

# Fintech Venture Capital Framework

Spring 2019

# VC ten surprises

- **Innovation**, odds of success
- **Variation: types of investors, stage of company**, geographical, industry
- **Structure**: firm and funds
- **Sequoia pitch deck** framework-investment process
- **Returns and risks** from the VC asset class
- **Cost of capital**, multiples, hurdle rates, IRR
- **Valuation** DCF and comps
- **Path dependency and structuring deal terms for advantage** (asymmetrical payoff patterns)
- **Exits**, illiquidity, cyclicalality
- **Concentration and network effects**
- ***The struggle with diversity***



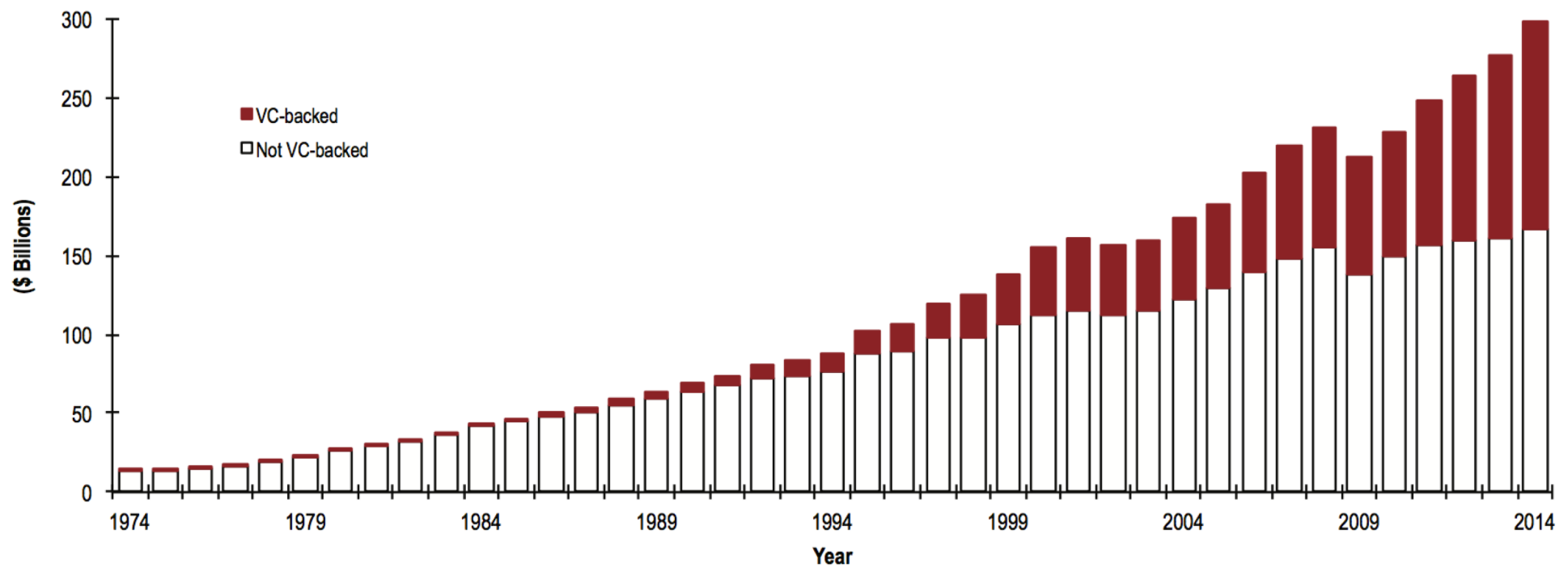
Venture Capital Fintech

# **1. INNOVATION AND THE ODDS OF SUCCESS**

# Source of innovation

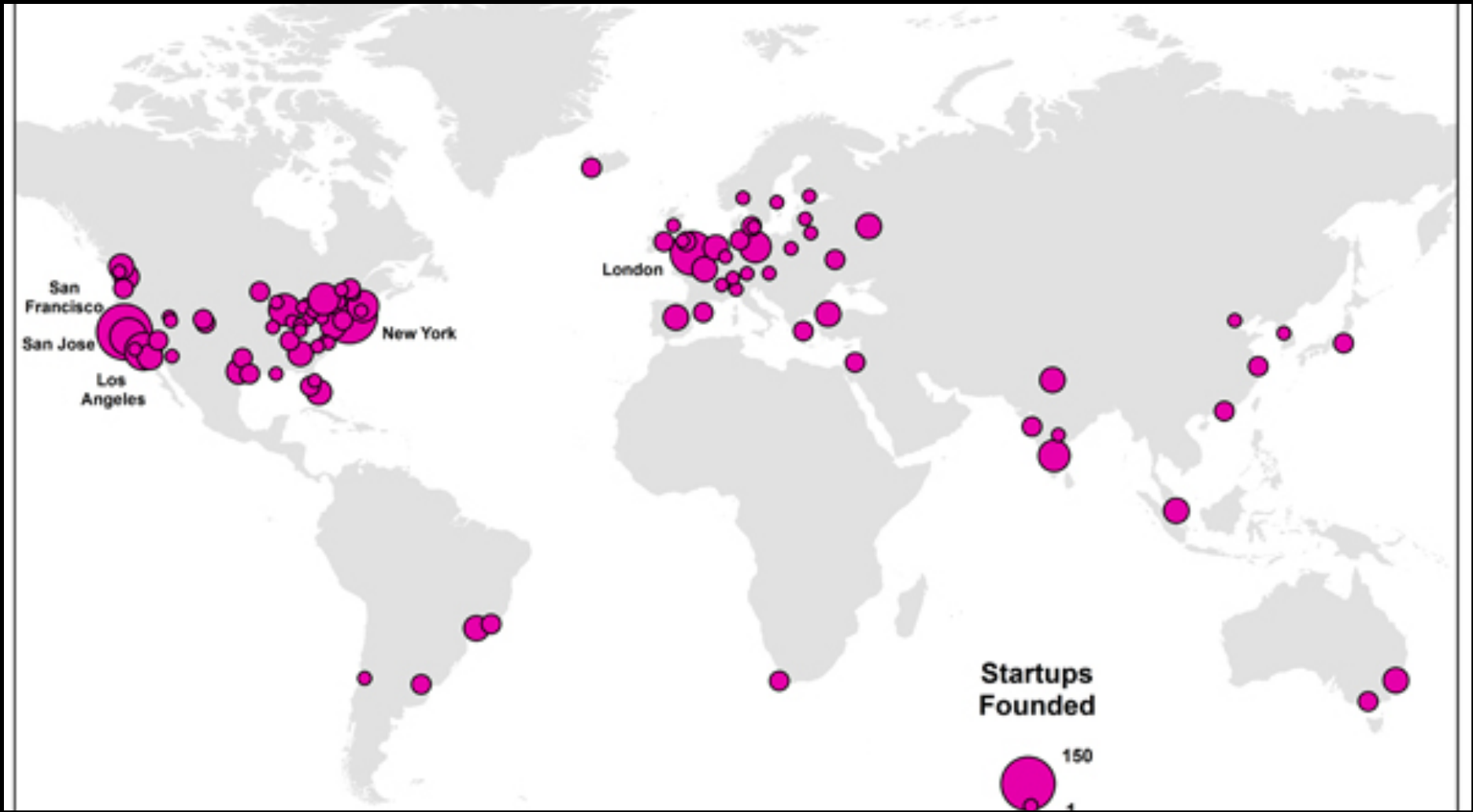
R&D comes from 3 sources: government, university, and industry  
VC backed companies are more likely to be R&D driven

**Research & Development Spending by Venture-backed Public Companies<sup>1</sup>  
1974 to 2014**



# Innovation around the world

number of startups founded



# By state

**Figure 8.0**  
**2015 Investments By State**

State	No. of Companies	Pct of Total	Investment (\$ Millions)	Pct of Total
California	1,498	40%	33,866.6	57%
New York	405	11%	6,254.4	11%
Massachusetts	350	9%	5,677.9	10%
Washington	100	3%	1,210.8	2%
Texas	133	4%	1,170.8	2%
Illinois	85	2%	1,103.6	2%
New Jersey	39	1%	979.0	2%
Maryland	61	2%	872.0	1%
Georgia	59	2%	836.1	1%
Colorado	74	2%	782.6	1%
All Others	905	24%	6,311.8	11%
<b>Total</b>	<b>3,709</b>		<b>59,065.6</b>	

By zipcode

63% of US patents  
from just 20 metro  
areas

# FAILURE RATES OF STARTUPS

---

**95%** FALL SHORT  
OF MEETING  
**PROJECTIONS**



---

**80%** FAIL TO SEE  
PROJECTED  
**RETURN**  
ON INVESTMENT



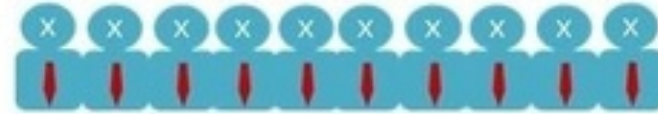
---

**40%** LIQUIDATE  
AND  
LOSE MOST OR ALL  
**INVESTMENT**



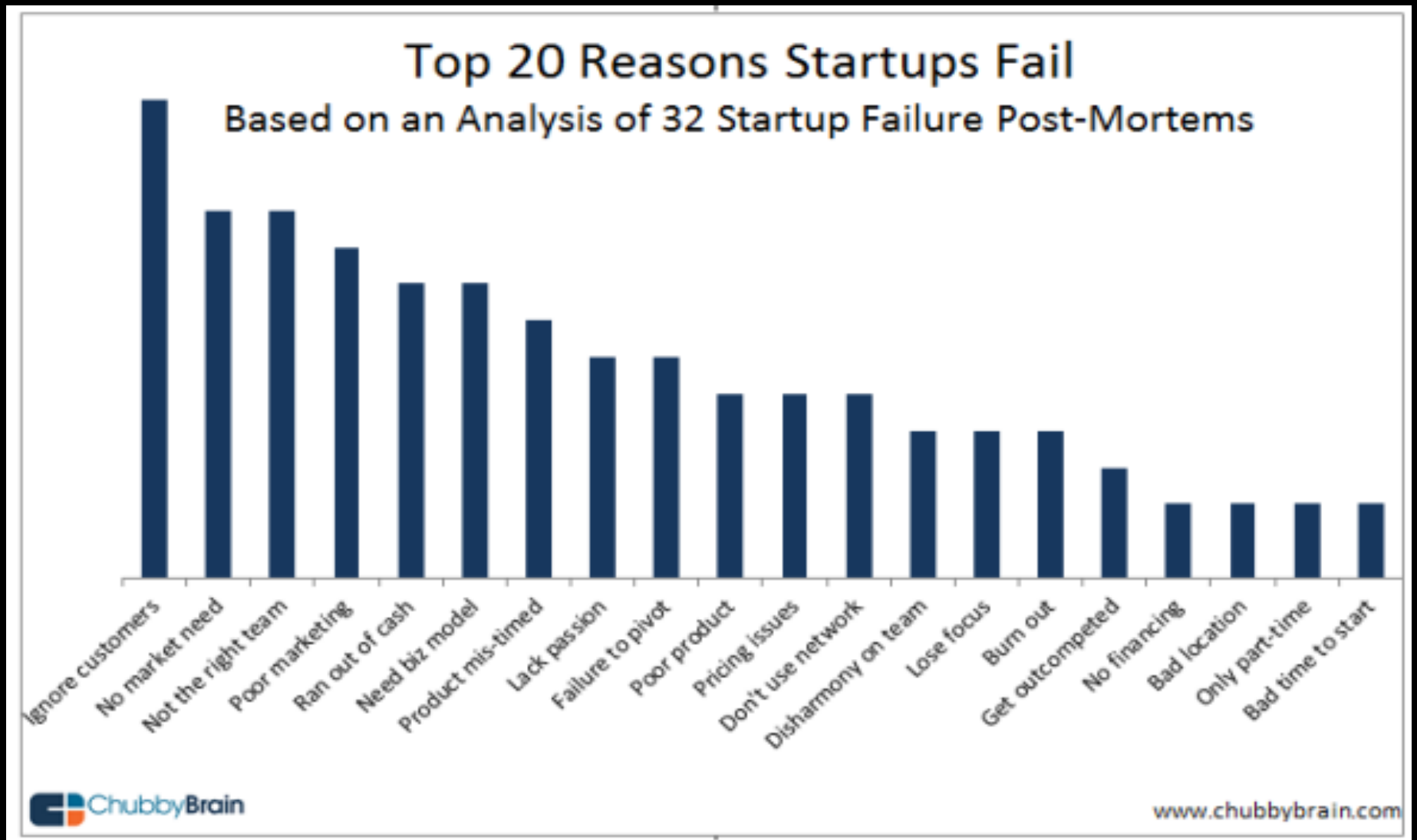
---

**99%** OF REASON FOR  
FAILURE IS  
LACK OF  
**PLANNING & EXPERIENCE**



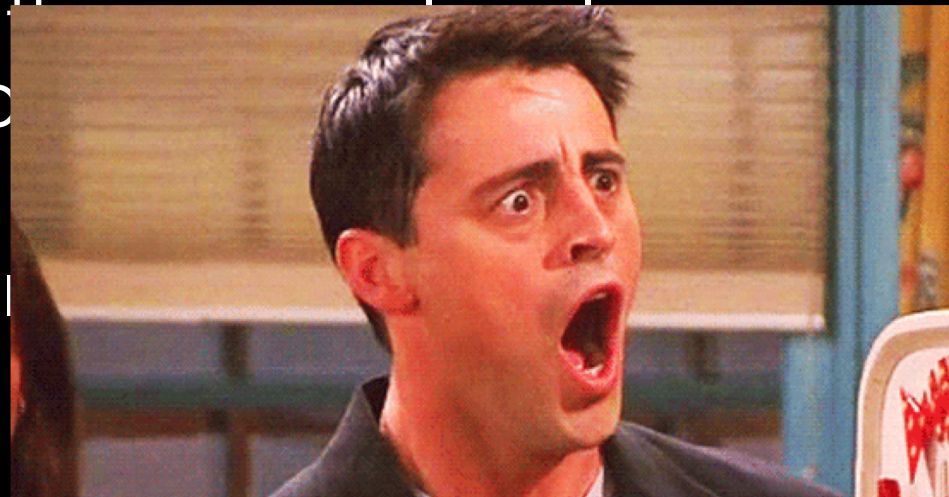
Data from various sources including Harvard Business School, University of Tennessee Research, StatisticBrain.com, and others.

# Reasons for failure



# Summary this section-innovation

- Scarce-most startups fail, most R&D dollars are wasted
- Concentrated in key spots
- Global-don't assume all developed markets-developing markets can leapfrog
- Critical to economic growth and productivity
- Metrics are input (R&D) and output (patents) per capita at the macro level  
R&D % sales at the micro level
- Driven by technology
- VC performs an important role

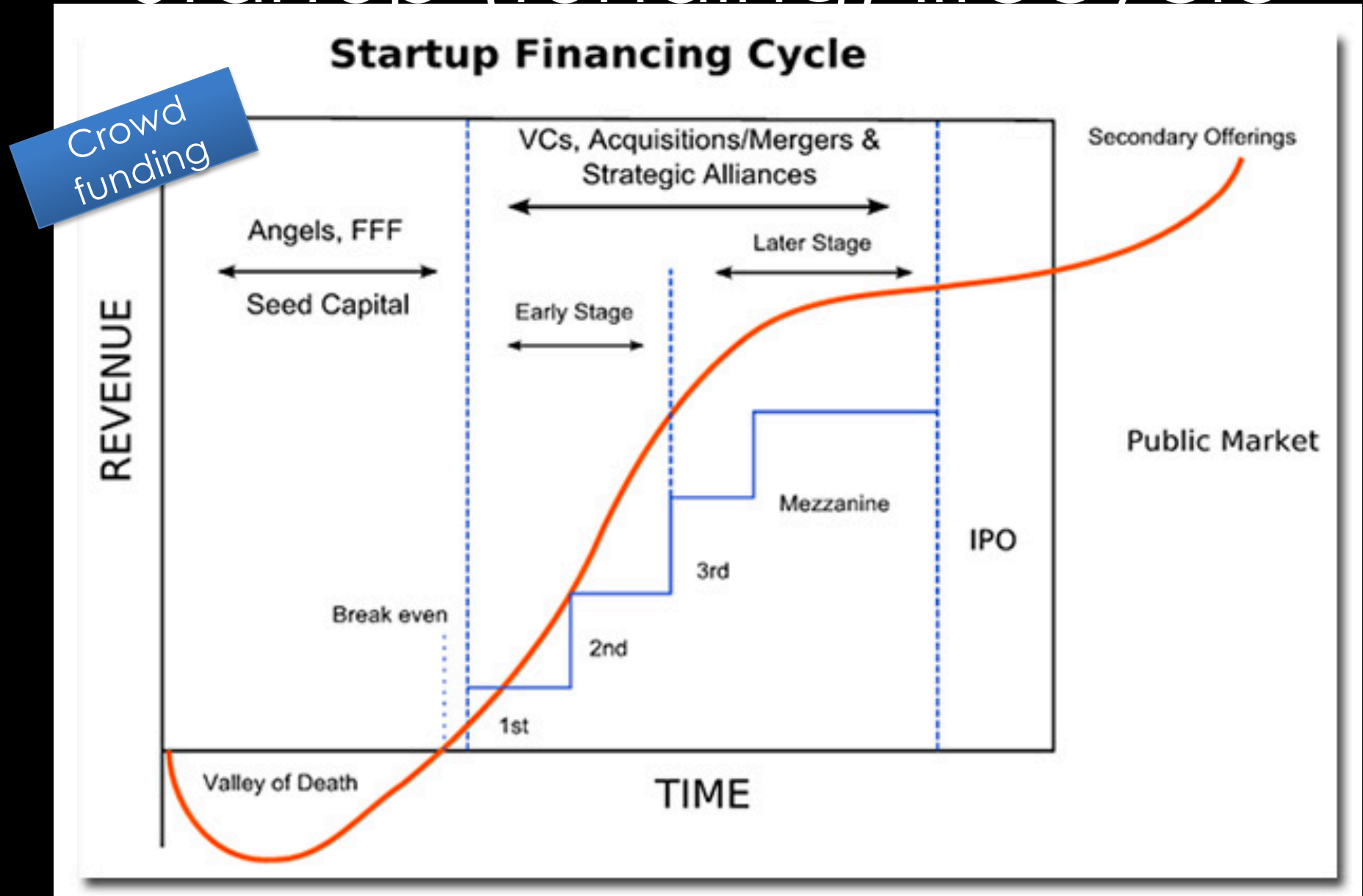




Venture Capital Fintech

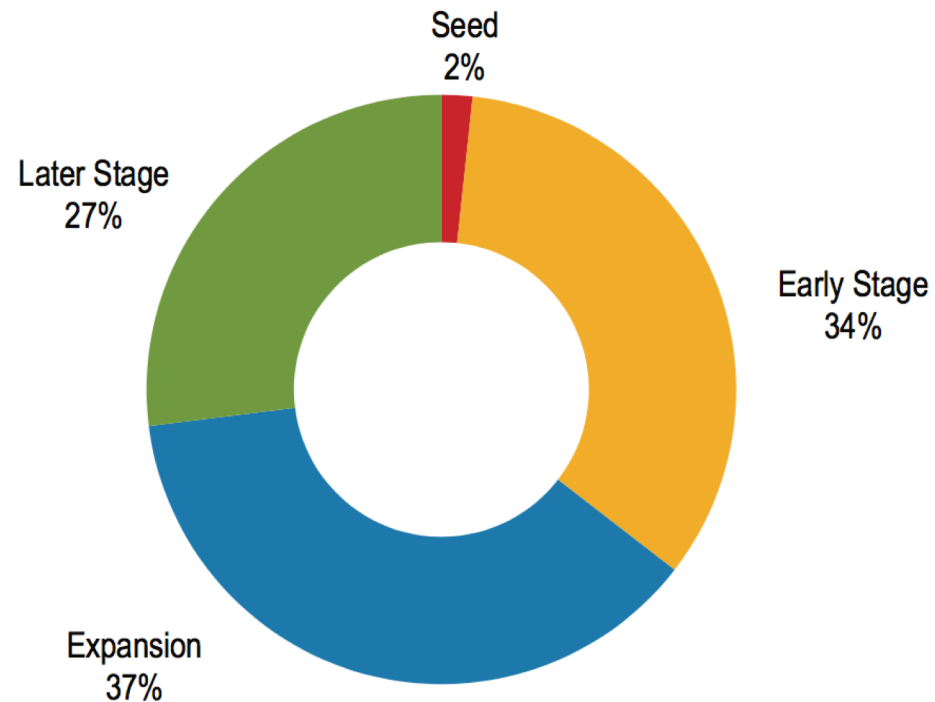
## **2. VARIATION: INVESTORS, STAGES, INDUSTRIES AND IP**

# Startup (funding) lifecycle



# By stage

**Figure 6.0**  
**Venture Capital Investments in 2015**  
**By Stage (% of Dollars Invested)**



**Figure 7.0**  
**Venture Capital Investments in 2015 By Industry Sector**  
**(% of Dollars Invested)**

# What motivates early stage investors?



# Friends and family



# Incubators

- Examples: Y Combinator, Startup Bootcamp, Level 39
- Business Model
  - Take slice of equity as payment for services to very early stage, first time entrepreneurs. Provide working space, small stipend, and advice from team and angels. Sometimes also charge entrepreneurs for access to investors, markets, advice
  - Some due diligence
  - Very low barriers to entry-can be playground
  - Opaque track records except for the few well-known success stories like Y-Combinator
- Clients
  - Incumbent financial sponsors looking for new business ideas
  - Governments supporting innovation
  - Angels and VCs looking for deal flow to put in pipeline

# Incubators

- Examples: Y Combinator, Startup Bootcamp, Level 39
- Business Model
  - Take slice of equity as payment for services to very early stage, first time entrepreneurs. Provide working space, small stipend, and advice from team and angels. Sometimes also charge entrepreneurs for access to investors, markets, advice
  - Some due diligence
  - Very low barriers to entry-can be playground
  - Opaque track records except for the few well-known success stories like Y-Combinator
- Clients
  - Incumbent financial sponsors looking for new business ideas
  - Governments supporting innovation
  - Angels and VCs looking for deal flow to put in pipeline

# Y-Combinator

Top Y Combinator Startup Alumni By Disclosed Financing or Exit Valuation

Rank	Company	Valuation (\$M)	Batch	Early VC Investors
1	<a href="#">AirBnB</a>	25500	W09	Sequoia Capital, Y Ventures, Greylock Partners
2	<a href="#">Dropbox</a>	10000	S07	Sequoia Capital, Accel Partners
3	<a href="#">Zenefits</a>	4500	W13	General Catalyst Partners, Andreessen Horowitz, Venrock, Maverick Capital
4	<a href="#">Stripe</a>	3500	S10	Sequoia Capital, SV Angel, Andreessen Horowitz, Lowercase Capital, General Catalyst Partners
5	<a href="#">Instacart</a>	2000	S12	Sequoia Capital, Khosla Ventures, Canaan Partners
6	<a href="#">Docker</a>	1000	S10	Trinity Ventures, Lowercase Capital, Benchmark, Trinity Ventures
7	<a href="#">Twitch Interactive</a>	970	S07	Felicis Ventures, Alsop-Louie Partners, Draper Associates
8	<a href="#">Mixpanel</a>	865	S09	Sequoia Capital, Andreessen Horowitz
9	<a href="#">DoorDash</a>	600	S13	Sequoia Capital, Khosla Ventures, CRV, Pejman Mar Ventures
10	<a href="#">ZenPayroll</a>	560	W12	Google Ventures, Sherpalo Ventures, Kleiner

About

Y Combinator created a new model for funding early stage startups.

Twice a year we invest a small amount of money ([\\$120k](#)) in a large number of startups (recently [105](#)).

The startups move to Silicon Valley for 3 months, during which we work intensively with them to get the company into the best possible shape and refine their pitch to investors. Each cycle culminates in Demo Day, when the startups present their companies to a carefully selected, invite-only audience.

But YC doesn't end on Demo Day. We and the YC alumni network continue to help founders for the life of their company, and beyond.



# Crowd funding platforms (invest)

EquityNet<sup>®</sup>

 MICROVENTURES

 **onevest**  
Where the best teams get funded

CircleUp

wefunder  
crowdfunding for startups and small businesses

 **INVESTABLE**

FundersClub



 crowdcube

seedinvest

# Crowd platform

disruptive to angel investing groups



- Examples:
  - Angelist, SEEDrs, etc.
- Business Model
  - No fund or permanent capital-platform model
  - Take underwriting fee from entrepreneur posting deal-very low entry for investors, plus network benefits
  - Various degrees of curation or due diligence to manage reputational risk
  - No investment process per se-follow crowd or an expert
  - Investments biased to easy-to-tell B2C stories
  - No track record-first exits starting to happen
- Clients
  - Accredited investors (most jurisdictions-see JOBS act U.S. change) for their own portfolios
  - Ticket sizes \$1000 and up

# Angel Investors



- Examples:
  - New York Angels, Go Beyond Investing, UK Business Angels,
  - Typically former entrepreneurs, HNWI individuals, former business owners
- Business Model:
  - Membership model (fees for access to deals), sometimes also charge entrepreneurs
  - Pooling angels, rarely a fund, some syndication with other angels- technically an unsolicited securities offering
  - Varying degrees of investment discipline (non-professional investors) and due diligence-internal champion and group interest key drivers
  - High costs, subsidies (experienced investors to inexperienced ones) and intangible value for members (networking)
  - Opaque track records
- Clients
  - Accredited Investors for their own portfolios
  - Family offices
  - Ticket sizes \$5000 to \$5 million
  - Deal sizes usually under \$10 million valuation

# Angel track record

Kerr, Lerner, Schoar (2014 )

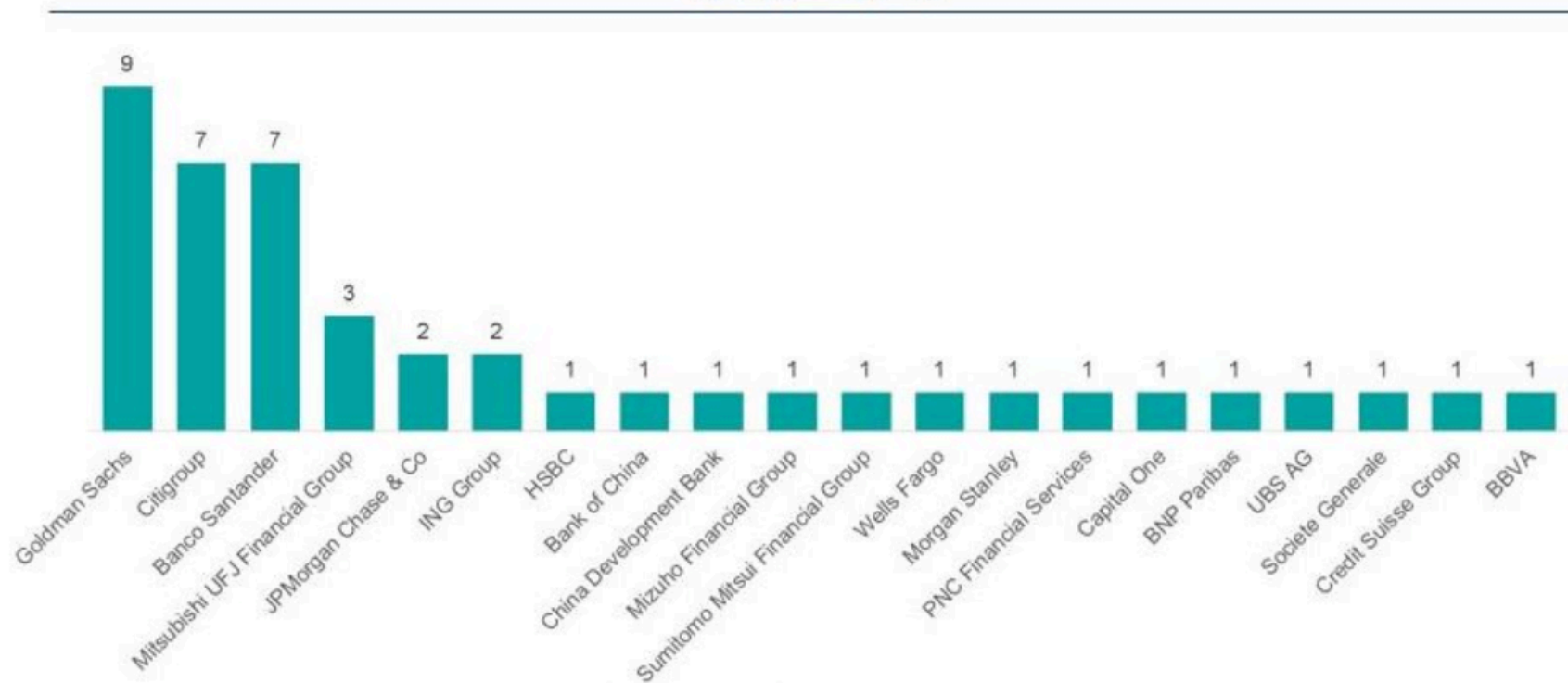


- Tech Coast Angels, (Ca.) CommonAngels (MA.) 2006
  - TechCoast = 300+ angels, 2500 deals
- Does angel financing predict startup success?
  - Hypothesis: Angel monitoring, value-added services, and powerful control rights produce better governance, better operations, lower capital constraints, and stronger growth?
- Difficulty of cause effect (nature v nurture) and Control for quality (control group)
- Independent variable: receiving funding
- Dependent variables (measures of success)
  - Survival rates, exit %, # employees, growth etc.
- Angel returns = VC (these are top tier angels)
  - “Hobbyists”?
  - Asset class versus deal by deal returns?
  - Note most of the returns (higher multiples) earned in early years later years are not even returning capital

# Corporate VCs-FinTech

Business Models Vary  
Source: KPMG and CB Insights

## Major Bank Investments to VC-backed Fintech Companies Q1'15 – Q1'16



\*Chart includes largest banks in US, Europe and Asia by AUM with disclosed fintech investments.

Source: The Pulse of Fintech, Q1 2016, Global Analysis of Fintech Venture Funding, KPMG International and CB Insights (data provided by CB Insights) May 25th, 2016.

# Ant financial

## Ant Financial to Evolve Into A Global Leading Fintech Company

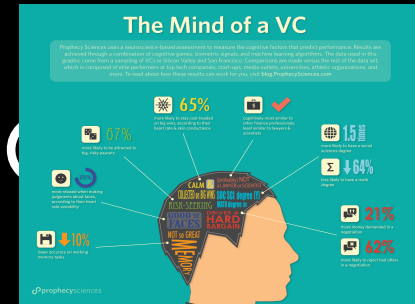
PAYMENT	WEALTH MANAGEMENT	FINANCING	INSURANCE	CREDIT REFERENCE
 <b>451mn</b> Annual Active Users <sup>(1)</sup> <b>153mn</b> No. of Daily Avg. Transactions <sup>(2)</sup> <hr/> <b>PayPal</b> 180mn active users <sup>(1)</sup> 16mn daily average transactions <sup>(3)</sup> <b>Visa</b> 2.2bn accounts <sup>(1)</sup> 260mn daily average transactions <sup>(3)</sup>	<b>152mn</b> Annual Active Users  <b>AUM RMB 760bn<sup>(4)</sup></b> 3-Yr Operation <hr/> <b>Charles Schwab</b> 9.9mn active users <b>CITIC Securities</b> 7mn active users <hr/> <b>Lufax</b> 3.6mn active users	  <b>SME Loans</b> <b>3mn<sup>(4)</sup></b> Cumulative Users <hr/> <b>China Merchants Bank</b> 38mn cards in circulation <b>China Minsheng Bank</b> 4.5mn cumulative borrowers	 <b>380mn</b> Cumulative Users <hr/> <b>China Life</b> 400mn cumulative users <b>Ping An</b> 110mn cumulative users	 <b>130mn<sup>(4)</sup></b> Cumulative Users <hr/> <b>People in credit reference system in the US</b> ~250mn

1: Number of users of Alipay and PayPal with one or more successful transactions in 2015. Number of accounts of Visa and MasterCard as of the fourth quarter of 2015 2: Daily average transactions of the first quarter of 2016  
 3: Daily average transactions of the fourth quarter of 2015 4: As of March 31, 2016 All data without footnote above refer to the year of 2015 or as of 2015 Source: annual reports, IR websites, research reports, public news

## ANT FINANCIAL TODAY

From mobile payments to investment products to P2P lending to a crowdsourced film investment fund to a personal credit system

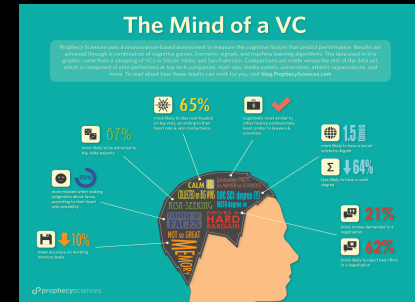
# Venture Capital



- Examples:
  - Sequoia, Technology Crossover Ventures
- Business Model:
  - Fund, series of funds from \$100 million to \$5 billion- investments of \$20-500 million typically for 20% of the company
  - Get paid fees and carry
  - Expect 10x
  - Strong investment discipline and process and due diligence
  - Published track record
- Clients:
  - Institutional Investors (pension plans, foundation/endowments, sovereign wealth funds) allocating \$10-100 million to asset class



# Largest VCs



1. ANDREESSEN  
HOROWITZ

2. SEQUOIA CAPITAL

3. ACCEL

4. BENCHMARK  
CAPITAL

5. union square

6.



General Catalyst  
Partners

7.

NEA

8.



9.

khosla ventures  
venture assistance, strategic advice, venture capital

10.

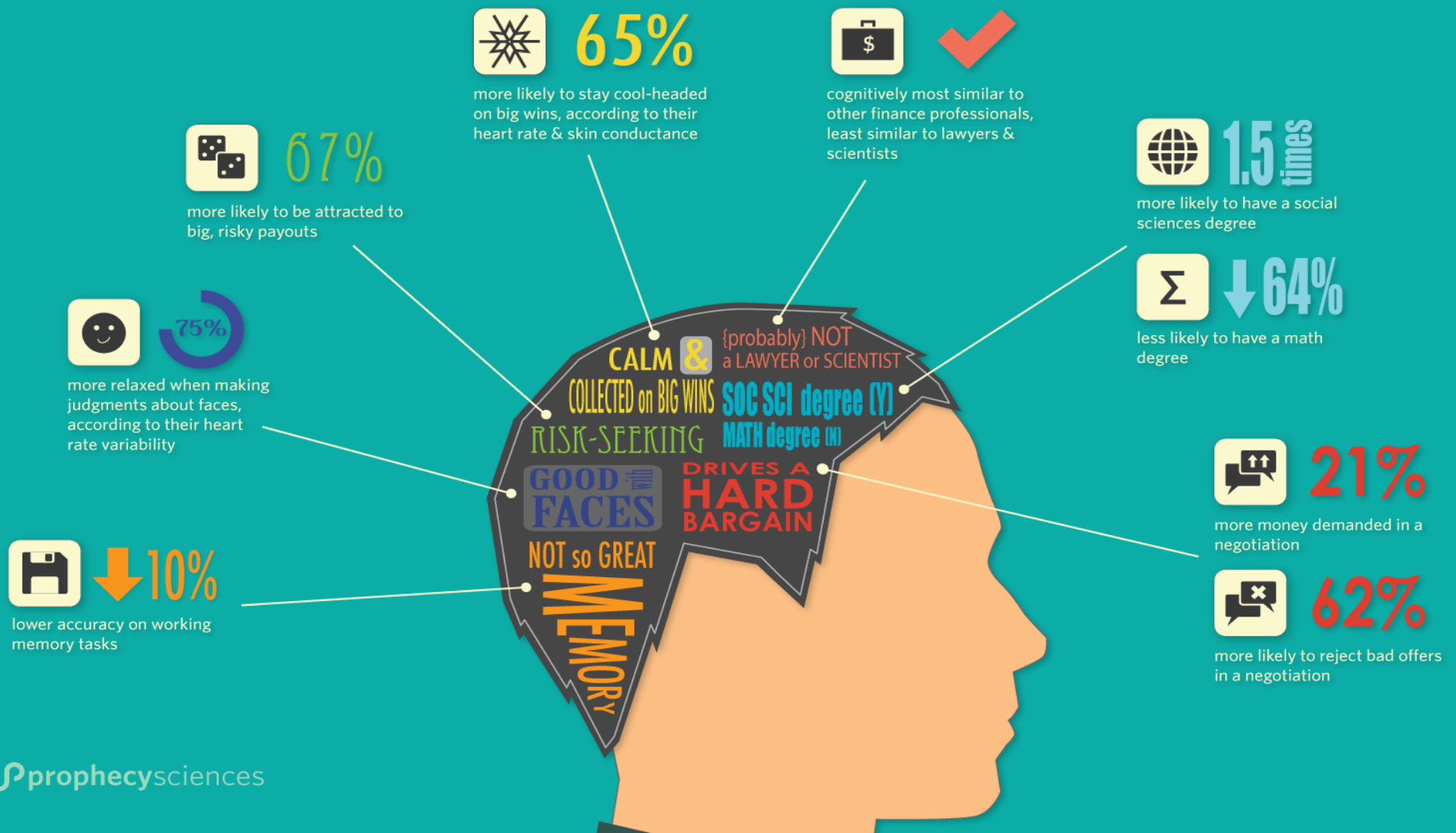
greylockpartners.





# The Mind of a VC

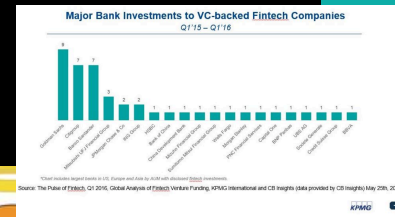
Prophecy Sciences uses a neuroscience-based assessment to measure the cognitive factors that predict performance. Results are achieved through a combination of cognitive games, biometric signals, and machine learning algorithms. The data used in this graphic come from a sampling of VCs in Silicon Valley and San Francisco. Comparisons are made versus the rest of the data set, which is composed of elite performers at top tech companies, start-ups, media outlets, universities, athletic organizations, and more. To read about how these results can work for you, visit [blog.ProphecySciences.com](http://blog.ProphecySciences.com)



# VC's skills

- Deal making and structuring (IB background)
- Technical (STEM at the PhD level)
- Operational (strategy, management, turnarounds)
- Entrepreneurship (successful launch, scale, exit)
- Investment decision-making (private v public)

# What kind of investor do you want for your startup?



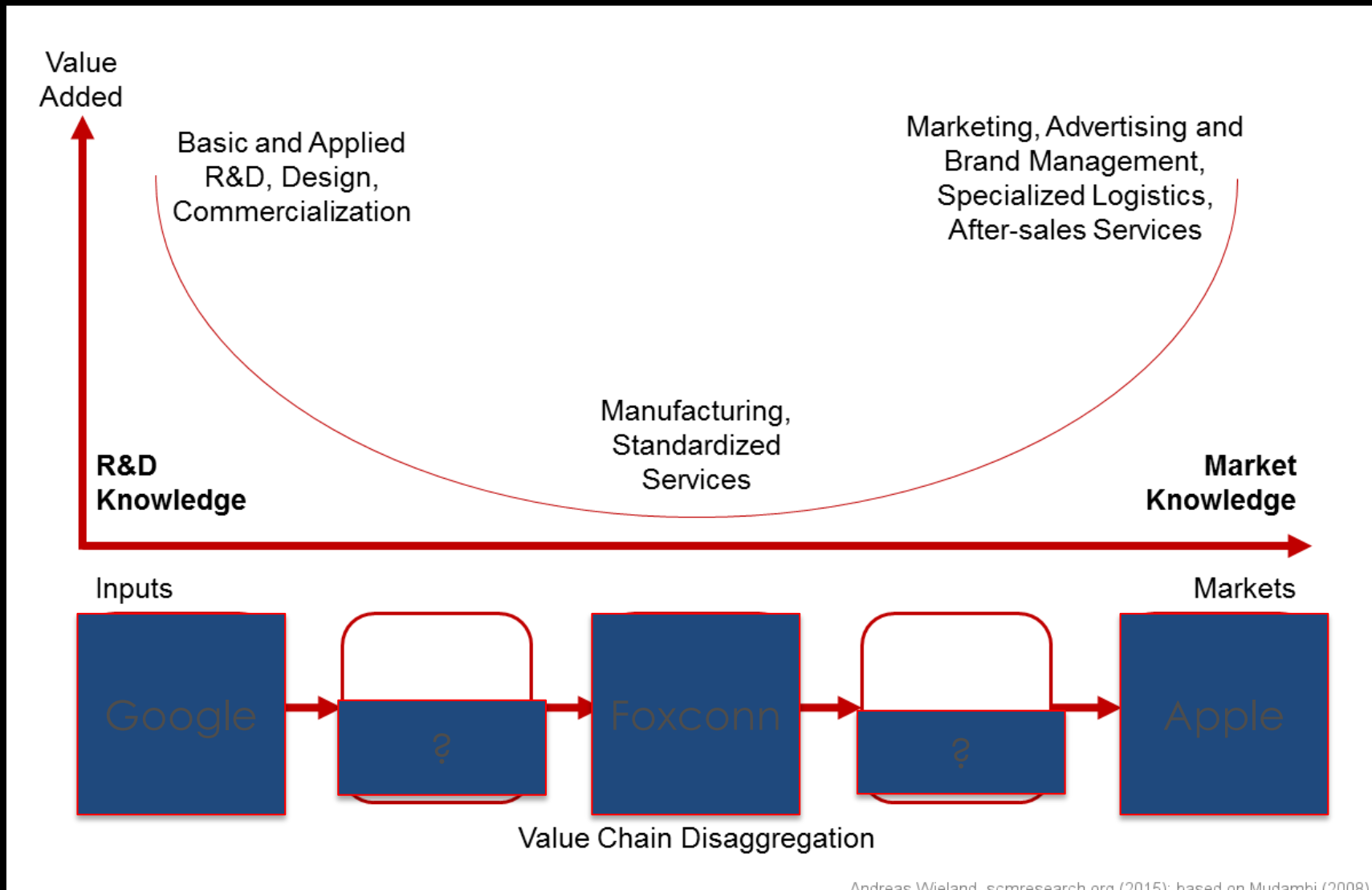
# By types of business

**Figure 5.0**  
**Venture Capital Investments in 2015 By Industry Group**

Industry Group	All Investments			Initial Investments		
	No. of Companies	No. of Deals	Investment Amt (\$Bil)	No. of Companies	No. of Deals	Investment Amt (\$Bil)
Information Technology	2,620	3,038	42.1	1,035	1,035	5.6
Medical/Health/Life Science	664	830	10.9	200	200	2.3
Non-High Technology	425	512	6.1	209	209	1.2
<b>Total</b>	<b>3,709</b>	<b>4,380</b>	<b>59.1</b>	<b>1,444</b>	<b>1,444</b>	<b>9.2</b>

# By types of business

All industries not created equal-where is financial services? How could you tell? Change ahead?



Andreas Wieland, scmresearch.org (2015); based on Mudambi (2008)



# IP hierarchy

Where is the IP in financial services? Can you patent software?

Novel  
Unique  
Useful  
Not obvious

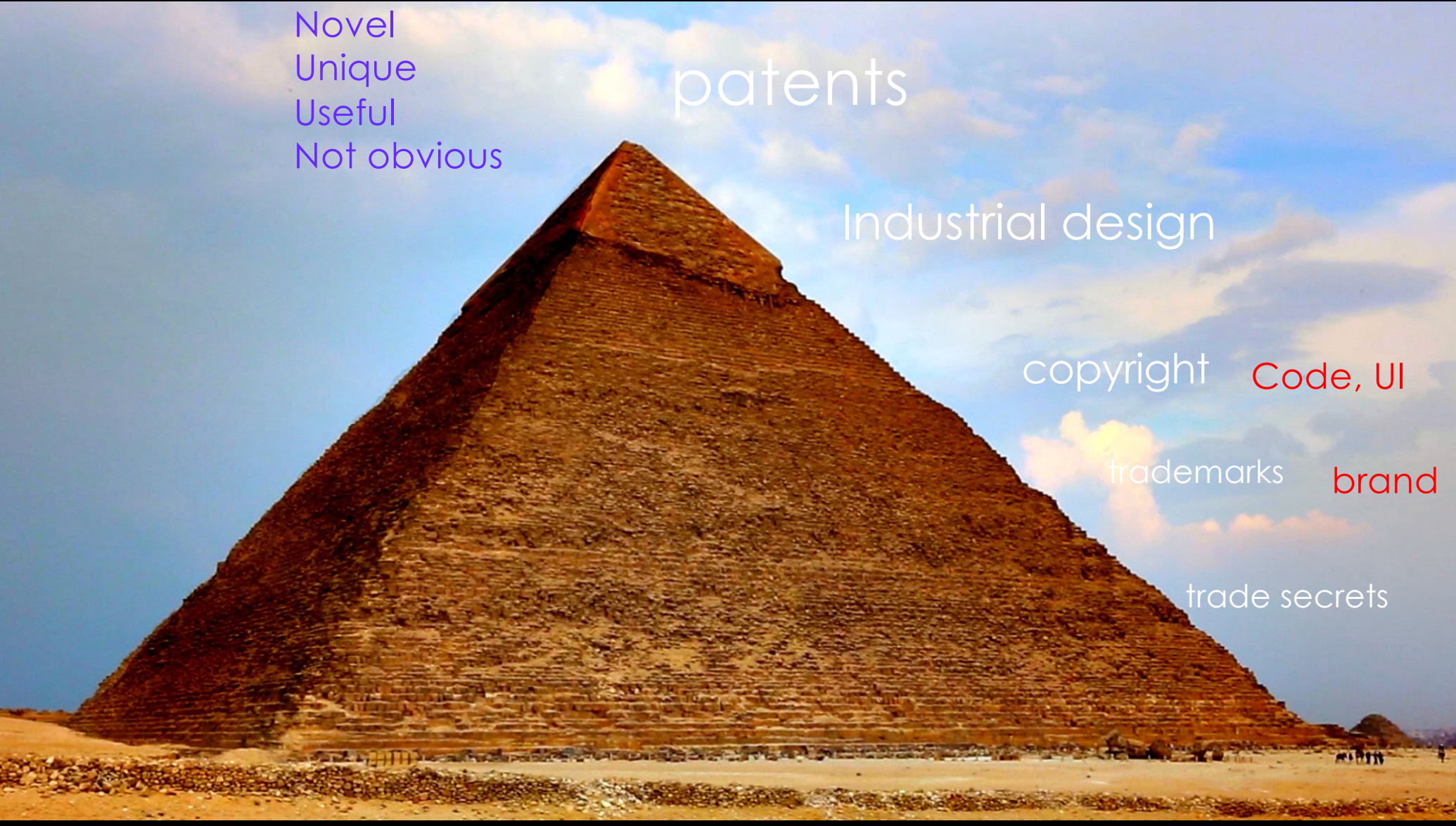
patents

Industrial design

copyright Code, UI

trademarks brand

trade secrets



# FinTech patents-tech + finance

## FinTech patents - Technology vs. Financial Categories (Patent counts)



- Relecura's Bucketing Module has been used to partition the FinTech patents based on (i) Financial Categories (financial product or service) and (ii) Enabling technologies employed, i.e. Technology Categories.
- Patent counts for the intersection of each of the Financial Categories (*Columns*) and Technology Categories (*Rows*) are shown below.

		Financial Categories					
		Payment	Banking	Wealth Management	Capital Market	Insurance	Lending
Technology Categories	Data & Analytics	18,447	8,736	4,154	3,278	2,679	2,353
	IOT	21,994	6,738	2,708	2,856	1,443	1,957
	Mobile Platform	16,426	3,229	827	567	609	763
	Security	8,540	2,602	1,330	1,424	639	790
	Cloud Computing	4,585	1,365	984	612	556	516
	Cryptocurrency	597	113	57	28	15	58

Blockchain  
(now  
fastest)



# Summary this section

- Investors prefer growth—what type of business to take a risk on
- Prefer sustainable competitive advantage driven by IP (more than brand)—avoid commodity businesses
- Also avoid capital intensive, prefer capital light given returns
- Where does financial se



# **3. VC FIRM AND FUND STRUCTURE**

# Private firms

**Figure 1.02**  
**Total Capital Under Management By Firm Type 1995 to 2015 (\$ Millions)**

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Private Independent	33,308	40,201	51,940	76,560	119,121	187,356	221,327	222,028	224,828	233,595	241,637
Financial Institutions	3,688	5,070	7,061	10,238	15,291	22,980	24,459	23,945	23,015	21,659	21,110
Corporations	1,526	2,219	2,531	3,425	8,169	12,995	14,153	14,126	13,886	13,627	13,467
Other	378	410	667	877	1,119	1,469	2,061	2,201	2,170	2,219	1,986
<b>Total</b>	<b>38,900</b>	<b>47,900</b>	<b>62,200</b>	<b>91,100</b>	<b>143,700</b>	<b>224,800</b>	<b>262,000</b>	<b>262,300</b>	<b>263,900</b>	<b>271,100</b>	<b>278,200</b>

**Figure 1.02 (Continued)**  
**Total Capital Under Management By Firm Type 1995 to 2015 (\$ Millions)**

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Private Independent	255,315	239,643	194,573	171,016	174,722	186,032	186,676	179,202	141,872	152,082
Financial Institutions	18,325	13,914	6,034	4,708	5,620	7,734	7,970	6,615	6,492	9,583
Corporations	13,297	8,990	4,294	3,125	3,688	4,860	4,892	6,401	6,730	1,695
Other	1,963	1,754	1,399	851	670	674	662	682	1,448	1,974
<b>Total</b>	<b>288,900</b>	<b>264,300</b>	<b>206,300</b>	<b>179,700</b>	<b>184,700</b>	<b>199,300</b>	<b>200,200</b>	<b>192,900</b>	<b>156,542</b>	<b>165,335</b>

# VC as intermediary

Key VC relationships and associated legal structure and business model

- VC and their institutional investors
  - VC as asset manager
  - Provide access to and enhanced returns from the asset class in exchange for fees and carry
  - Series of funds where VC is GP and investors are LPs
- VC and their portfolio companies – i.e. with entrepreneurs
  - VC as startup investor
  - Act as a conduit for institutional capital seeking returns
  - Advisory role (to increase odds of good returns)
  - Series of investments and rounds in same investment from a fund

# VC business-economics

Invest, monitor and exit (asymmetric risk)

\$200 million fund

CARRY

Capital distribution

Capital distribution

Capital distribution

Ending capital (year 10)

Capital call

Capital call

Capital call

2% annual fees

\$100 million fund

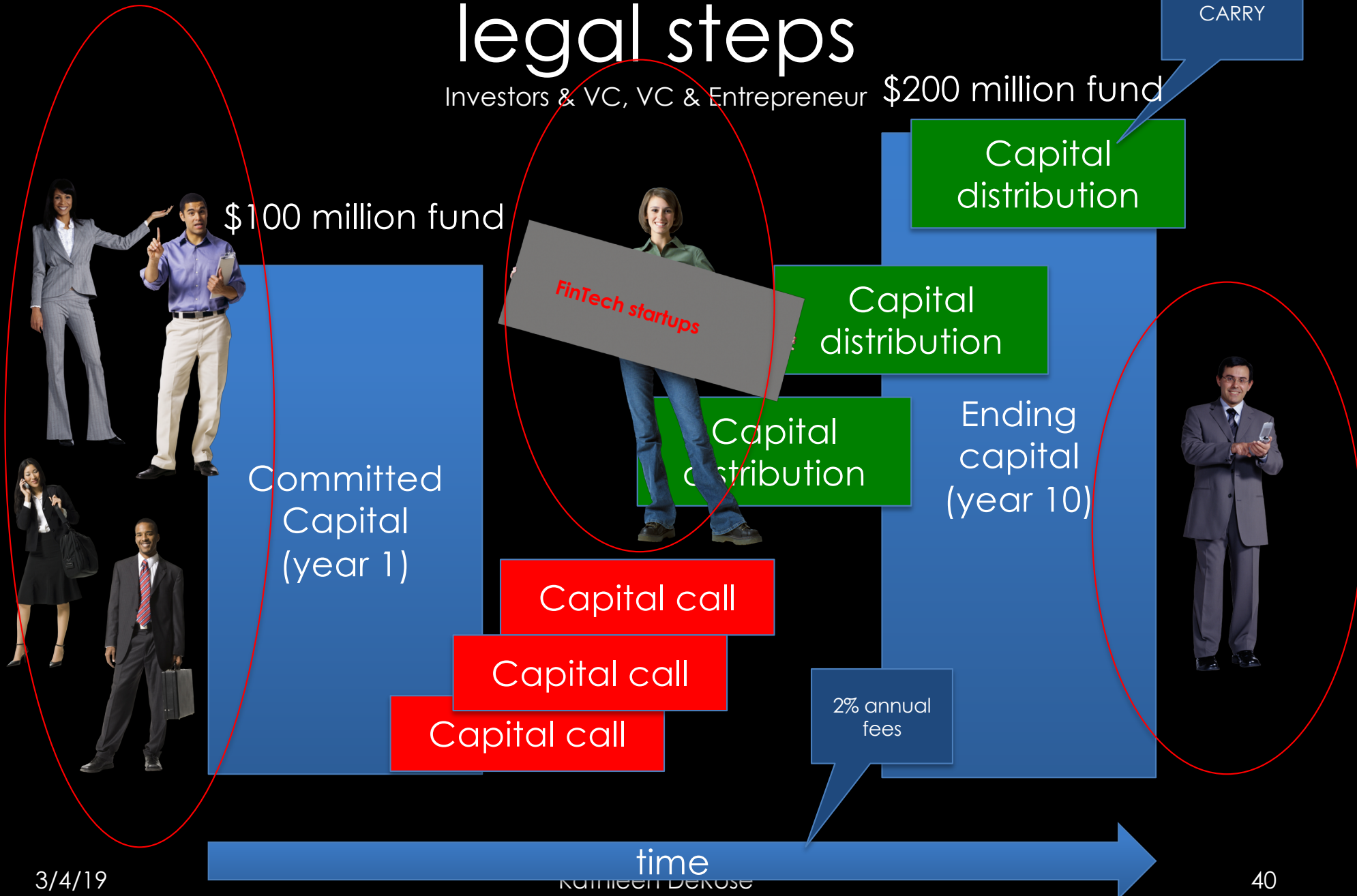
Committed Capital (year 1)

startups

time

# VC business-transactions and legal steps

Investors & VC, VC & Entrepreneur \$200 million fund



# VC business-economics

- Committed capital versus called capital
  - **On what base are fees charged?**
  - **On what base is performance calculated**
- Borrowing to “smooth” capital calls
- Management fees(charged to investors in fund)
- Underwriting fees (charged to startups)
- Advice fees (charged to startups)
- Carry (shared participation in upside)
- Hurdle rates (hurdle below which no carry earned)
- How structuring affects economics (staying first in line)
- Conflicts of interest?

# Private securities offerings

Regulations, disclosure rules (wild wild west)



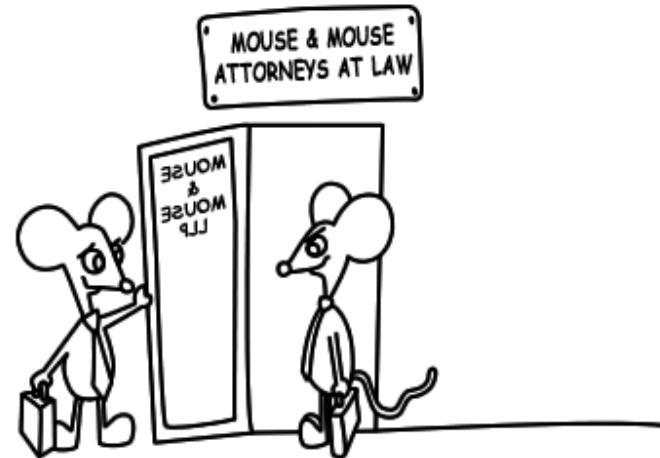


# VC fund & investor

## Partnerships v. limited partnerships



*Joint and several liability  
(held responsible for the acts of other partners)*



*Limited liability (general partner held liable)*

# VC fund and investor: GP & LP

## Types of partnership and types of partners.

Limited partnership.

General partner.  
(at least one)

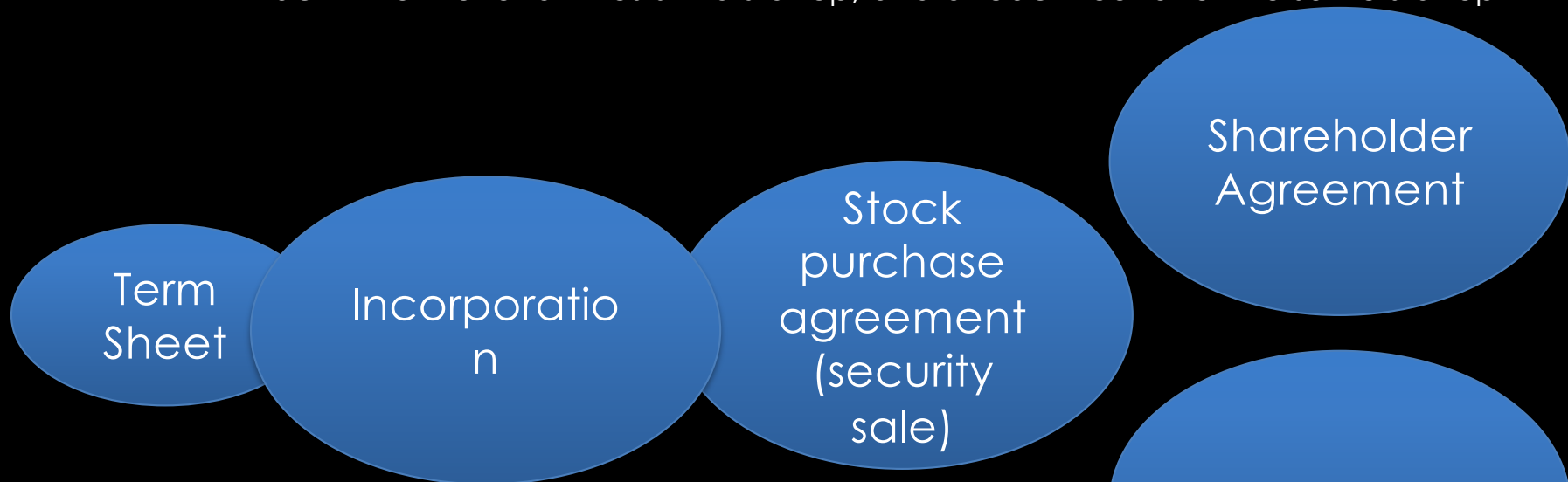
Limited partner.  
(one or more)

General partnership.

General partners.  
(all partners are general)

# VC & entrepreneur: legal process

Each time the fund invests in a startup, and at each round for the same startup



A typical US venture capital transaction involves the following key documents:

- **The Stock Purchase Agreement.** This agreement includes the mechanism for the purchase of shares by the investors and includes the arrangements for the closing of the transaction. Typically this agreement also includes terms requiring the company to provide the investors with information on and access to its business. At the back of the agreement is usually a schedule of exceptions to the representation and warranties made by the parties.
- **The Stockholders' Agreement.** This agreement typically includes pre-emption rights, rights of first refusal, co-sale and drag-along rights, and often a vesting schedule by which the founders would forfeit shares in the event of their departure from the company.
- **The Certificate of Incorporation.** This is the constitutional document of the company. When an investor is to purchase preferred stock with special rights such as anti-dilution protection and liquidation preferences, the company's Certificate of Incorporation must be modified (or, in some cases, a Certificate of Designation may be used) to grant such rights.
- **By-Laws.** The by-laws, together with the Certificate of Incorporation, regulate the internal governance of the company. An investor will sometimes require that these be modified if they contain corporate governance procedures deemed unsuitable for the company; often, however, the by-laws can be left as they are.

In a typical UK venture capital transaction

- **"Investment Agreement" or "Share Purchase Agreement."** This document, regardless of the name used, is a contract between the investor and the company. As such, it includes the terms of the investment, including the price, the number of shares, and the rights of the shares.
  - **Articles of Association.** This document typically includes share class rights, pre-emption rights, and the mechanism of holding board and shareholder meetings. It is often a letter from the company (or its lawyers) to the investor that sets out the exceptions from the warranties given to the investor. This letter is the equivalent of the disclosure letter at the back of the US-style Stock Purchase Agreement. The disclosure letter, which typically sets out the exceptions from the warranties, is generally, are discussed further below.
- UK-style transactions frequently require key executives of the company to enter into employment contracts in a form approved by the investors. These will typically set out the conditions of employment of the executive and will impose restrictive covenants on the company. These restrictive covenants are discussed further below.

# Summary this section

- VCs as intermediaries



Investment Process and Due Diligence

# **4. HOW INVESTORS INVEST: SEQUOIA PITCH DECK FRAMEWORK**

# Choosing among competing alternatives





# VC investment process

which steps are proprietary? Which add the most value? What % get funded?

- Permanent capital, fund series
- Deal flow (network)
- Preliminary due diligence
  - Sequoia pitch deck
- Selection
  - Firm's criteria
- Funding and structuring
  - Term sheet
  - Final due diligence
  - Process and valuation
- Active management
  - Board seats, hiring, customer
- Exit

100-1000



Good selection  
Smart structuring  
Active Management  
Exit

# Sequoia Pitch Deck

proxy for a selection process

**Company Purpose**

**Problem**

**Solution**

**Why Now?**

**Market Size**

**Competition**

**Product**

**Business Model**

**Team**

**Financials**



# AirBnB Problem and Solution

## Problem

2

**Price** is an important concern for customers booking travel online.

**Hotels** leave you disconnected from the city and its culture.

**No easy way exists** to book a room with a local or become a host.

## Solution

Clip slide

**A web platform** where users can rent out their space to host travelers to:

**SAVE  
MONEY**  
when traveling

**MAKE  
MONEY**  
when hosting

**SHARE  
CULTURE**  
local connection to the city

Template by PitchDeckCoach.com

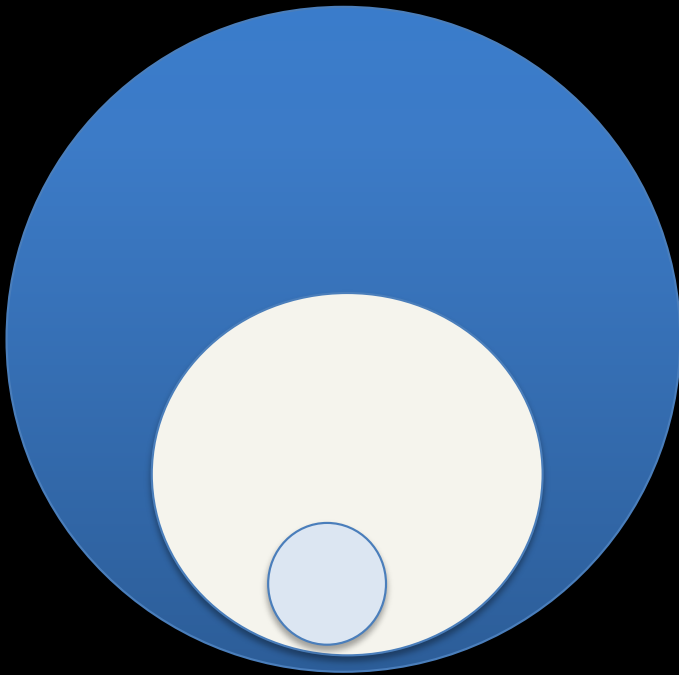
# Market Test

- Market test-why is this so important?
  - Does this venture have a large and addressable market? (Metrick)
  - TAM SAM SOM (Sequoia)

# TAM SAM SOM

links to industry assessment and to financial model

- TAM= Total available market
- SAM= Serviceable addressable market (parts of the TAM you can reach, i.e. customer segments, geography)
- SOM= Serviceable obtainable market (your market share of the SAM)



# AirBnB TAM SAM SOM

## Market Size

5

1.9 Billion+

**TRIPS BOOKED (WORDLWIDE)**  
Total Available Market

532M

**BUDGET & ONLINE TRIPS**  
Serviceable Available Market

10.6M

**TRIPS W/AB&B**  
Market Share

## Market Size

Large and growing opportunity

Our clients: independent advisors



\$20.9 billion

**Advisor Operating Costs**  
Total Available Market

\$4.8 billion

**Software substitution**  
Serviceable addressable market

\$259 m

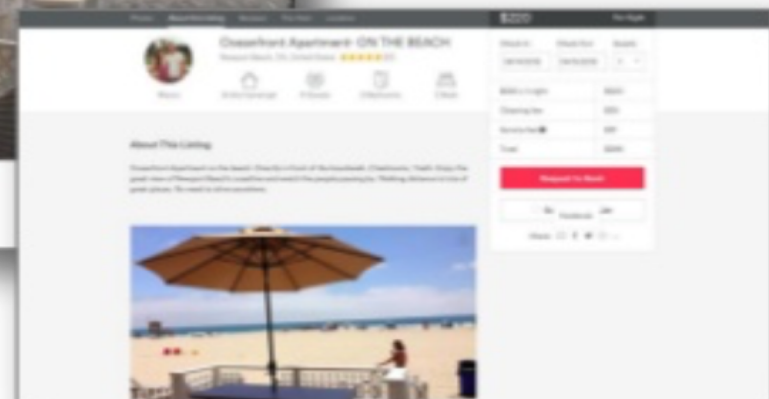
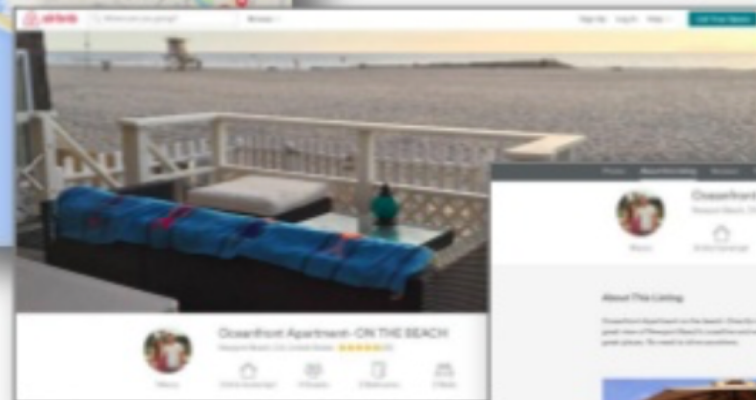
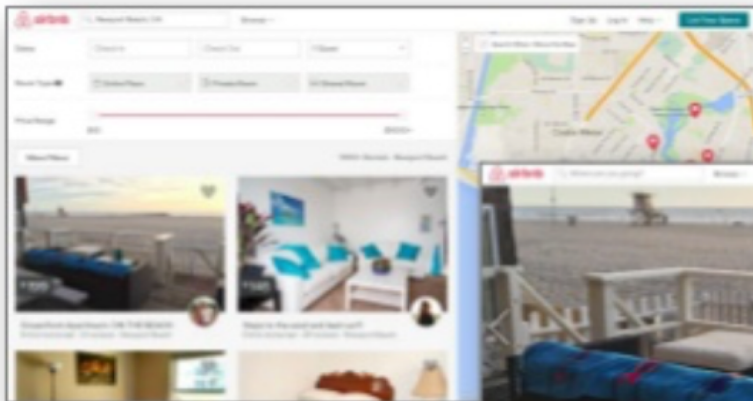
**Evolute**  
Target Market Share

# AirBnB Product

## Product

6

SEARCH BY CITY → REVIEW LISTINGS → BOOK IT!



# AirBnB Business Model

## Business Model

Clip slide

We take a 10% commission on each transaction.



Template by PitchDeckCoach.com



# Management Test

- Management test-why is this so important
  - Does the management have the capabilities to make this business work?
  - What are the team dynamics?

# Summary this section

- **Investors run a disciplined due diligence and investment process to choose among competing alternatives in the face of high uncertainty**
- **VCs:** Use Sequoia pitch deck outline to run preliminary due diligence
- **Entrepreneurs:** Make sure you hit the points on the outline to get the next meeting



VC fund data bases

## **5. RETURNS AND RISK FROM THE VC “ASSET CLASS”**

What return?

How to calculate?

Non-traded securities

Founders returns?

VC – GPs returns?

VC – LPs returns?

# VC returns

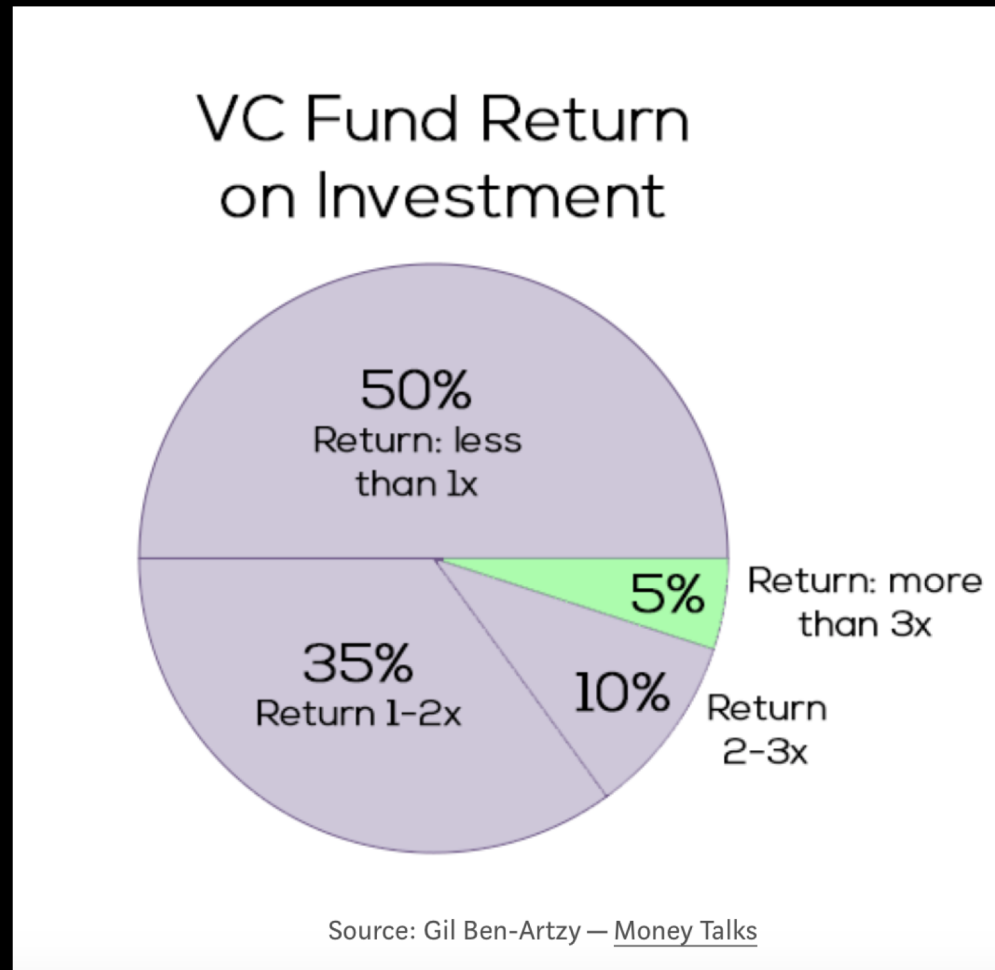
- What is success?
  - Long term return on equities? (equity risk premium)
  - Metrick-calculated cost of capital 15% (recent results much lower) for venture capital given imbedded betas
  - Let's say 12% or we wouldn't bother given the extra risk
  - A 10 year fund needs to return a multiple of 3x (after fees) to realize a 12% return:

$$\begin{array}{c} \text{fund length} \\ \overbrace{1.12}^{10} = \times \underbrace{3.10} \\ \text{annual return} \qquad \text{total return} \end{array}$$

# Example: \$100 million fund

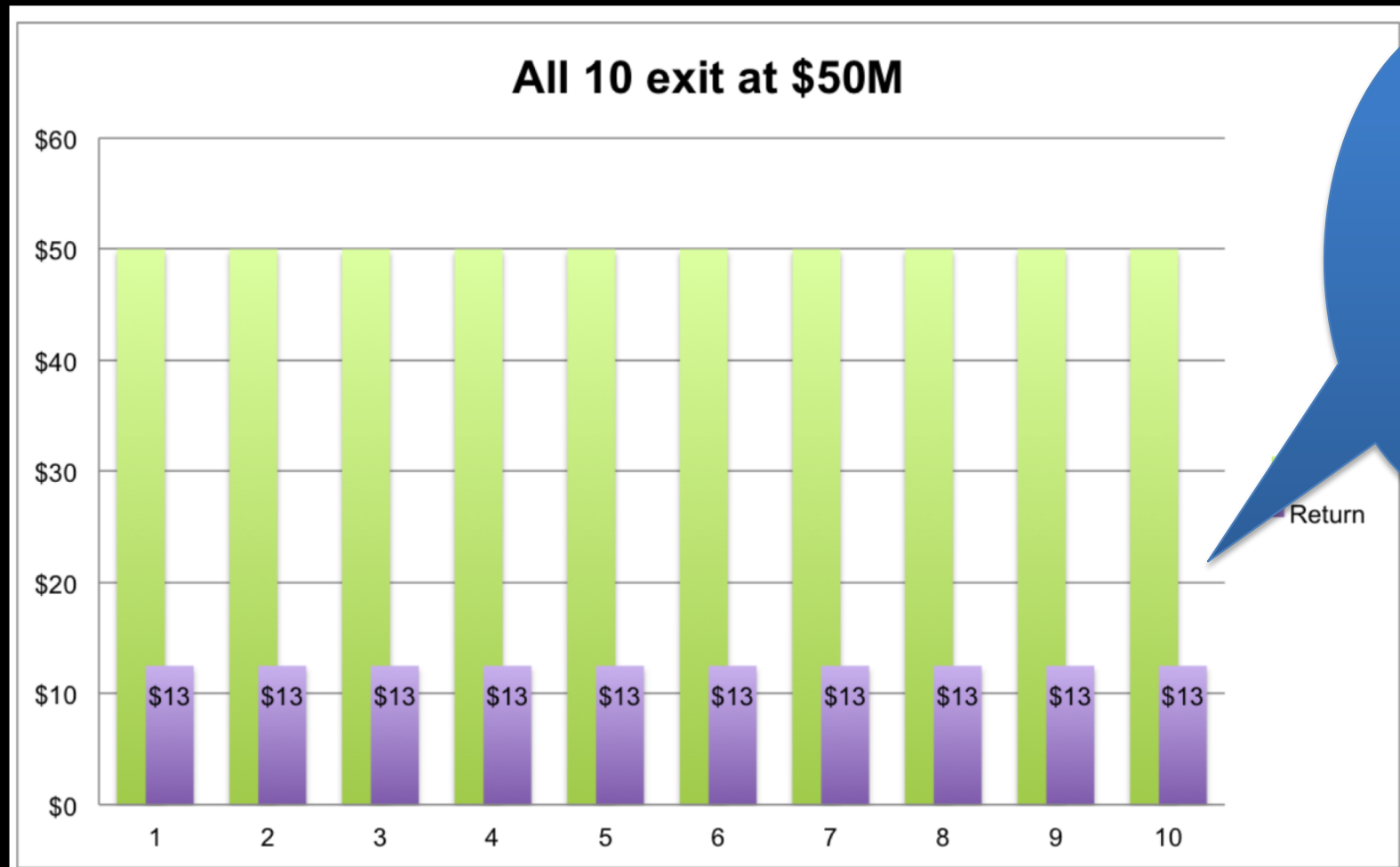
- Assume 10 investments of \$10 million each
- Fund needs to grow to \$300 million in 10 years to reach 12%
- What are the implications for the returns from each investment?
- VC owns 25% of each company
- Also have to cover fees & expenses running 2-3% per year

# How many hit 3x or 12% in 10 years?



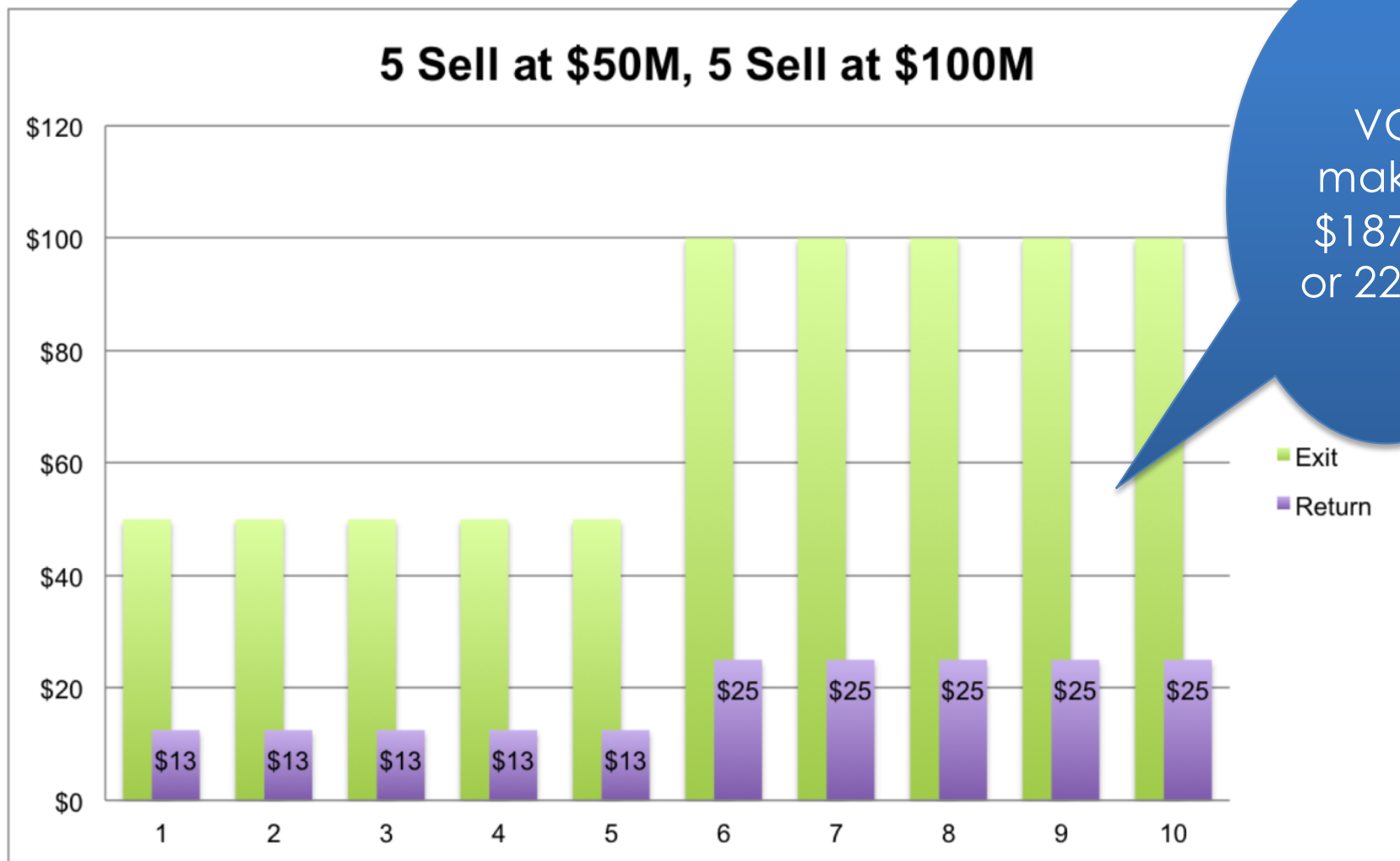


# \$100 million fund: 5x returns for all 10 investments



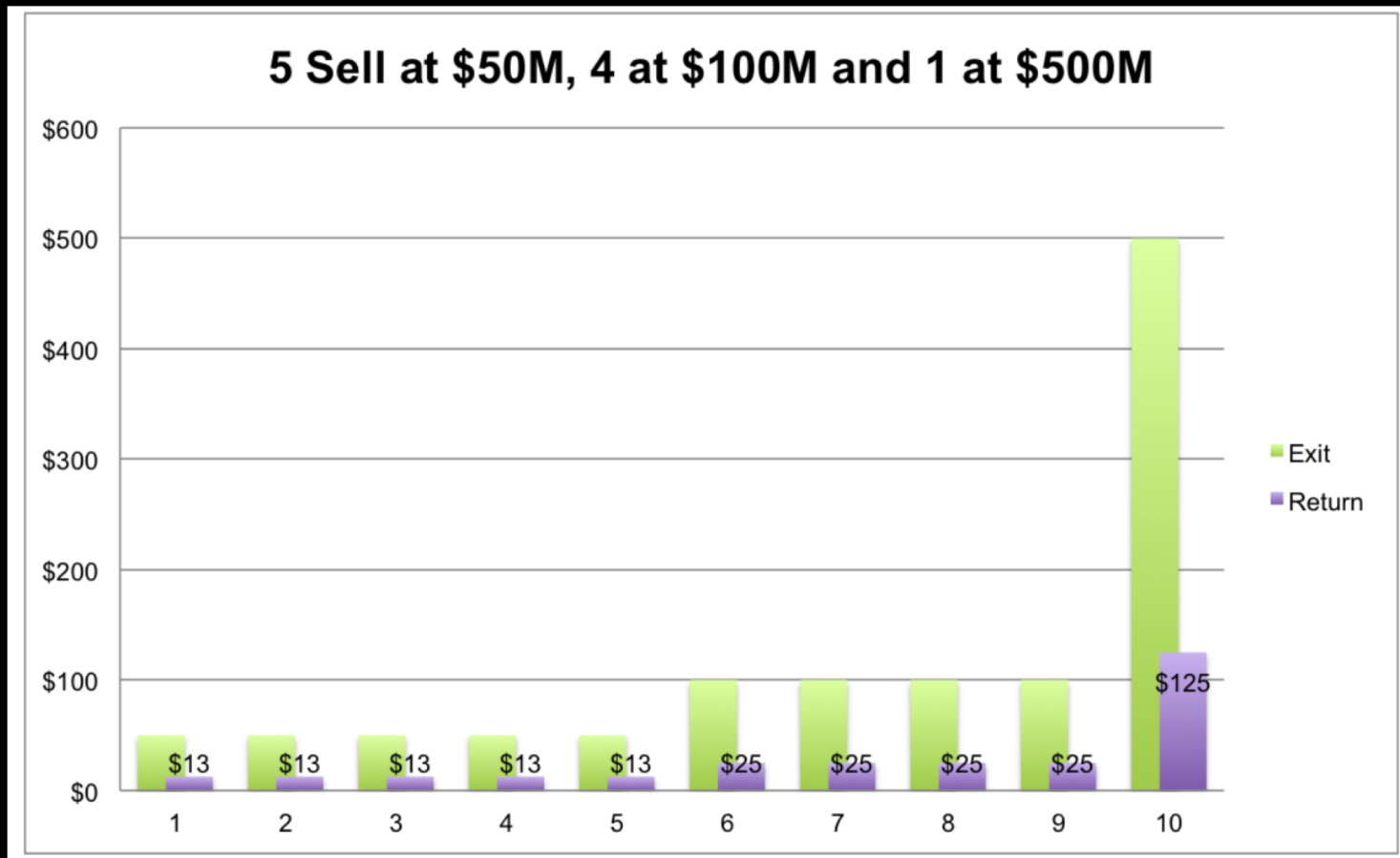
VC  
makes  
 $10 * 12.5$   
or \$125  
or 17.5%

# \$100 million fund: 5x returns for 5, 10x returns for 5



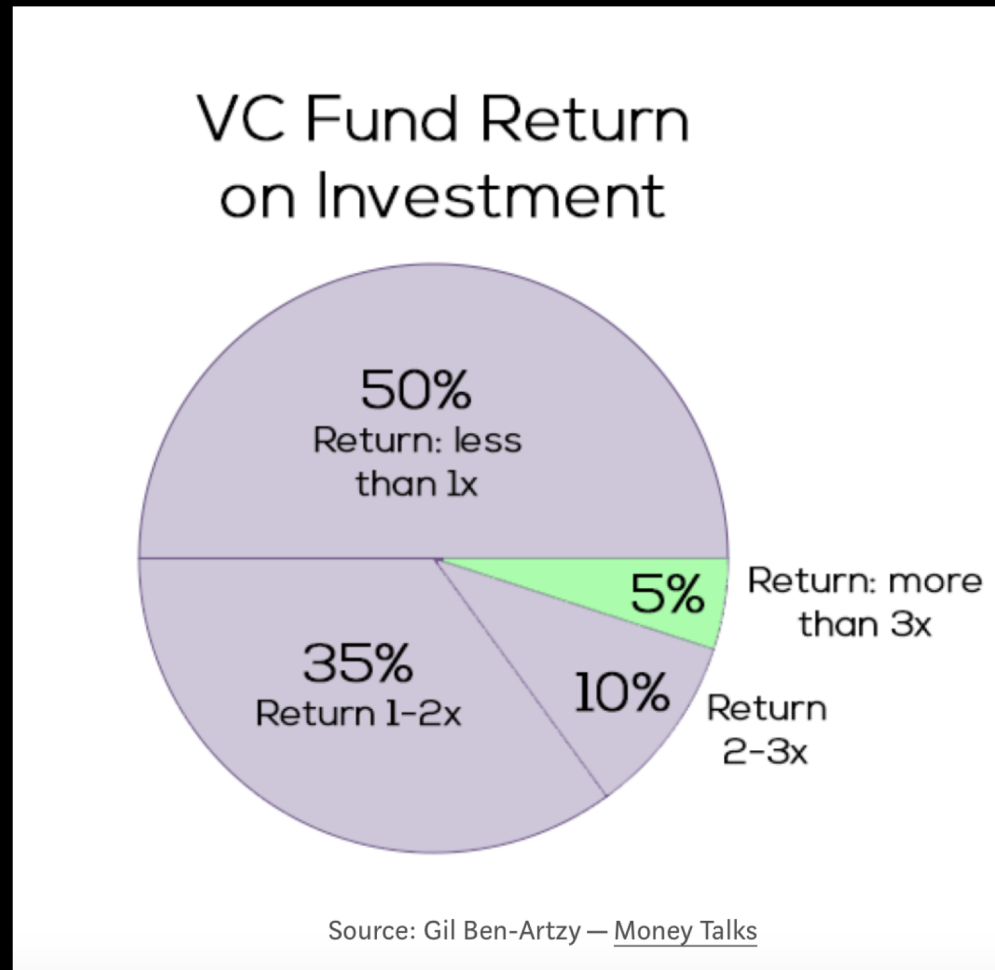
VC  
makes  
\$187.5,  
or 22.3%

# \$100 million fund: 5x returns for 5, 10x returns for 4, 50x for 1



VC makes  
\$287.50 or 27.7%

# How many hit 3x or 12% in 10 years?



# More realistic case

- 50% return nothing ( $10 * 5 * 0$ )
- 35% return 1-2x, at 2x = \$70 million ( $3.5 * 20$ )
- 10% return 2-3x, at 3x = \$30 million ( $1 * 30$ )
- Fund value so far after 10 years = 100 million, return is zero-remember you need a fund value of > 300 million to earn 12%
- 5% return more than 3x
- How big a unicorn do you need to make up for the other losers?
- 5% (half of one) has to return \$200 million to get over the return hurdle, ie 5 million investment produces \$200 million return or 40x
- You need a huge home run to make a 12% return on a VC fund

# Other solutions to this problem?

- Reduce fund lifespan (same returns over shorter time)
- Lower return hurdle rate (lower returns over same time)
- **Negotiate disproportionate share of returns**
  - How do investors do this?
  - Are these “investment” or other skills?

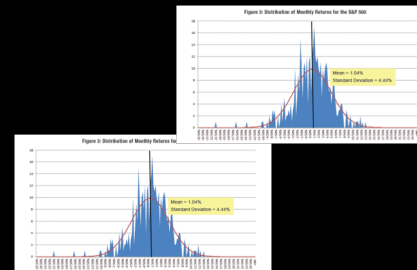
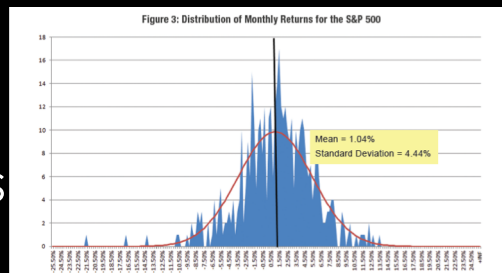
# Evaluating managers

## Universe or benchmark

## Peer Group (subcategory)

## Manager

Public equities



- Selecting
- Timing
- Weighting

- Russell 1000
- Mean return
- Std. deviation
- Factor risk exposures

- Russell 1000 value
- Mean return
- Std. deviation
- Factor risk exposures

Higher risk-adjusted return (to justify fees)

Private equities



Consultant  
databases of PE  
managers



# Venture Capital Peer Group

Cambridge Associates performance report (as of September 2016)



## US Venture Capital Index and Selected Benchmark Statistics

Data as of  
September 30, 2016

US Venture Capital: Fund Index Summary: Horizon Pooled Return  
Net to Limited Partners

Index	1-Quarter	YTD	1-Year	3-Year	5-Year	10-Year	15-Year	20-Year	25-Year	30-Year
Cambridge Associates LLC US Venture Capital Index®¹	3.31	0.53	2.18	16.78	14.24	10.31	6.40	26.43	25.76	18.47
US Venture Capital - Early Stage Index¹	3.44	1.06	1.24	18.83	15.30	10.62	5.61	55.43	35.02	23.13
US Venture Capital - Late & Expansion Stage Index¹	1.63	-1.10	0.99	10.14	10.57	11.65	8.00	9.61	12.54	12.18
US Venture Capital - Multi-Stage Index¹	3.59	0.15	4.14	15.62	13.70	9.43	7.50	10.11	14.15	12.14
Bloomberg Barclays Government/Credit Bond Index	0.40	6.66	5.86	4.22	3.24	4.86	4.90	5.67	6.06	6.56
Dow Jones Industrial Average Index	2.78	7.21	15.46	9.23	13.77	7.39	7.61	8.30	10.07	10.94
Dow Jones US Small Cap Index	5.66	10.71	12.41	6.93	15.63	8.00	10.29	9.24	—	—
Dow Jones US TopCap Index	4.04	7.75	15.09	10.86	16.34	7.46	7.44	7.95	—	—
Nasdaq Composite Index*	9.69	6.08	14.97	12.09	17.07	8.93	8.80	7.60	9.68	9.48
Russell 1000® Index	4.03	7.92	14.93	10.78	16.41	7.40	7.48	8.07	9.51	10.24
Russell 2000® Index	9.05	11.46	15.47	6.71	15.82	7.07	9.26	8.06	9.56	9.33
S&P 500 Index	3.85	7.84	15.43	11.16	16.37	7.24	7.15	7.91	9.34	10.22
Wilshire 5000 Total Market Index	4.29	8.44	15.35	10.65	16.31	7.44	7.84	8.03	9.45	10.09



# Venture Capital Peer Group

Cambridge Associates performance report-dispersion (as of September 2016)

Dispersion increasing?

Year	<b>1981</b>	<b>2014</b>
Median	7.87%	3.23%
Mean	9.01%	4.31%
1st Q'tile	13.24%	14.27%
4 <sup>th</sup> Q'tile	5.94%	(5.16%)
Std Dev	5.59	16.73

**US Venture Capital Index and Selected Benchmark Statistics** September 30, 2016

US Venture Capital: Since Inception IRR & Multiples by Fund Vintage Year  
Net to Limited Partners

Vintage Year	Pooled Return (%)	Arithmetic Mean (%)	Median (%)	Equal-Weighted Pooled Return (%)	Upper Quartile (%)	Lower Quartile (%)	Standard Deviation (%)	DPI	RVPI	TVPI	Number of Funds
1981	8.47	9.01	7.87	9.03	13.24	5.94	5.59	1.76	0.00	1.76	9
1982	7.38	7.20	7.90	7.36	9.11	4.87	3.29	1.79	0.00	1.79	11
1983	10.23	9.56	8.72	10.13	12.46	7.10	5.73	2.01	0.00	2.01	28
1984	6.65	7.76	6.27	6.11	12.92	3.78	8.82	1.77	0.00	1.77	32
1985	12.91	11.70	12.86	12.88	17.35	5.49	8.21	2.69	0.00	2.69	26
1986	14.52	8.81	8.43	9.09	12.90	5.27	5.13	2.90	0.00	2.90	30
1987	18.26	14.83	15.68	15.80	22.18	8.70	10.63	2.72	0.00	2.72	34
1988	18.89	14.29	11.87	14.69	21.65	6.61	13.78	2.42	0.07	2.49	26
1989	19.16	17.05	13.31	18.86	28.80	7.75	14.46	2.59	0.00	2.59	37
1990	33.11	24.07	21.54	26.25	31.19	14.28	19.60	3.15	0.00	3.15	17
1991	27.89	24.02	18.56	25.67	27.86	11.64	20.33	3.17	0.00	3.17	17
1992	32.60	28.23	19.65	38.01	35.86	10.85	30.55	3.09	0.00	3.09	22
1993	46.71	30.43	18.83	41.08	46.49	12.13	31.10	4.13	0.00	4.13	36
1994	59.26	34.26	26.45	43.29	46.45	6.83	47.14	5.40	0.00	5.40	42
1995	88.48	56.60	41.65	77.99	80.62	21.54	58.50	6.07	0.00	6.07	35
1996	100.73	60.63	37.06	86.04	81.50	7.18	77.84	4.90	0.02	4.91	42
1997	91.80	55.25	11.56	73.32	63.73	-1.60	101.96	3.09	0.01	3.10	71
1998	11.90	16.78	-0.26	14.30	15.19	-6.15	71.45	1.48	0.02	1.50	81
1999	-0.62	-3.33	-3.16	-1.33	3.04	-11.43	17.95	0.92	0.04	0.96	112
2000	0.77	-2.29	-1.05	0.33	5.12	-6.87	12.49	0.93	0.13	1.05	157
2001	2.63	0.40	2.02	4.37	7.62	-3.64	18.80	1.01	0.18	1.19	56
2002	0.35	0.55	0.02	2.83	6.08	-5.99	8.89	0.82	0.20	1.02	34
2003	8.33	-0.04	1.98	5.62	7.92	-5.90	20.06	1.46	0.27	1.73	40
2004	8.22	2.84	2.87	8.28	8.00	-3.88	20.99	1.15	0.45	1.60	67
2005	7.08	3.33	4.49	7.39	9.95	0.53	17.17	0.81	0.67	1.49	85
2006	9.37	4.81	5.05	7.54	12.92	-3.04	11.36	0.89	0.76	1.65	83
2007	16.44	15.16	13.23	17.12	20.90	7.35	15.94	1.11	0.94	2.06	89
2008	13.75	10.97	9.14	12.91	19.07	1.50	12.32	0.89	1.01	1.70	64
2009	15.76	13.96	11.82	14.53	20.53	6.68	13.06	0.58	1.17	1.75	22
2010	30.41	21.54	19.02	26.91	28.85	9.80	20.04	0.71	1.53	2.55	47
2011	22.38	13.99	14.67	17.77	21.42	1.25	18.27	0.39	1.43	1.82	45
2012	21.04	14.02	11.62	16.61	21.15	6.49	18.00	0.16	1.42	1.58	56
2013	19.89	18.45	8.61	14.09	16.10	0.66	72.78	0.14	1.19	1.33	52
2014	11.70	4.31	3.23	8.67	14.27	-5.16	16.73	0.04	1.11	1.15	88

Notes: Based on data compiled from 1,633 US venture capital funds, including fully-limited partnerships, formed between 1981 and 2014. Internal rates of return are net of fees, expressed as a percentage.

# Fewer, bigger firms

**Figure 1.0**  
**Venture Capital Under Management Summary Statistics**

	1995	2005	2015
No. of VC Firms in Existence	425	1,009	798
No. of VC Funds in Existence	688	1,764	1,224
No. of First Time VC Funds Raised	38	43	93
No. of VC Funds Raising Money This Year	161	233	236
VC Capital Raised This Year (\$B)	9.4	30.1	28.2
VC Capital Under Management (\$B)	38.9	278.2	165.3
Avg VC Capital Under Mgt per Firm (\$M)	91.5	275.7	207.1
Avg VC Fund Size to Date (\$M)	44.4	98.0	135.0
Avg VC Fund Size Raised This Year (\$M)	58.3	129.1	119.6
Largest VC Fund Raised to Date (\$M)	5,600	10,025	21,700

# VC asset class risk/return implications

- High startup failure rate
- Fund returns are falling and risk is getting higher
- Very hard to generate required returns
- Few VC firms succeed-winner take all industry
- **Result? It does not make sense to invest in this class;** institutional investors should only invest if they can choose winning VCs
- **Result? Target investments must become quite large companies (billions) to justify large ticket sizes, high potential returns**
- **Result? Key VC skill is “active” management; helping shape the path dependent outcome to the highest possible return and trying to harvest a disproportionate share of that return (or a lower share of the losses via preferences)**



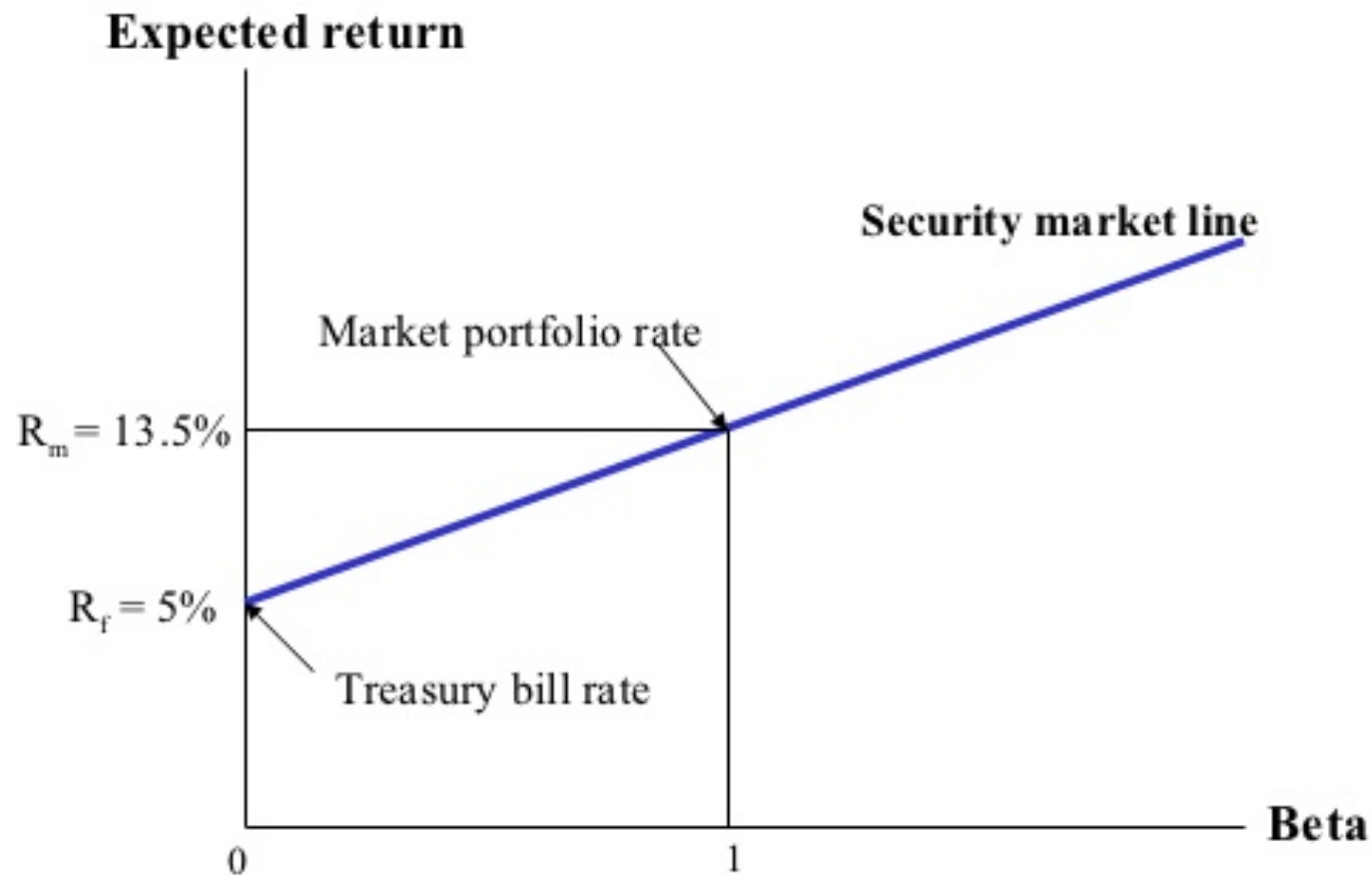
Fintech Venture Capital

# **COST OF CAPITAL, MULTIPLES, AND FUND IRR PITFALLS**

# What is a VC's cost of capital?

- How can you determine this?
- Do VC's add value?

# Capital Asset Pricing Model (CAPM)



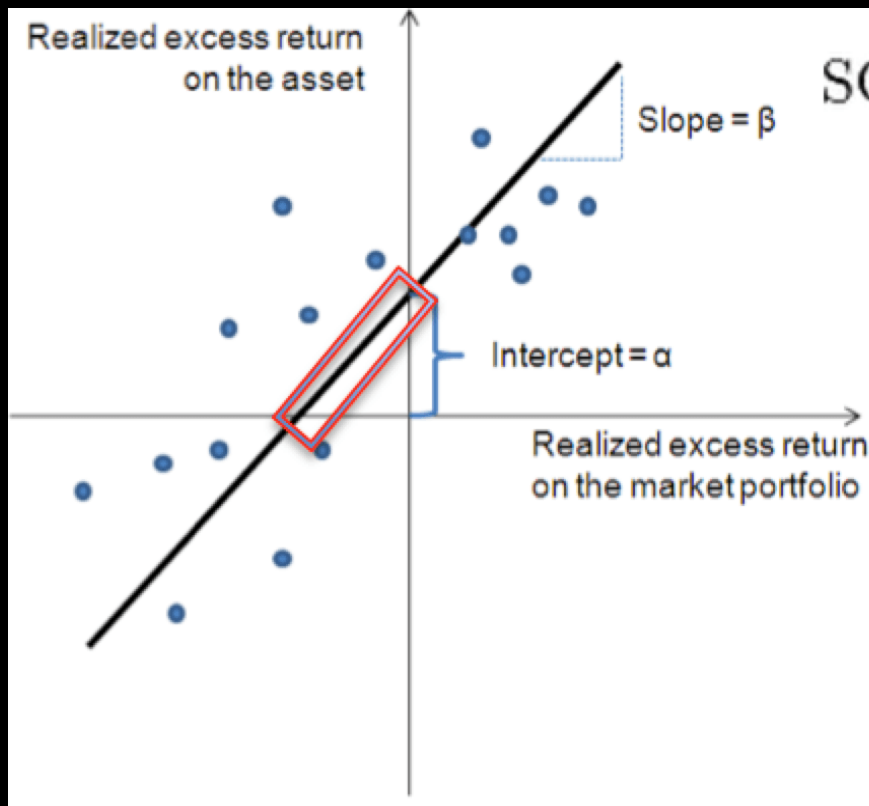
$$R = r_f + B ( r_m - r_f )$$

# CAPM assumptions

- Equilibrium assumption
- Cost of capital = expected return
- Risk free rate (match time horizon)-Metrick =4%
- Equity risk premium (historical) –Metrick 7%
- For a company's equity, or a capital project, or an entire industry or asset class, or a portfolio
- Beta is covariance of assets returns with the returns on the market (systematic risk)
- Risk that is uncorrelated is idiosyncratic, and diversifiable

# CAPM regression

- Alpha, regression constant (intercept) allows for realized returns to be greater than the cost of capital
- $\epsilon$ , error term



$$\text{SCL} : R_{i,t} - R_f = \alpha_i + \beta_i (R_{M,t} - R_f) + \epsilon_{i,t}$$

Figure 1

$\alpha_i$  is the asset's alpha (abnormal return)

$\beta_i$  - volatility compared to & correlated with market's

$\beta_i(R_{M,t} - R_f)$  - systematic risk

$\epsilon_{i,t}$  - non-systematic risk

$R_{M,t}$  - market risk

$R_f$  - risk-free rate



# So what the heck is VC beta?

- Initial regression looks like great excess returns, and below market beta, plus uncorrelated with the market! (Ex. 4-5, p.75)

	Sand Hill	Cambridge
– Alpha	5.88%	6.03%
– Market beta	0.81	0.55
– R2	0.71	0.16



# Problems

- Style = + 2% for size, + 5% for value
  - Fama and French: size (small-large) and value-growth spread
  - Add factor loadings for the VC asset class
- Liquidity = +6% per year (p.77)
  - Pastor-Stambaugh model (liquid-illiquid spread)
- Stale values cause market risk (vola) to be understated
- **Once you add style and liquidity as regression betas (explaining part of the returns), the VC alpha shrinks and risk increases**

With alphas, risk  
and correlation  
like this....

# So...

	• Sand Hill Assoc	Cambridge
• Alpha	0.48	0.47
• Market beta	1.83	1.88
• Size beta	-0.03	1.14
• Value beta	-0.52	-1.60
• Liquidity beta	0.23	0.05
• R2	0.83	0.57

# Regression with size, value, liquidity betas

15% cost of capital

NO alpha ;-(

Much riskier  
Highly correlated with equity  
markets

# Returns

- IRR (not geometric or average return)
- Lumpy cash flows
- Early period of investment (negative cash flows)
- Later period of distribution (positive cash flows)
- Timing is everything
- Before or after fees, how carry is determined, etc.
- Returns, multiples and probabilities are all related

# Multiples and returns

## IRR Analysis: Years Invested vs. Return Multiple

IRR Analysis – Years Invested vs Return Multiple

Return Multiple

Years Invested	1.5x	2.0x	3.0x	4.0x	5.0x	6.0x	7.0x	8.0x	9.0x	10.0x
	22%	41%	73%	100%	124%	145%	165%	183%	200%	216%
	14%	26%	44%	59%	71%	82%	91%	100%	108%	115%
	11%	19%	32%	41%	50%	57%	63%	68%	73%	78%
	8%	15%	25%	32%	38%	43%	48%	52%	55%	58%
	7%	12%	20%	26%	31%	35%	38%	41%	44%	47%
	6%	10%	17%	22%	26%	29%	32%	35%	37%	39%
	5%	9%	15%	19%	22%	25%	28%	30%	32%	33%
	5%	8%	13%	17%	20%	22%	24%	26%	28%	29%
	4%	7%	12%	15%	17%	20%	21%	23%	25%	26%

<u>Multiple</u>	<u>Years</u>	<u>IRR</u>	<u>Invested</u> 1/1/2010	<u>Returned</u> 12/31/2014
4.0x	5.00	32%	\$(100.00)	\$ 400.00

Created By: J. Skyler Fernandes

[www.OneMatchVentures.com](http://www.OneMatchVentures.com)

Instructions: Change the blue cells for Return Multiple and Years Invested to see new IRR results.  
Green IRR Cells = IRR that is at or above the desired IRR.

# But IRR has limits too

Only valid over life of the fund

- Cannot compare IRR to periodic (ie annualized) returns
- Assumes reinvestment when none exists (matters over shorter time frames)
- Does not distinguish between realized and unrealized returns-unrealized investments treated as terminal positive cash flow (when they may not be)
- Returning 100% in one year is better than returning 100% in 10 years, but IRR does not account for this



# Summary this section

- High cost of capital – and no alpha-- on average- VC industry can't justify fees
- Relationship between IRR, multiples, exit probabilities and time
- Pitfalls of return calculations (don't really know what the returns are until the exit or the end of the funds life)



Fintech Venture Capital

# VALUATION

# Startup capital raising process

- Sell a % (usually 20-30%) of your business to the investor
- Dilution means watering down all shareholders' percentage ownership
- Hopefully dilution is offset with increase in valuation, but tradeoff is that too high a valuation too fast causes problems
- Other concessions often made too
- Many rounds before success

# Pre and post money valuation

$$\text{Post-money valuation} = \text{New investment} \cdot \frac{\text{Total post investment shares outstanding}}{\text{Shares issued for new investment}}$$

$$\text{Pre-money valuation} = \text{Post-money valuation} - \text{New investment}$$

# Valuation methods

- **Discounted cash flow (absolute)**
- **“Comps” –comparing to similar companies (relative)**
- VC method-DCF with adjustments to account for dilution and optionality
- First Chicago method (3 fundamental scenarios, calculate value, assign % chance, calc p-wtd)
- Dark side—for a later class

# DCF-basic concepts

- Stages and growth rates
  - Venture period: rapid revenue growth (3-5 years to IPO)
  - Rapid growth period (IPO+5 years) above industry revenue growth, rising margins and returns
  - Stable growth period: converging with industry growth, margins, and returns
- Cash flows =  $EBIT (1-t) + d + a - \text{cap ex-change in NWC}$ 
  - Free cash flow net of reinvestment
    - Cash flow for each year in forecast
    - Perpetuity or terminal value (final cash flow)  $NPV = X/(r-g)$
    - No debt so no interest expense, no amortization, so basically E less reinvestment, defined as  $\text{cap ex} + \text{NWC} - d$
- Discount rate
  - Relevant cost of capital for that type of company
  - VC cost of capital

# Valuation and P&L

- Initially valuation based on the idea plus a 5 year forecast
- Fundamental performance of the company must support the valuation
- Investors compare you to other companies at similar stages in similar businesses

# Financial model build

Income statement, cash flow statement, balance sheet

- Revenues (units, prices, growth rate)
  - COGs (fixed and variable)
- Gross profit (GM%)
  - SGA (sales and marketing = customer acquisition costs versus overhead)
- Operating profit (OM%)
  - Other expenses (interest expense)
- Pretax profit
  - Taxes
- Net profit (net margin%)

5 year P&L  
Cash flow picture  
Required balance sheet



# Key metrics, link to valuation

One Metric? (Eisenmann, ed., Ch. ) B2C versus B2B?

- Customer acquisition costs
  - Customer lifetime value
  - Churn (customer life)
  - LTV/CAC
  - Other KPIs?
    - Drive the strategy?
    - The operations? The finances?
    - KPI pitfalls (call center)
- Customer growth
  - Revenue growth
  - Gross, Operating, Net margin
  - Cash flow
  - Cash burn
  - ROIC, ROE

# Link this to ROE (or ROIC)

- Dupont ROE formula

$$\text{ROE} = \text{sales/assets} * \text{assets/equity} * \text{pretax/sales} * (1 - \text{tax rate})$$

*Drivers?*

- Pretax/sales = margins
- Assets/equity = leverage
- Sales/assets = asset turn (productivity of each revenue dollar)
- Tax rate

*Link between returns and valuation:*

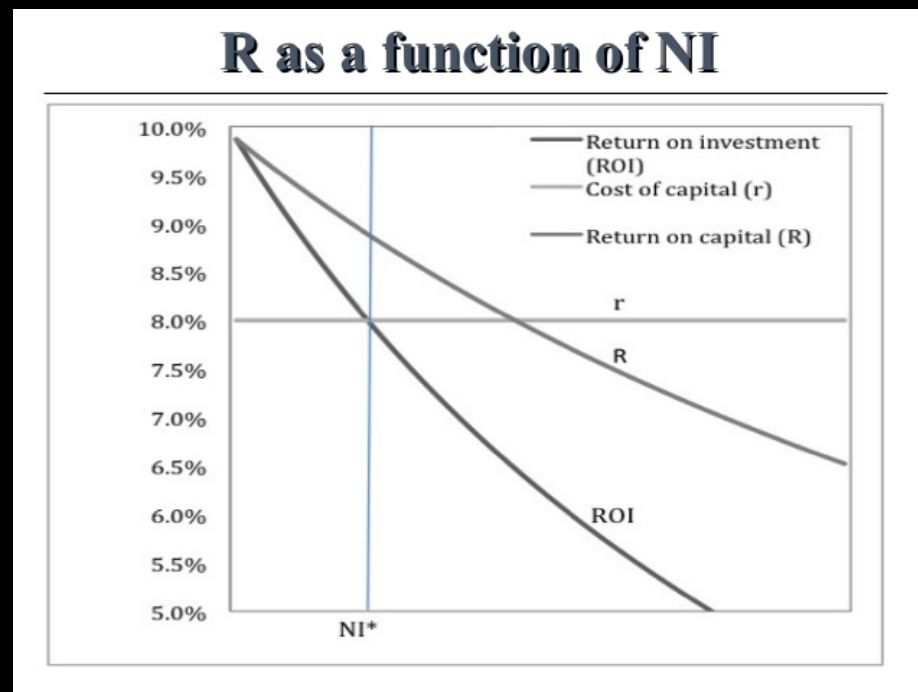
(P/BV) and ROE (Net/BV)

$$G = \text{ROE} (1 - k)$$

# VC method

Chapter 11: tradeoffs between growth and returns; optimizing

- NPV is positive on an incremental investment NI only if R (return on capital) is greater than r (cost of capital)



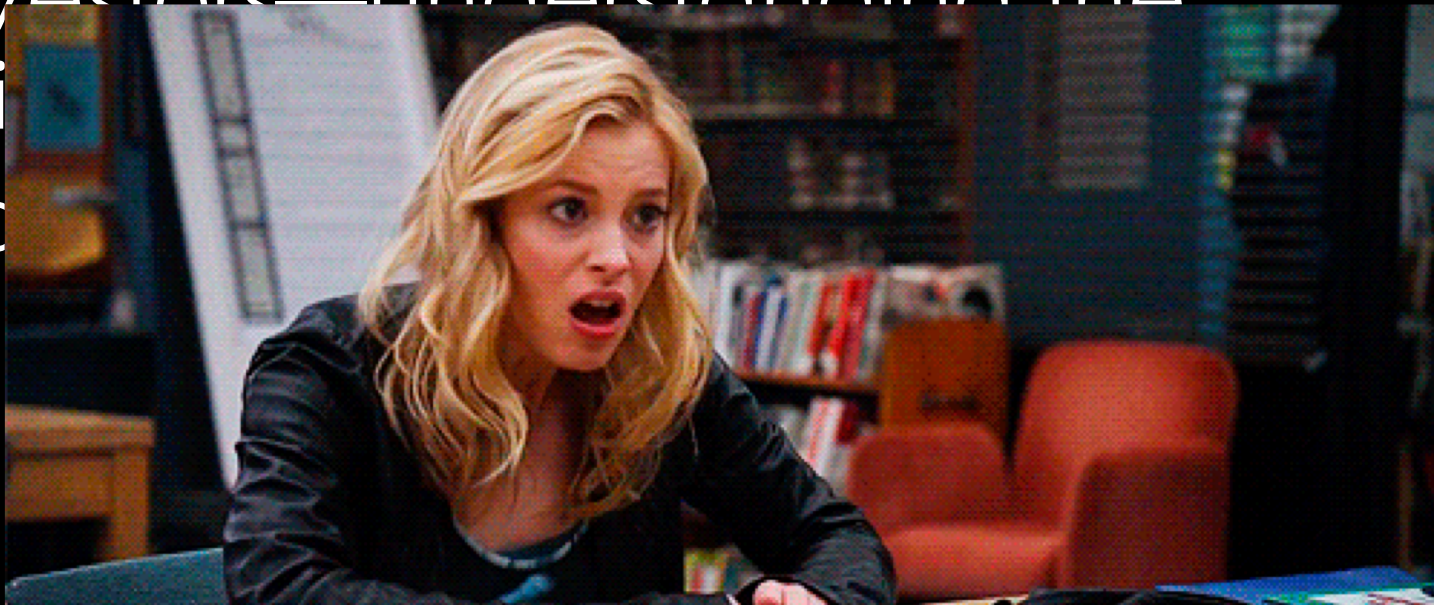
# How it all goes wrong

Over and under-  
estimating valuation



# Summary this section

- DCF is the method of choice, followed by comps
- Art not science in startup businesses
- Other features of the financial forecast are very important to VC investors—understanding the drivers
- Vc



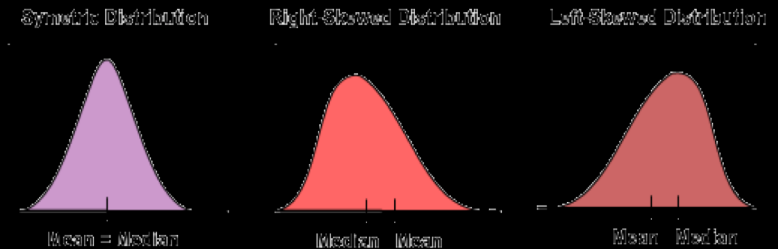
Fintech Venture Capital

# **PATH DEPENDENCY AND STRUCTURING FOR ADVANTAGE**

# Data patterns

Implications for modeling and prediction

- Random data (aka “coin toss”)
  - Each data point is independent
  - **Normal distribution**
  - Equilibrium states
  - Example: Stock prices (if the efficient market hypothesis is correct)
- Random data with anomalies
  - Regime shifts or trends
  - **Skewed distributions**
  - Example: value stocks (why do they systematically earn higher returns?)
  - Example: survivor bias in peer groups (right skew, mean > median)
  - Example: serial correlation in illiquid securities
- Path-dependent data (aka “butterfly effect” or evolution)
  - Each data point is not independent, may depend on other data points
  - **Pareto distributions**
  - Game theoretical outcomes
  - Emergent behavior



# Another way of explaining it

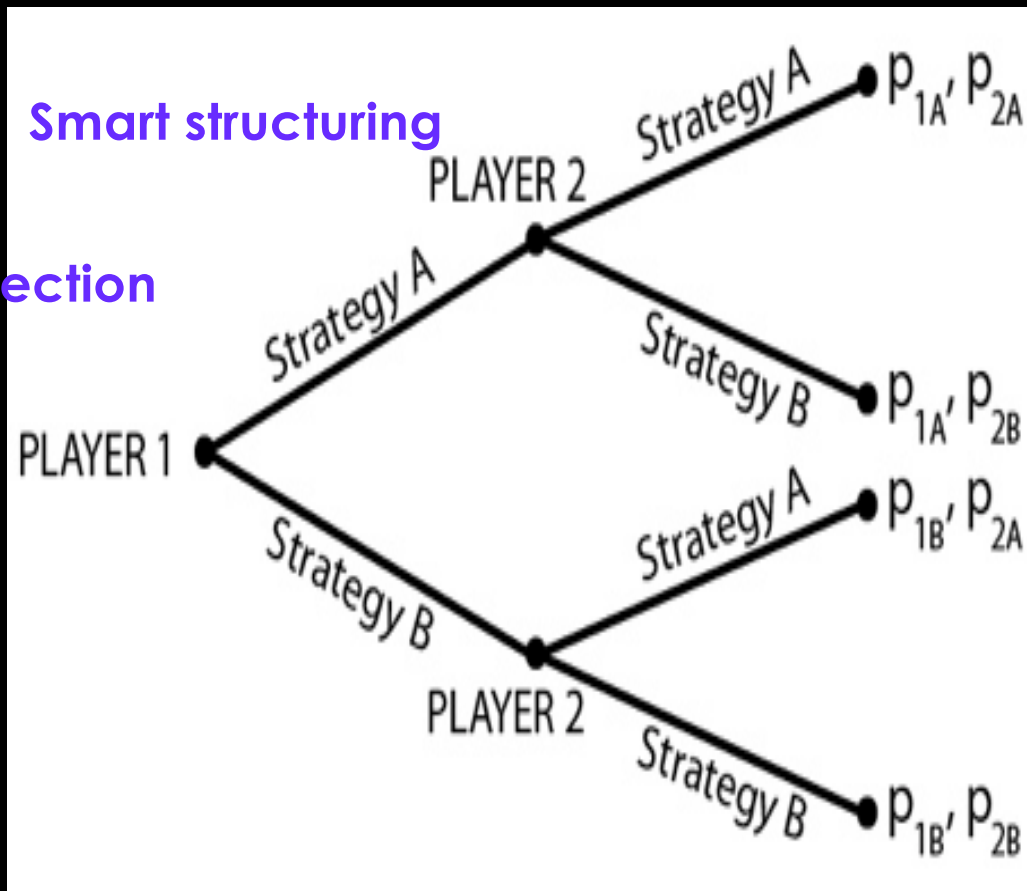
increase the probability and value of the chosen path

Exit

Active management

Smart structuring

Good selection



Probabilities and values at each node

Optionality  
(in securities,  
in portfolios of  
startup  
companies)



# VC business-ways to increase returns

- Preferential treatment in the waterfall chart
  - At each stage
- Board Seats
- Corporate Governance
- Human resources
- Matchmaking
- Strategy

# What kind of shares do VCs take?





# Cap Table

(Ch. 8) Assuming all common equity

Options Pool  
Preferred  
Payoffs

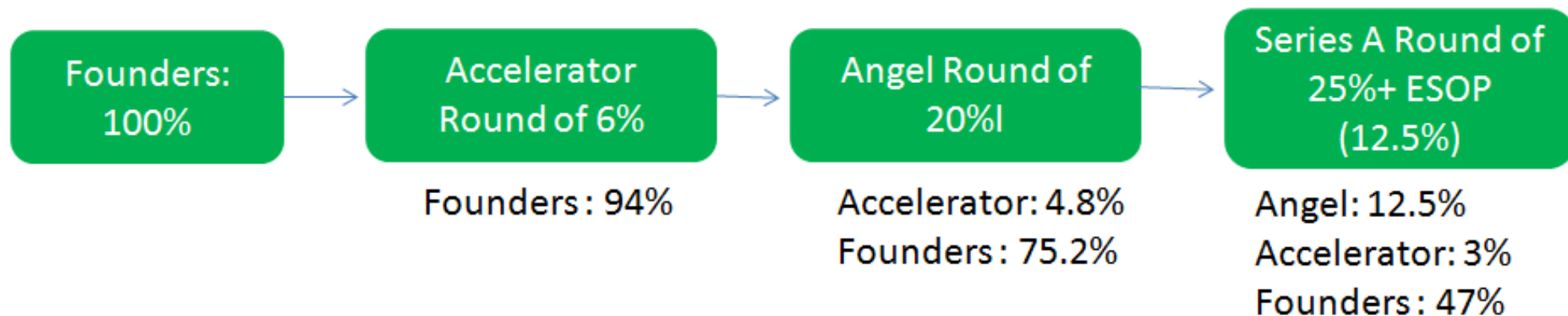
Security	Pre-Financing		Post-Financing	
	# of Shares	%	# of Shares	%
Common—Founders	7,750,000	77.5	7,750,000	51.7
Common—Employee Stock Pool	2,250,000	22.5	2,250,000	15.0
Issued	300,000	3.0	300,000	2.0
Unissued	1,950,000	19.5	1,950,000	13.0
Series A Preferred	0	0.0	5,000,000	33.3
Total	10,000,000	100	15,000,000	100

## 8.1.1 Investors

This section of the term sheet lists all investors, the dollar amount of their investment (which we will call the *\$investment*), and the number of shares they receive for this amount. In this case, the investment implies ownership of 33.33% of the *fully diluted basis* (which assumes that all preferred stock is converted into common stock at the time of the *fully diluted share* calculation).

# How much do VCs buy? Typical dilution

## Equity Dilution of a Start-up

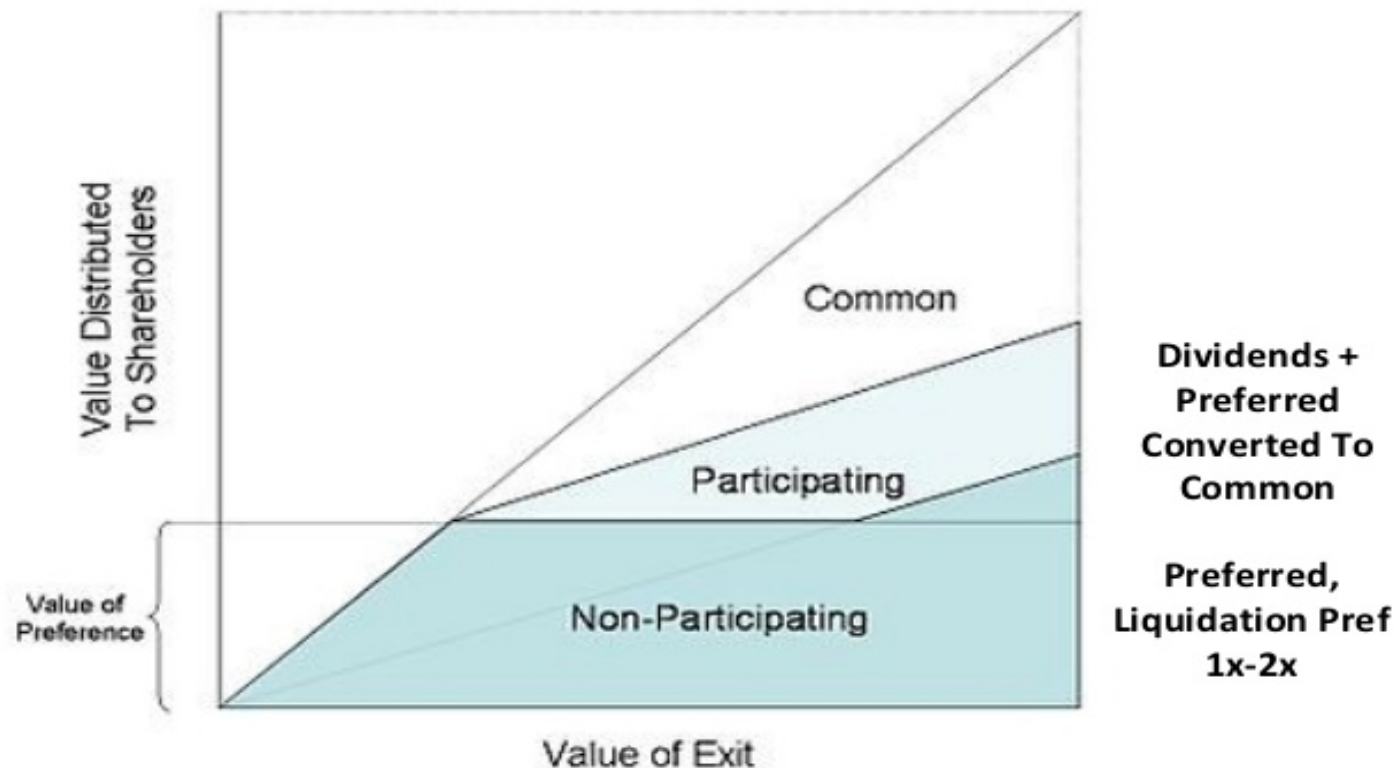


Source: <http://brandalyzer.wordpress.com>

# VC structures and waterfall

Control rights and payoff patterns

## Waterfall



20

# VC & entrepreneur: Term sheet

[www.passioncapital.com](http://www.passioncapital.com): "Plain English Term Sheet"

- What % of the company are you selling? For what valuation? # shares, price, options?
- Conditions
- Documents and Warranties
- Liquidation preference
- Important decisions
- Pre-emption rights
- Right of first refusal, drag along and tag along rights
- Restrictive covenants (don't start a competing biz)
- Founder shares
- Board of directors
- Information rights
- Expenses
- Exclusivity & confidentiality
- Non-binding
- Expiry



# Road to riches?

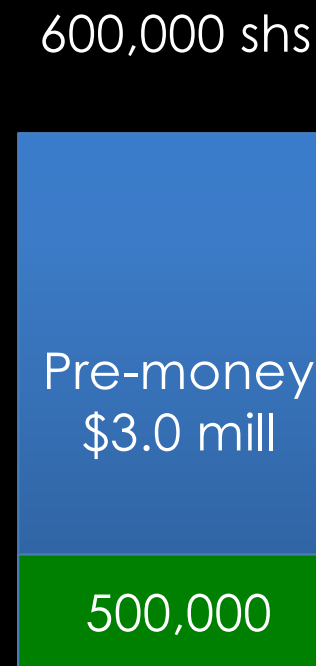
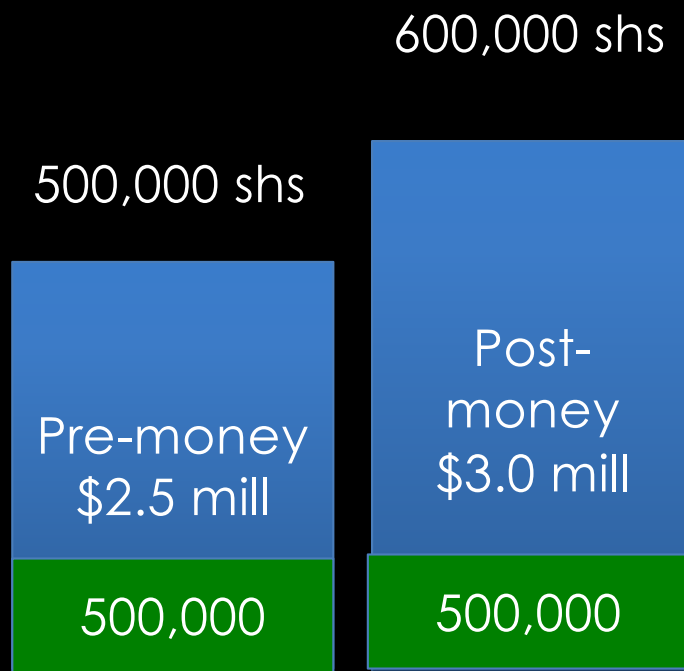
Effects of dilution on founders stake

Have  
you  
made  
money  
?

Issue 100,000 shares at \$5.00  
per share, raising \$500,000,  
selling 20% of your firm

Issue 100,000 shares at \$6.00  
per share, raising \$600,000  
Selling another 17%

700,000 shs



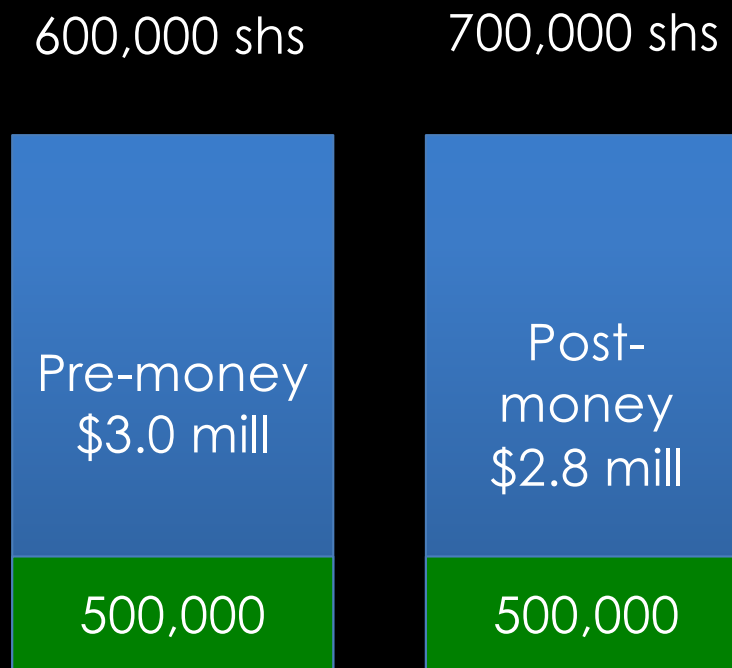
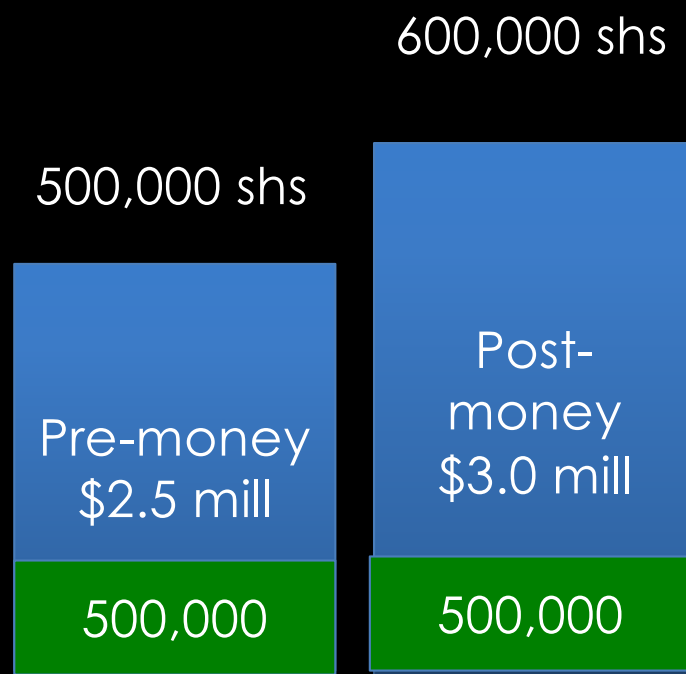
# Or...profitless prosperity

Effects of dilution on founders stake

Have  
you  
made  
money  
?

Issue 100,000 shares at  
\$5.00 per share, raising  
\$500,000, selling 20% stake

Issue 100,000 shares at \$4.00  
per share, raising \$400,000  
Selling another 17% stake





# Summary: structuring & path dependency

## Entrepreneur:

- Be capital efficient
- Plan for loss of partnership and control (aution)
- Watch the negotiation details



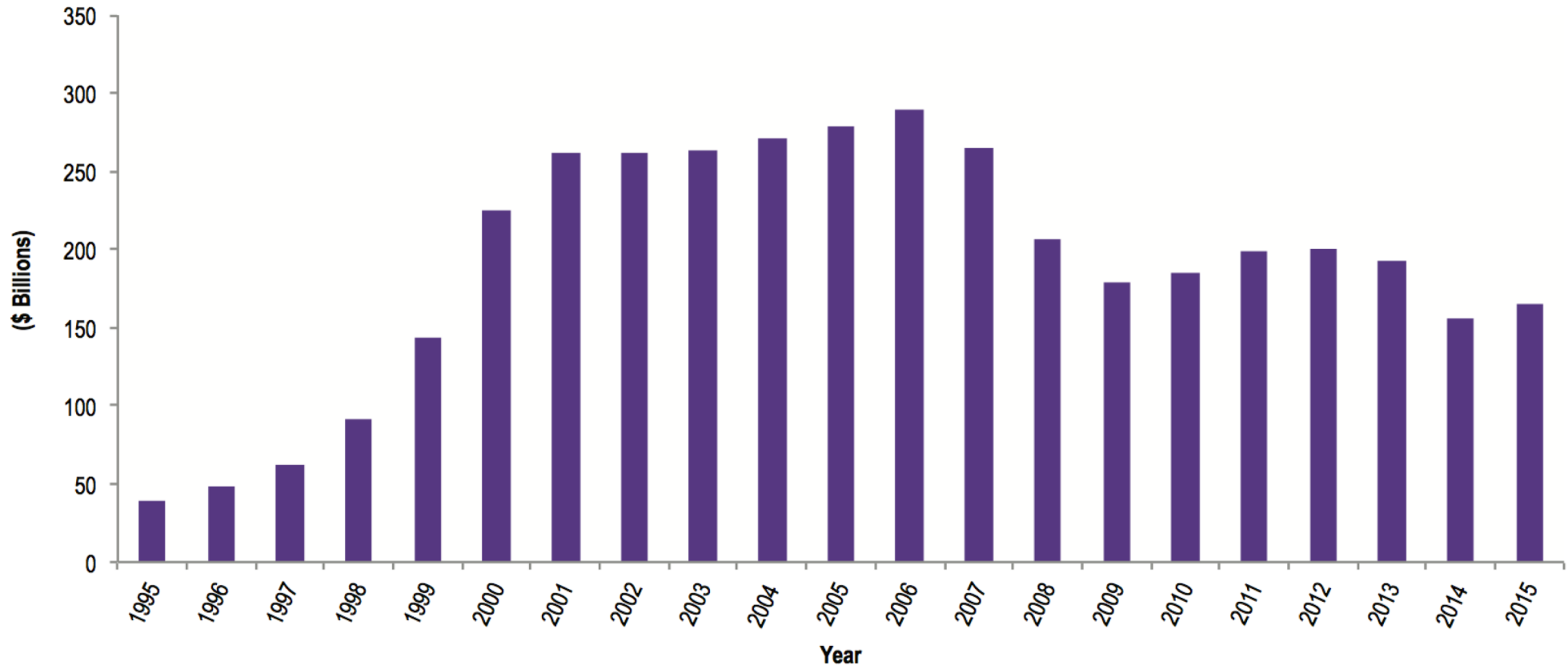
**VC:** Will negotiate hard to tilt odds in their favor (valuation, terms) through deal structure

Fintech venture capital

# **ILLIQUIDITY, CYCLICALITY AND EXITS**

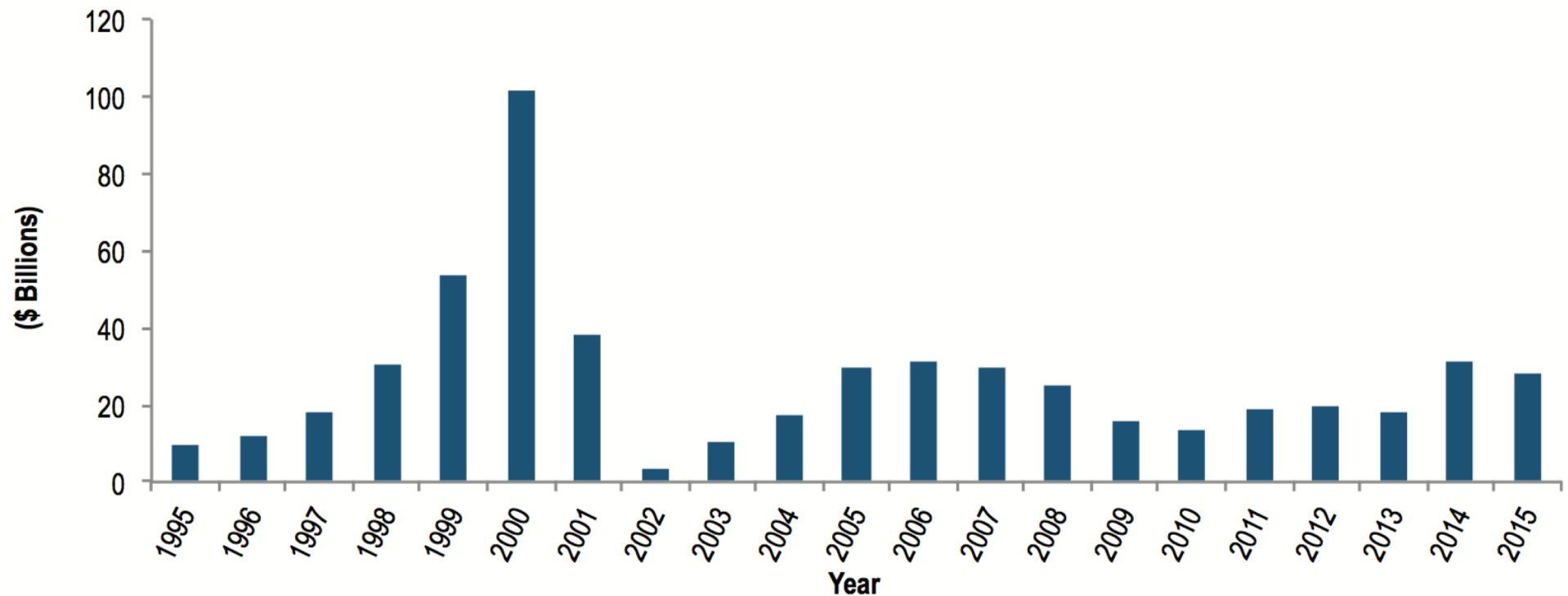
# Capital under management

**Figure 2.0**  
**Capital Under Management U.S. Venture Funds (\$ Billions)**  
**1995 to 2015**



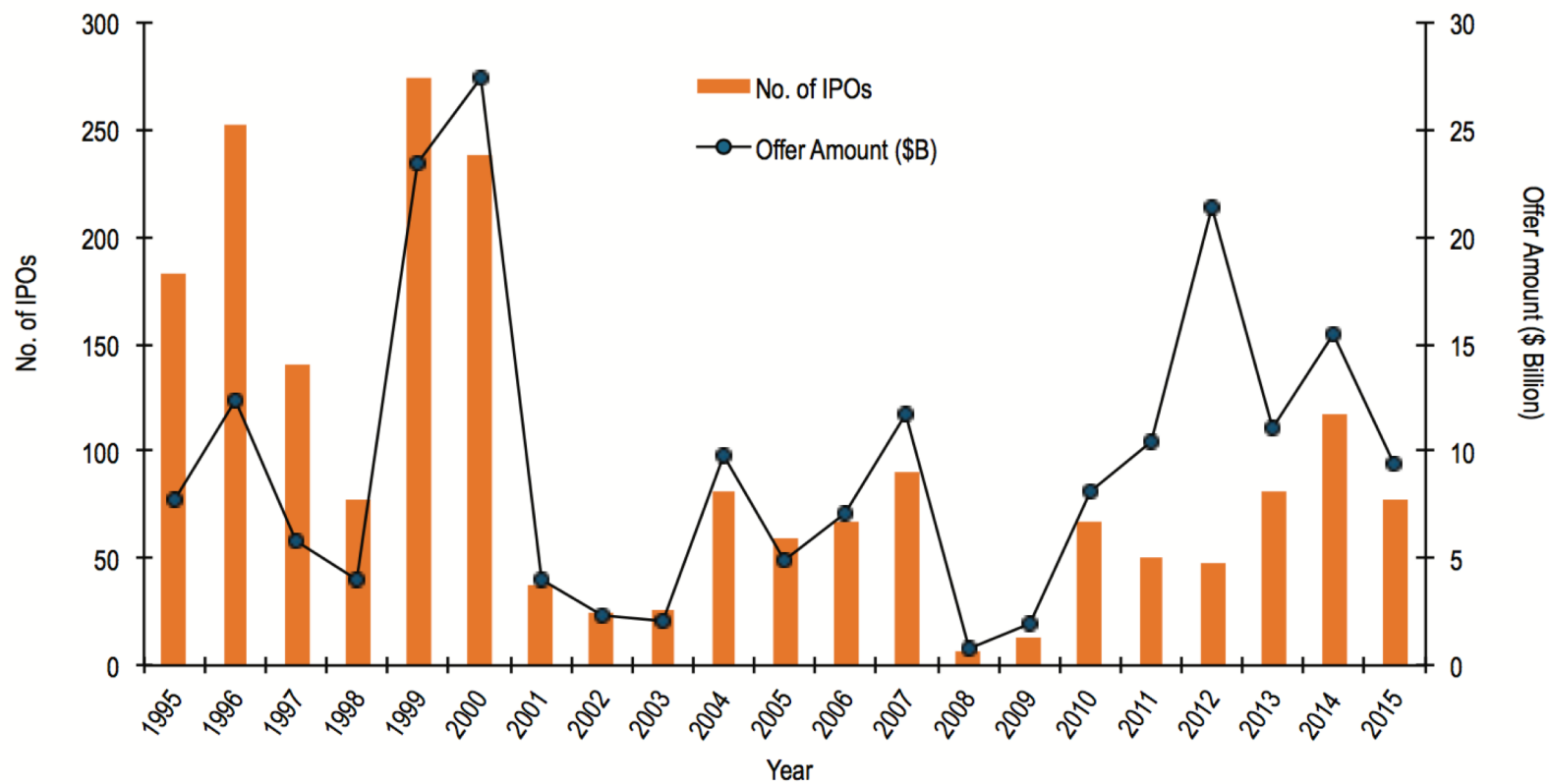
# Capital commitments to funds

**Figure 3.0**  
**Capital Commitments To U.S. Venture Funds (\$ Billions)**  
**1995 to 2015**



# Exit-IPO

**Figure 9.0**  
**Venture-Backed IPOs, 1995-2015**



# Exit –M&A

Venture-Backed Mergers & Acquisitions by Year							
Year	Total No. of M&A's	No. With Disclosed Values	Price (\$ Millions)	Average (\$ Millions)	Median (\$ Millions)	Mean Time To Exit (Years)	Median Time To Exit (Years)
1995	92	58	3,801.8	65.5	31.0	4.6	4.1
1996	109	77	8,249.9	107.1	52.0	5.2	4.1
1997	146	101	7,817.7	77.4	43.5	4.5	3.2
1998	189	113	8,002.0	70.8	47.5	4.5	2.8
1999	228	155	38,710.6	249.7	85.6	3.6	2.8
2000	379	245	79,996.4	326.5	125.0	3.2	2.7
2001	385	175	25,115.6	143.5	30.0	3.0	2.2
2002	364	166	11,913.2	71.8	20.0	3.5	2.9
2003	324	135	8,243.6	61.1	27.5	4.3	3.6
2004	403	200	23,432.4	117.2	49.0	5.0	4.6
2005	447	201	19,717.3	98.1	45.0	5.4	5.2
2006	482	207	24,221.0	117.0	58.3	5.7	5.7
2007	488	201	30,745.5	153.0	85.0	5.8	6.3
2008	417	134	14,925.7	111.4	52.6	5.9	5.6
2009	350	109	12,364.9	113.4	30.0	5.7	5.5
2010	525	152	17,733.5	116.7	65.8	5.8	5.1
2011	492	170	24,197.2	142.3	81.0	5.8	5.0
2012	477	132	22,694.2	171.9	100.0	6.1	5.6
2013	386	95	16,909.8	178.0	130.0	5.9	4.9
2014	472	140	48,139.9	343.9	93.8	6.2	5.5
2015	360	87	16,947.1	194.8	110.0	6.1	4.7

Average acquisition price is calculated by dividing total known acquisition proceeds by the number of transactions where the proceeds are known, not the total number of transactions. Median figures are calculated based on transactions with disclosed amounts only.

# VC method to deal with industry cyclicalality

Adjust future value for...

- **Probability of exit**
- **Dilution to get to exit**
- **Other fees and carry**

Expected value at exit (FV) = exit valuation \* p

Present discounted value of exit (PV) = exit valuation (FV) \*  $p/(1+r)^T$

p= probability of exit

r= cost of venture capital

$p/(1+r)^T$  = effective discount factor for the exit valuation, 1/discount factor = multiple, e.g.  $1/20\% = 5x$  multiple or “M”

# Summary

- Capital flows in the industry are highly cyclical-tied to the stock market and economy
- Exits are highly market-dependent

<https://goo.gl/images/oe9Dw>





Fintech Venture Capital

# **CONCENTRATION AND NETWORK EFFECTS IN VC BIZ**

# Influence of the network

Who are these “made men”?

source: Bus. Insider





# THE PAYPAL MAFIA

THE PAYPAL FOUNDERS WENT ON TO  
CREATE INCREDIBLE NEXT BUSINESSES

JAMESALTUCHER.COM



Russel Simmons

**You**Tube



Jawed Karim

**You**Tube



Dave McClure

**500**startups



Elon Musk

**TESLA**  **SolarCity**  
**SPACEX**



Peter Thiel

 **Palantir**

**CLARIVUM**



Jeremy Stoppelman

**You**Tube



Max Levchin

**slide**



Reid Hoffman

**Linked in**



Steve Chen

**You**Tube



Roelof Botha

**SEQUOIA**  **CAPITAL**



David Sacks

**yammer**  
The Enterprise Social Network



Chad Hurley

**You**Tube

The Ellen Pao case

# **THE STRUGGLE WITH DIVERSITY**

# Huge bias-overlooked groups

- Women founded businesses do not get funded at the same rate
- When they do get funded, it is for a smaller amount
- There are very few female VC partners
- Industry tilts in target investments are also male-dominated



# Who is Ellen

Fintech + Add to myFT

SoFi CEO Mike Cagney to step down after lawsuits

Hard-charging entrepreneur says...

*7% of partners at top 100 venture firms are women.*

UBER



COURT OF THE STATE OF CALIFORNIA  
THE COUNTY OF SAN FRANCISCO

Case No. CGC-12-520719

COMPLAINT FOR DAMAGES  
JURY TRIAL DEMANDED

11 ELLEN PAO,  
12 Plaintiff,

13 vs.

14 KLEINER PERKINS CAUFIELD &  
15 BYERS LLC AND DOES 1-20.

16 Defendants.  
17

KPCB

KLEINER  
PERKINS  
CAUFIELD  
BYERS



# How about gender?

Boys will be Boys: Barber &

Odean (1997)

**Theory & Literature:** Overconfidence exists in decision making in uncertainty, overconfidence is highest for difficult tasks, e.g. financial decision-making

**Hypothesis:** men are more overconfident than women, and will trade more than women, and this trading will cost them

**Data:** large discount brokerage firm, 35,000 accounts

## **Findings:**

- Men's portfolio turnover is 1.5x women's portfolio turnover
- Both men and women reduce their net returns by trading
- Men reduce their net returns by 0.94% more per year than women
- The difference is even more pronounced between single men and single women. Single men trade 1.67x more than single women and hurt their net returns by 1.44% per year more
- When controlled for the riskiness of their portfolios, women outperform men by 1.1% per year

# How about culture?

Ji et al (2018)

## Conclusions

Overall, the present research has shown that cultural groups experience gambling fallacies differently—Asians are more subject to the gambler's fallacy and less subject to the hot-hand fallacy than Euro-Canadians, and that these differences are likely influenced by underlying cognitive beliefs that vary across cultures. These findings are an important step in identifying why certain cultural groups, such as Chinese, are more susceptible to gambling. Future research with problem gambling populations is recommended in order to further develop our understanding of the effects of culture and cognition on gambling behaviors.

## Gambler's Fallacy-will my luck reverse?-culture bound time perception

**Table 1 Number of participants in Study 1 who predicted a win or loss after a streak of wins or losses (with percentages in brackets)**

Prediction	After 3 losses		After 6 losses		After 3 wins		After 6 wins	
	Win	Loss	Win	Loss	Win	Loss	Win	Loss
Caucasian	21 (51.2 %)	20 (48.8 %)	13 (31.7 %)	28 (68.3 %)	26 (63.4 %)	15 (36.6 %)	29 (70.7 %)	12 (29.3 %)
Asian	28 (70 %)	12 (30 %)	21 (52.5 %)	19 (47.5 %)	20 (50 %)	20 (50 %)	24 (60 %)	16 (40 %)

## Hot Hand Fallacy-will my luck continue?-Caucasians more susceptible

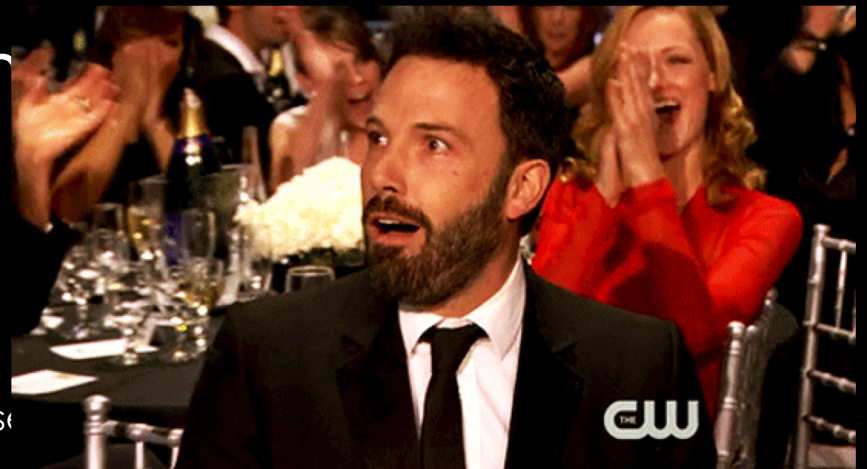
**Table 2 Number of participants in Study 2 who predicted a hit or miss after a streak of hits or misses (with percentages in brackets)**

Prediction	After 5 misses		After 15 misses		After 5 hits		After 15 hits	
	Hit	Miss	Hit	Miss	Hit	Miss	Hit	Miss
Caucasian	11 (17.5 %)	52 (82.5 %)	5 (7.9 %)	58 (92.1 %)	54 (85.7 %)	9 (14.3 %)	56 (88.9 %)	7 (11.1 %)
Asian	25 (25 %)	75 (75 %)	21 (21 %)	79 (79 %)	74 (74 %)	26 (26 %)	85 (85 %)	15 (15 %)



# Summary this section

- VC industry is not diverse
- While empirical studies suggest that gender and culture can shape decision-making under uncertainty, they do not disadvantage investment results
- Diversity offers important bottom line benefits to firms and funds
- What can you do to improve diversity?



# VC ten surprises

- **Innovation**, odds of success
- **Variation**: Geographical, industry, and stage
- **Structure**: firm and funds
- **Sequoia pitch deck** framework-investment process
- **Returns and risks** from the VC asset class
- **Cost of capital**, multiples, hurdle rates, IRR
- **Valuation** dcf and comps
- **Path dependency and structuring deal terms for advantage** (asymmetrical payoff patterns)
- **Exits**, illiquidity, cyclicalality
- **Concentration and network effects**
- ***The struggle with diversity***

# Fintech VC implications

- Innovation: how to find IP?
- Investors and stages
- Firms focused on fintech (Bain Capital, NYCA, Anthemis)
- Same DD process more or less-plus regulation and capital
- Valuation tech or fin?
- Exit map both IPO and corporate acquisition

# APPENDIX

# Investment returns 101

- **Average return:** never used in investing due to effect of cash flows and compounding
- Cash flows: capital additions and withdrawals, realized gains and losses, dividends, fees
- **Geometric (time-weighted)** return: used to calculate compound annual returns for all investments where prices are available and flows are not relevant (manager does not control). Eliminates effect of in and outflows by weighting each time unit equally (i.e., monthly, annually)
  - Used by all mutual funds and ETFs
  - Geometric mean and standard deviation are classical risk/return metrics used to compare managers and benchmarks
- **IRR: interest rate that turns a stream of cash flows into  $PV=0$ .** (or  $r$  that equates  $PV$  initial capital + all contributions and  $PV$  terminal capital + all withdrawals). Strongly affected by size and timing of cash flows.
  - Used by private equity and venture funds due to lumpy cash flows to provide a sense of absolute return
  - Cannot really be used to judge manager skill or relative performance unless manager controls flows
- **Realized and unrealized return:**
  - Total return = realized + unrealized
  - Distributions = realized capital gains that are distributed to fund investors
- Reinvestment: assumed in all calculations. Correct for geometric, incorrect for IRR
- Timing-effect of time is everything in IRR and nothing in geometric
- Fees: all managers' returns should be shown **gross and net of fees**

# *Arithmetic & Geometric Means*

## *Arithmetic Mean(average)*

$$AM = \frac{a_1 + a_2 + a_3 + \dots + a_n}{n}$$

## *Geometric Mean*

$$GM = \sqrt[n]{a_1 a_2 a_3 \dots a_n}$$

*e.g.* Find the *AM* and *GM* of 4 and 25

$$\begin{aligned} AM &= \frac{25 + 4}{2} \\ &= \frac{29}{2} \end{aligned}$$