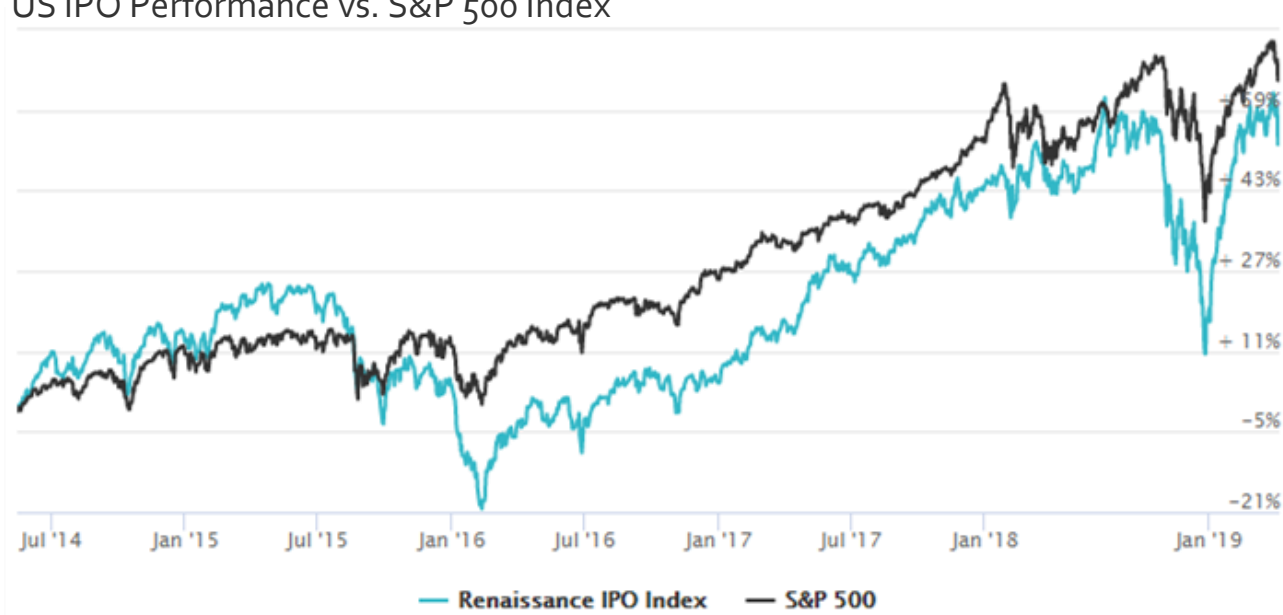
Sources: CapitalIQ

Lena Goldberg and Annelena Lobb, "The Facebook IPO Litigation," *Harvard Business School Case No. 9-313-080*, 2013.

In fact, IPO performance in general has lagged...

- IPO performance has trailed the S&P 500 index.

US IPO Performance vs. S&P 500 Index



Source: <https://www.renaissancecapital.com/IPO-Center/Stats>. The Renaissance IPO Index reflects approximately the top 80% of newly public companies based on full market capitalization, weighted by the free float capitalization. A 10% cap is imposed on large constituents. Companies are removed two years after their initial trade date. Data as of May 2019.

IPO underperformance has led researchers to look for other strategies in the public markets.

- **Recent work has studied whether investing in innovative public companies leads to outsized returns.**
 - They compared investments in innovative versus non-innovative companies.

- **But how to measure innovation?**
 - A popular approach is to use patents.
 - However, patenting can be an imperfect measure.
 - If Company A and Company B both have 1 patent, are they equally innovative?

Sources: David Hirshleifer, Po-Hsuan Hsu, Dongmei Li, "Innovative Originality, Profitability, and Stock Returns," *The Review of Financial Studies*, 2018.
Coller Capital, "The Lure of the New," *Private Equity Findings*, Issue 14, 2018.

Measuring innovation

- **Key insight – innovation occurs when ideas from very different fields are combined in new ways.**
- **One set of authors developed a measure for this called “InnOrig”.**
 - It measures the number of unique technology classes that are cited in a company’s patents.
 - So, if Company A’s patent cites 5 different technology classes while Company B’s patent cites only 2 different classes, Company A is more innovative.

Sources: David Hirshleifer, Po-Hsuan Hsu, Dongmei Li, “Innovative Originality, Profitability, and Stock Returns,” *The Review of Financial Studies*, 2018.
Coller Capital, “The Lure of the New,” *Private Equity Findings*, Issue 14, 2018.

They find that innovation DOES matter!

- **Companies with high InnOrig scores were undervalued.**
 - These companies had higher and less volatile profitability.
 - They outperformed their peers on the stock market.
 - Finding is true for small and large companies.
- **Why?**
 - Investors don't have the knowledge or tools to understand where innovative value lies.
 - Many companies undertake "me-too" R&D projects.
 - Difficult for investors to sift through the noise to find companies with innovations that will truly make a breakthrough.
 - With genuinely new technologies, companies charge a premium, customers are more sticky, and they sustain competitive advantage.

Sources: David Hirshleifer, Po-Hsuan Hsu, Dongmei Li, "Innovative Originality, Profitability, and Stock Returns," *The Review of Financial Studies*, 2018.
Coller Capital, "The Lure of the New," *Private Equity Findings*, Issue 14, 2018.

Public markets – Bottom line and practical advice

- Investing in innovation through public markets can be challenging.
- **Popular method of investing in IPOs → underperformance.**
 - Suggests that institutional investors (i.e. pensions funds, etc.) should not use a strategy of investing in IPOs to access innovative companies.
- **However, research suggests another approach is profitable.**
 - Investing in innovative public companies can lead to outperformance.
 - But measuring innovation and identifying these companies can be challenging!
 - For a institutional investor to implement, it would require a sophisticated investment team with different skills.

Alternate strategy – invest in companies before they go public.

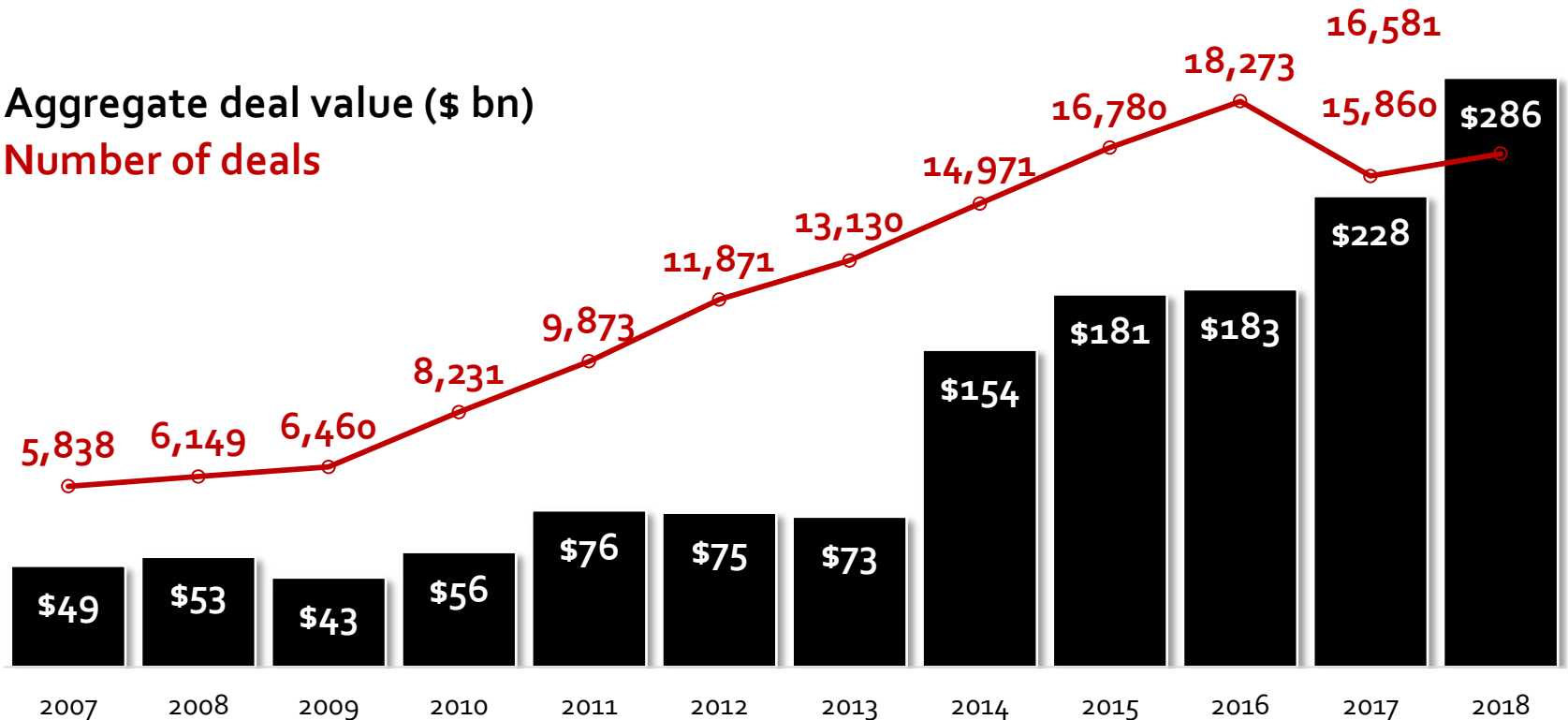
- **Clearly, difficult to identify and invest in truly innovative companies in the public markets.**
 - Therefore, investors are increasingly interested in accessing innovative companies *before* they go public.
 - The obvious way to do this is by **investing in VC funds**.
- **However, many issues exist...**
 - An increasingly competitive VC environment.
 - VC investment is risky!
 - Not everyone is a winner.
 - How to identify “skilled” GPs.
 - What about bypassing funds altogether?
- **We explore these issues in the next section!**

The challenge of investing in innovation in private markets.

The surge in VC investment

*Global VC investment by year,
2007 – 2018*

Aggregate deal value (\$ bn)
Number of deals



Source: Preqin.

Major player is the SoftBank Vision Fund.

- **What is the SoftBank Vision Fund?**
 - \$100 billion tech-focused fund raised in 2017.
 - Fund led by Masayoshi Son, founder and CEO of Japan's SoftBank.
 - **\$100 million minimum investments** in late-stage tech companies.
- **Aims to build an ecosystem of companies.**
 - Goal of companies in the ecosystem working together.
 - Positions SoftBank for future growth in emerging technology areas.

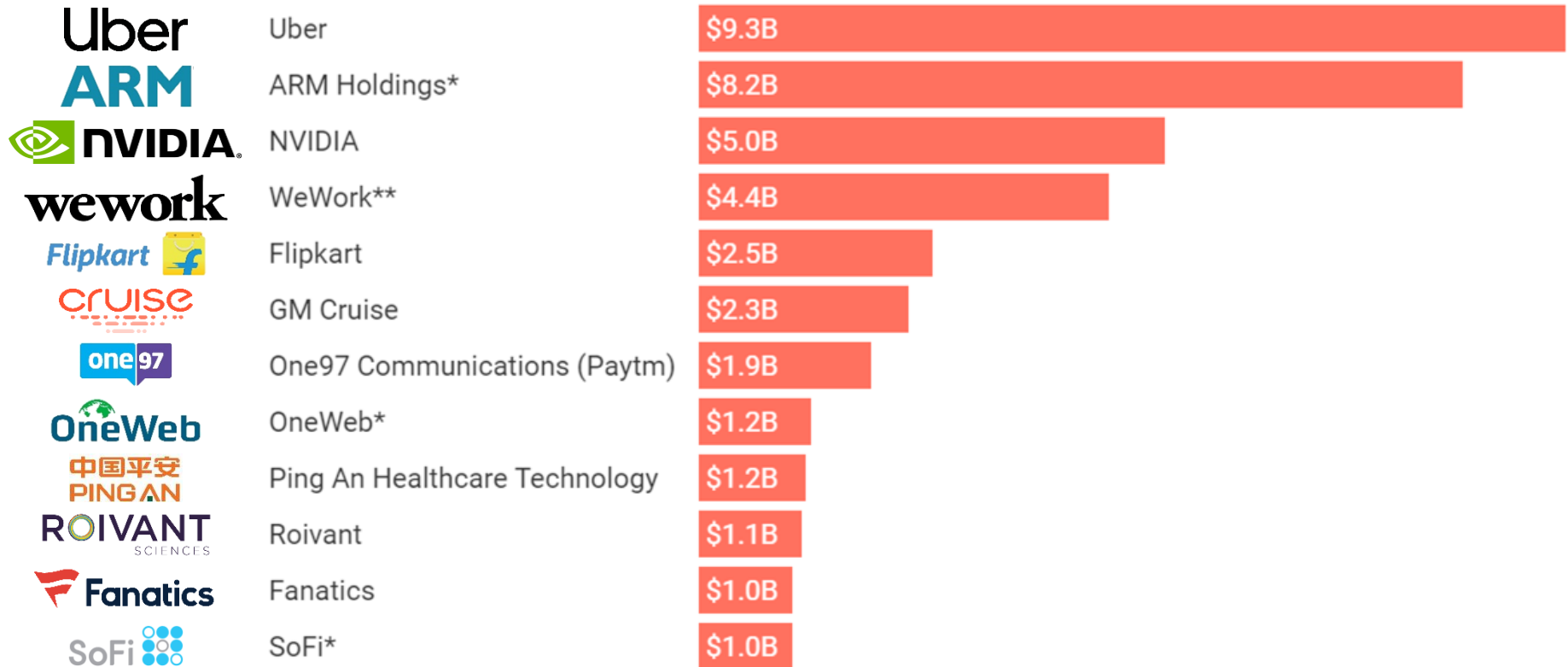
"The Fund is expected to invest in businesses and foundational platforms that SoftBank believes will enable the next age of innovation and make tomorrow's world possible."

Source: SoftBank Vision Fund website; Sam Nussey, "SoftBank's Son says new Vision Fund to be set up in 'near future'", *Reuters*, May 15, 2018; "SoftBank Investment Tracker", *CB Insights*; "The impact of Masayoshi Son's \$100bn tech fund will be profound", *The Economist*, May 10, 2018.

Several big name Vision Fund investments

Selection of SoftBank's Vision Fund Investments

As of June 2018



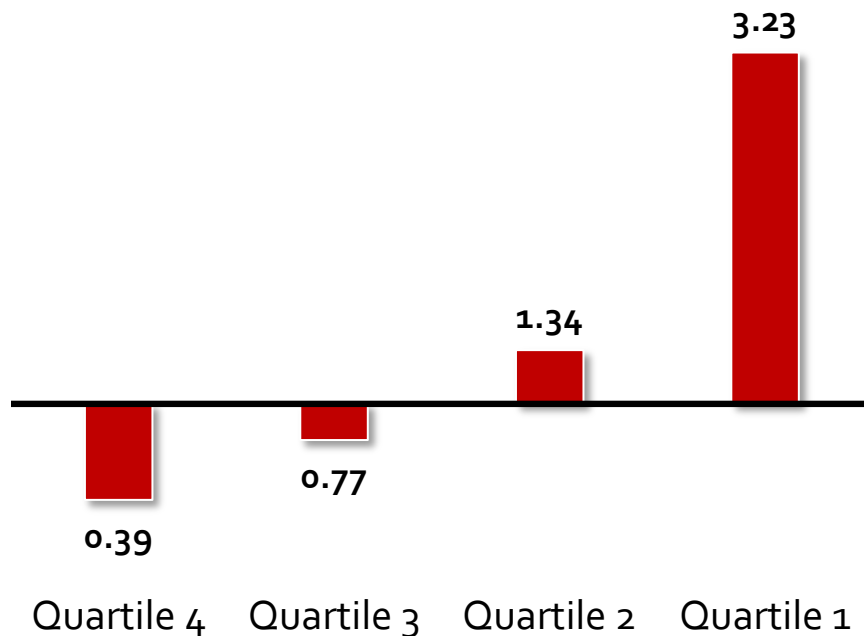
*SoftBank investments expected to be offered to the Vision Fund. **Combined \$4.4 billion from both SoftBank Group and SoftBank Vision Fund. Split not disclosed. Note: Since final deal values are not disclosed, value of funding rounds led by SoftBank used instead. OSISOFT not included since deal value is unknown.

Sources: SoftBank announcements and disclosures, news reports. Aggregated by Rani Molla, "Where SoftBank has invested its \$100 billion Vision Fund", *Recode*, June 6, 2018.

With intense competition, outperformance is hard.

- Most of outperformance concentrated in top quartile of VC funds—or even smaller share!

PMEs of Post-2000 Funds (S&P500)



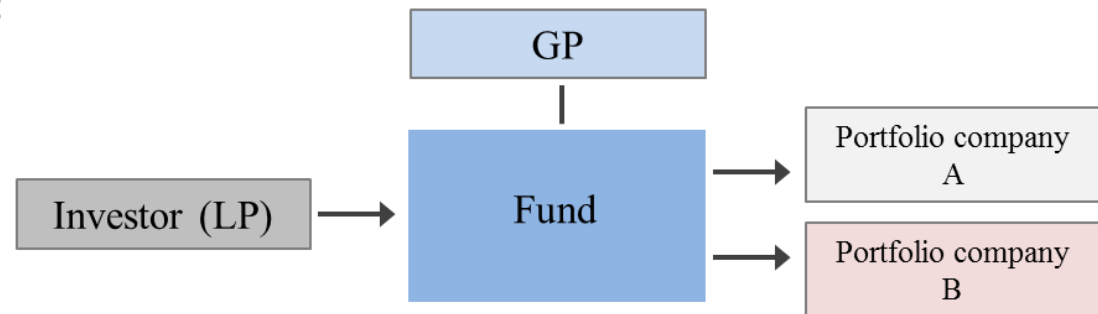
- But how to choose a top fund manager?
 - In VC, past performance might be indicative of future performance.
 - Analysis shows that if a manager's previous fund was top quartile, the next fund has a 70% chance of being in the top two quartiles.
- So invest with the best—or those likely to be the best!

Source: Steve Kaplan, "What Do We Know About VC Performance? VC Persistence?", November 2018. Data come from Burgiss and the author's analysis.

Or co-invest!

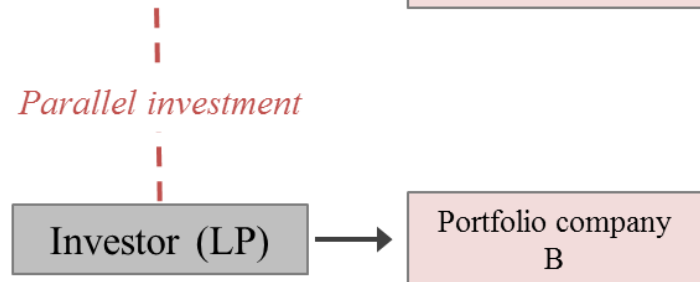
- Investors are also increasingly looking at co-investments.
 - Co-investments occur alongside an existing fund.

Traditional PE investment:



Direct investment: Co-investment

- ✓ Reduced fee and carry
- ✓ Quasi-independent investment decision
(decision over the pre-selected set and no control over exit)



But choose your deals carefully.

- Researchers analyzed data on direct* investments made by large institutions and found that some did better than others.
 - Some situations were better for direct investing:
 1. *Local deals.*
 2. *Smaller deals.*
 3. *Deals when economy is relatively robust* (less need for intervention?).
- “Plain vanilla” transactions when better information, less need for special skills.
- With increasing opportunities in Japan, may be a **unique opportunity for pension funds** with specific local knowledge and reputation!

*Direct deals include co-investments.

Source: Fang, Lily, Victoria Ivashina, and Josh Lerner. 2015. The disintermediation of financial markets: Direct investing in private equity. Journal of Financial Economics.

Who is doing co-investment right?

- **A recent study investigated the performance of different types of LPs.**
 - Looked at 112 global LPs investing in PE/VC between 1980 and 2017.
- **Found that the best performance in alternative vehicles (incl. co-investments) was among three sets of LPs:**
 - Endowments and foundations.
 - Mid-sized asset owners.
 - European LPs.
- **LPs with historically high performance also do better.**
 - Suggests that there is some persistence of skill effect.

Source: Lerner, Josh and Mao, Jason and Schoar, Antoinette and Zhang, Nan R., Investing Outside the Box: Evidence from Alternative Vehicles in Private Capital (August 15, 2018). Harvard Business School Entrepreneurial Management Working Paper No. 19-012; Harvard Business School Finance Working Paper No. 19-012. Available at SSRN: <https://ssrn.com/abstract=3230145>

What practical advice does this study offer?

- **Alternative vehicles (i.e. co-investments) are not “one size fits all.”**
 - Significant heterogeneity in performance across LP (and GP!) types.
 - Certainly not a simple path to riches!
 - LPs that are typically seen as **more sophisticated perform better.**
- **Relevance to institutional investors:**
 - Real danger of adverse selection and adverse market timing.
 - That is, more co-investment opportunities might be available from “bad” GPs or during market peaks.
 - Places strong demands on the pension’s investment team.
 - These are not simple investments.
 - Requires a very knowledgeable and experienced investment team to implement this strategy successfully.

Source: Lerner, Josh and Mao, Jason and Schoar, Antoinette and Zhang, Nan R., Investing Outside the Box: Evidence from Alternative Vehicles in Private Capital (August 15, 2018). Harvard Business School Entrepreneurial Management Working Paper No. 19-012; Harvard Business School Finance Working Paper No. 19-012. Available at SSRN: <https://ssrn.com/abstract=3230145>

Co-investment caveat

- **LPs must do a significant amount of due diligence.**
 - This includes evaluating the track records of the fund managers and performing due diligence on the deal itself.
- **Lack of diversification.**
 - Co-investing occurs outside the traditional fund structure and in single companies.
 - Therefore, the LP must consider *each individual investment's* impact on its portfolio.
 - Investing in many different companies is key to diversification.

Bottom line – It's possible to succeed when investing in innovation!

- **But not easy!**
- **Requires a sophisticated investment team to navigate a complex landscape:**
 - New measures and tools needed.
- **However, opportunity to access innovative companies – and generate strong returns – still exists!**
 - Co-investment can be a part of a successful pension fund's investment strategy.

Final Thoughts

Final thoughts

- **Innovation is important!**
 - Investors constantly trying to access companies with innovative ideas and strong growth prospects.
- **However, investing in innovation can be difficult.**
 - IPOs can go well... or very poorly.
 - Research has shown that innovative companies outperform.
 - But need new tools to invest successfully.
- **Venture capital is another choice for investing in innovation.**
 - It is not a golden ticket, but strong returns are possible!

Out of time!

U.S. Patent

June 11, 1991

Sheet 1 of 3

5,023,850

Innovation!!



Fig. 1

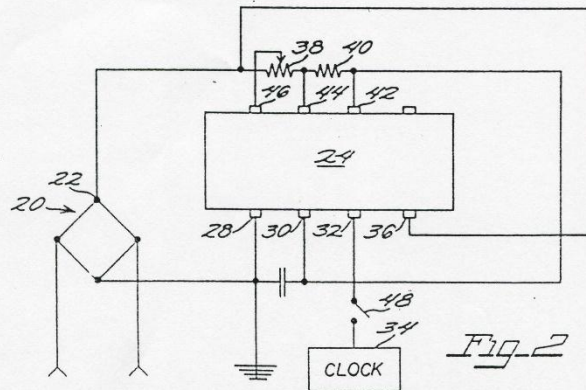


Fig. 2

Thank You!



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