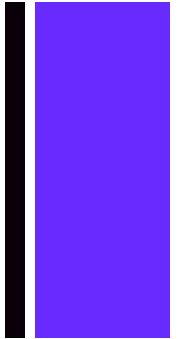


# FinTech Introduction

The theory and history of financial innovation



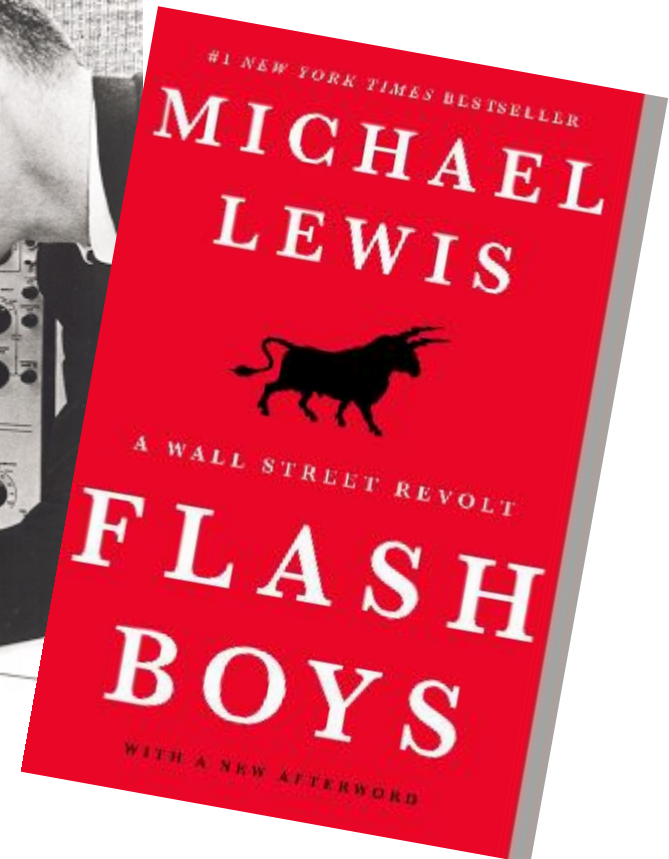
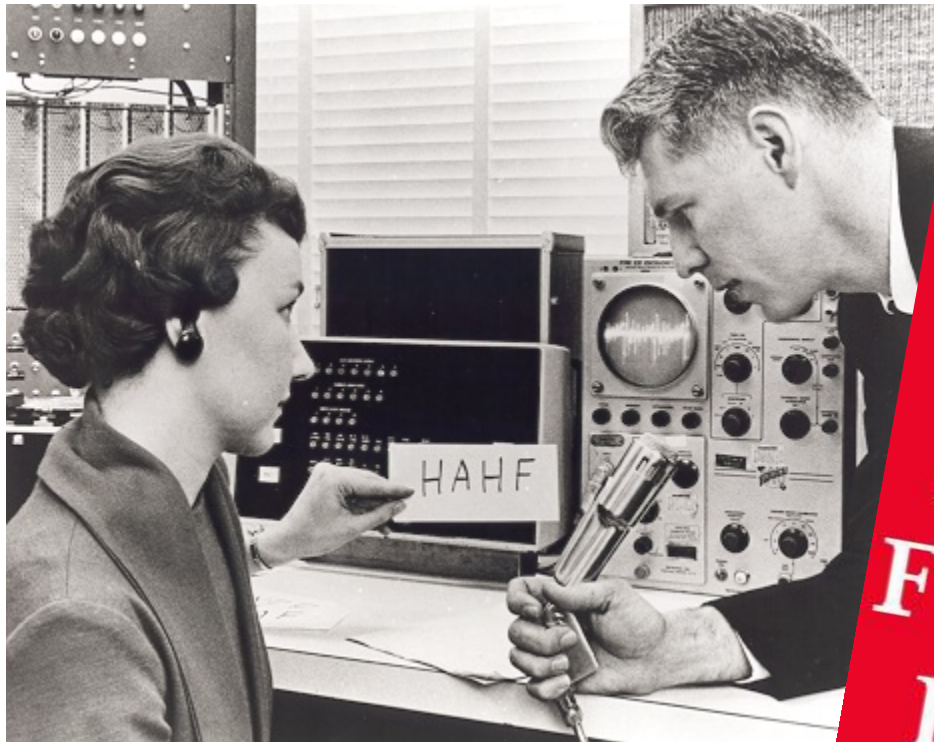
# Foundations of FinTech



Professors Yannis Bakos, Kathleen DeRose, Hanna Halaburda

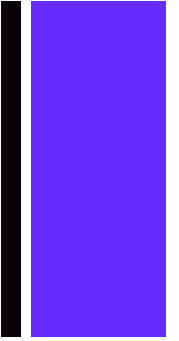
*This inter-departmental course provides an introduction to the emerging FinTech discipline. It is intended to be the starting point for Stern students who may take additional electives in the FinTech area, while providing an overview for students who intend to take only one FinTech course.*

# + Technology in the financial markets



# + Technology in consumer finance





- How much difference have these innovations made?

# + Stability of the financial system



1873



1932

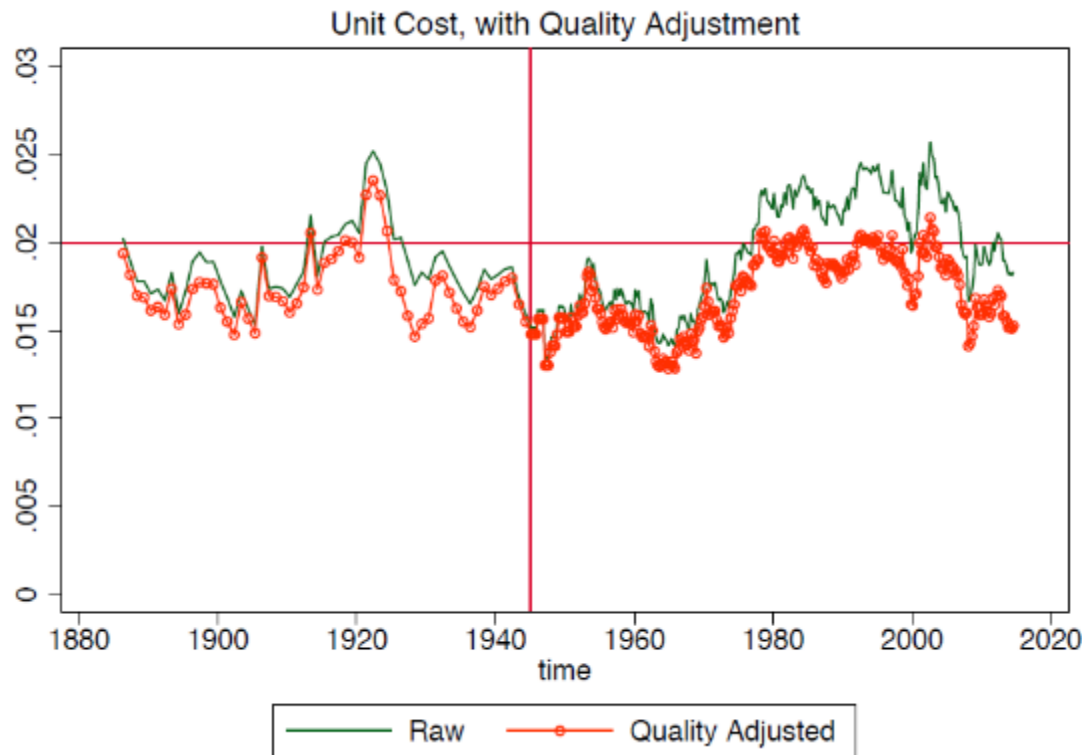


2007

# The cost of financial transactions

A long view: worldwide data from 1886-2015

- 2% per transaction, unchanged for 130 years



Source: Philippon (2016)



# + Intelligent redesign of the financial system

Bitcoin network is launched, January 3, 2009

**Bitcoin: A Peer-to-Peer Electronic Cash System**

Satoshi Nakamoto  
satoshin@gmx.com  
www.bitcoin.org

**Abstract.** A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.





# + Finance enters the peer-to-peer economy

- An early breakthrough



- Industries now being disrupted



# + Employment?

## FINANCIAL TIMES Fintech lures MBAs away from banking and consulting

Salaries are less of a concern to those who aim to be agents of disruption



“A 2015 Goldman Sachs report estimated \$4.7 trillion of financial services revenue was at risk of displacement from fintech . . .”



# The Economics of [Fin]Tech: Platforms and Networks

## ■ Network effects

- The more users, the more value *per user*
- Can create positive feedback and barriers to entry

## ■ Platforms

- Coordinate different “sides” of the market
  - application developers and users
  - funders and users of funds
  - money senders and recipients
  - Envelopment



# Important Technologies for Financial Innovation

- Security and Authentication
  - Transactions and Payments
  - **Blockchain**
  - P2P Applications
  - Privacy
- 
- Analytics
  - Machine Learning



# Why is innovation important?

[https://www.youtube.com/watch?v=J-GVd\\_HLIps](https://www.youtube.com/watch?v=J-GVd_HLIps)

[https://youtu.be/J-GVd\\_HLIps](https://youtu.be/J-GVd_HLIps)



The background of the image shows the silhouettes of a large crowd of people walking away from the camera. They are walking on a reflective surface, possibly a beach or a wet plaza, which creates clear reflections of the people and the sky. The sky is a mix of orange, yellow, and light blue, suggesting a sunset or sunrise. A semi-transparent teal rectangle is overlaid on the center of the image, containing the text.

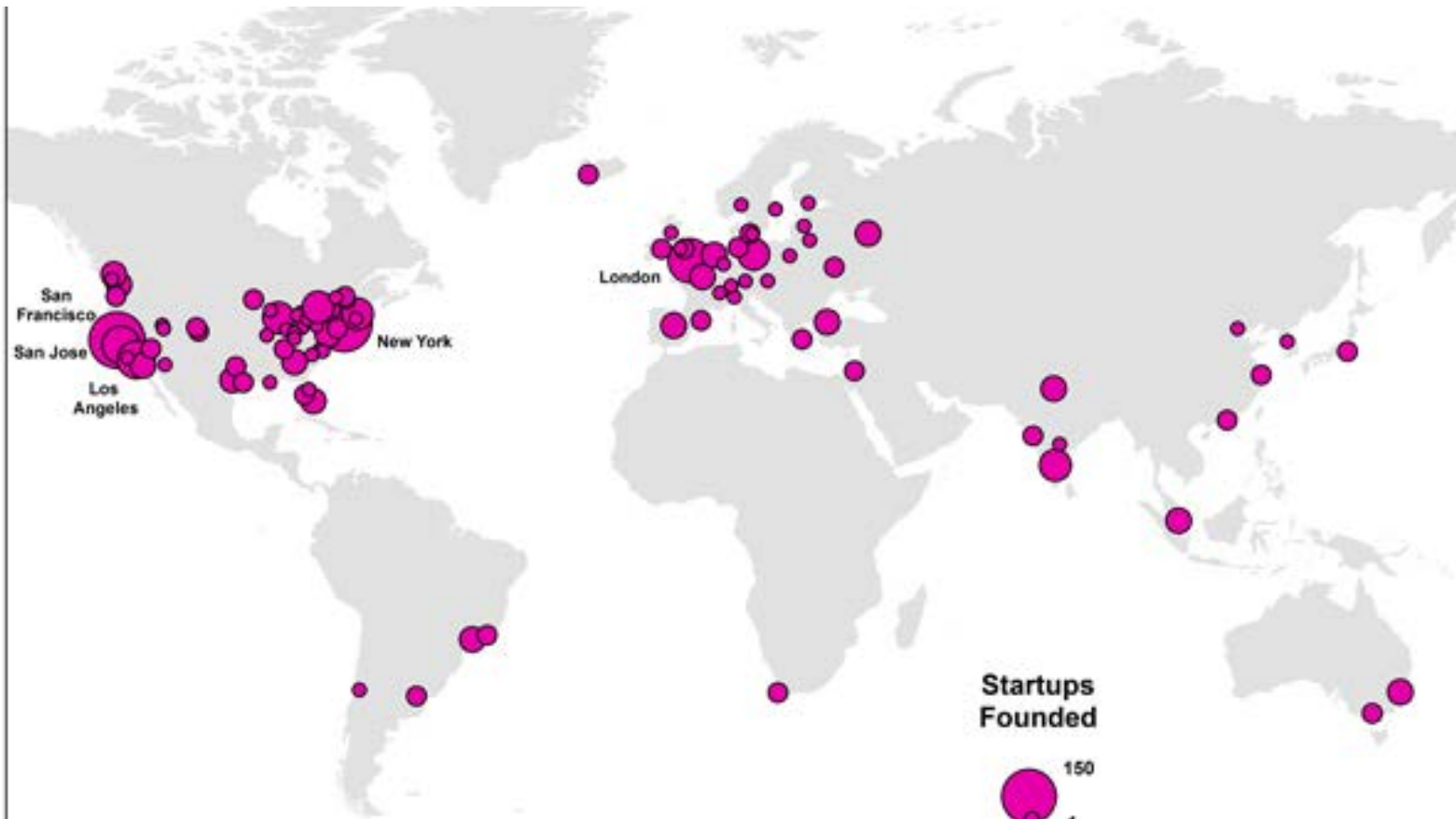
**MAKE**  
**THE WORLD A**  
**BETTER**  
**PLACE**

Is innovation  
widespread or  
scarce?



# Innovation around the world

number of startups founded





# + Concentrated innovation

19

63% of US patents  
from just 20 metro  
areas

# What role does technology play in innovation?



# + Overview-today

- Innovation (Macro)
  - Why is innovation important?
  - What explains differences in innovation globally?
  - Drivers of innovation
- Financial Services Innovation (Micro)
  - Technology in financial services (history, patterns, types)
  - Defining disruptive innovation
  - Why now and current trends
- Platform innovation in financial services



+

# Macro

Innovation Theory



# + Kerala

25





# QUARTERLY JOURNAL OF ECONOMICS

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Vol. CXXII

August 2007

Issue 3

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## THE DIGITAL PROVIDE: INFORMATION (TECHNOLOGY), MARKET PERFORMANCE, AND WELFARE IN THE SOUTH INDIAN FISHERIES SECTOR\*

ROBERT JENSEN

When information is limited or costly, agents are unable to engage in optimal arbitrage. Excess price dispersion across markets can arise, and goods may not be allocated efficiently. In this setting, information technologies may improve market performance and increase welfare. Between 1997 and 2001, mobile phone service was introduced throughout Kerala, a state in India with a large fishing industry. Using microlevel survey data, we show that the adoption of mobile phones by fishermen and wholesalers was associated with a dramatic reduction in price dispersion, the complete elimination of waste, and near-perfect adherence to the Law of One Price. Both consumer and producer welfare increased.

# + How did he measure market inefficiency?

100%  
difference  
in prices!

PRICES AND EXCESS SUPPLY AND DEMAND IN FIFTEEN SARDINE BEACH MARKETS

	Price (Rs/kg)	Excess buyers	Excess sellers
<b>Kasaragod District</b>			
Hosabethe	6.2	0	0
Aarikkadi	4.0	0	0
Kasaba	0.0	0	4
Kanhangad	7.2	0	0
Thaikadappuram	9.7	11	0
<b>Kannur District</b>			
Puthiangadi	8.7	2	0
Neerkkadavu	6.9	0	0
Ayikkara	8.4	1	0
Thalassery	4.3	0	0
New Mahe	6.2	0	0
<b>Kozhikode District</b>			
Chombala	9.9	15	0
Badagara	0.0	0	11
Quilandi	9.8	12	0
Puthiyangadi	0.0	0	6
Chaliyam	6.4	0	0

Data from the Kerala Fisherman Survey conducted by the author. The first column contains the average 7:45–8:00 A.M. price of sardines in each market on Tuesday, January 14, 1997, in rupees per kilogram. The markets are listed in north–south geographic alignment; starting from Hosabethe, the distance in kilometers between each market and the next is: 12, 14, 15, 15, 24, 15, 6, 14, 9, 8, 7, 15, 10, and 16. “Excess buyers” represents the number of buyers who leave the market without having purchased enough fish, and “excess sellers” is the number of fishermen who leave the market without selling their fish.



# + Cellphones introduced 1997

28



# Large Changes in Fish Marketing

1996



2001





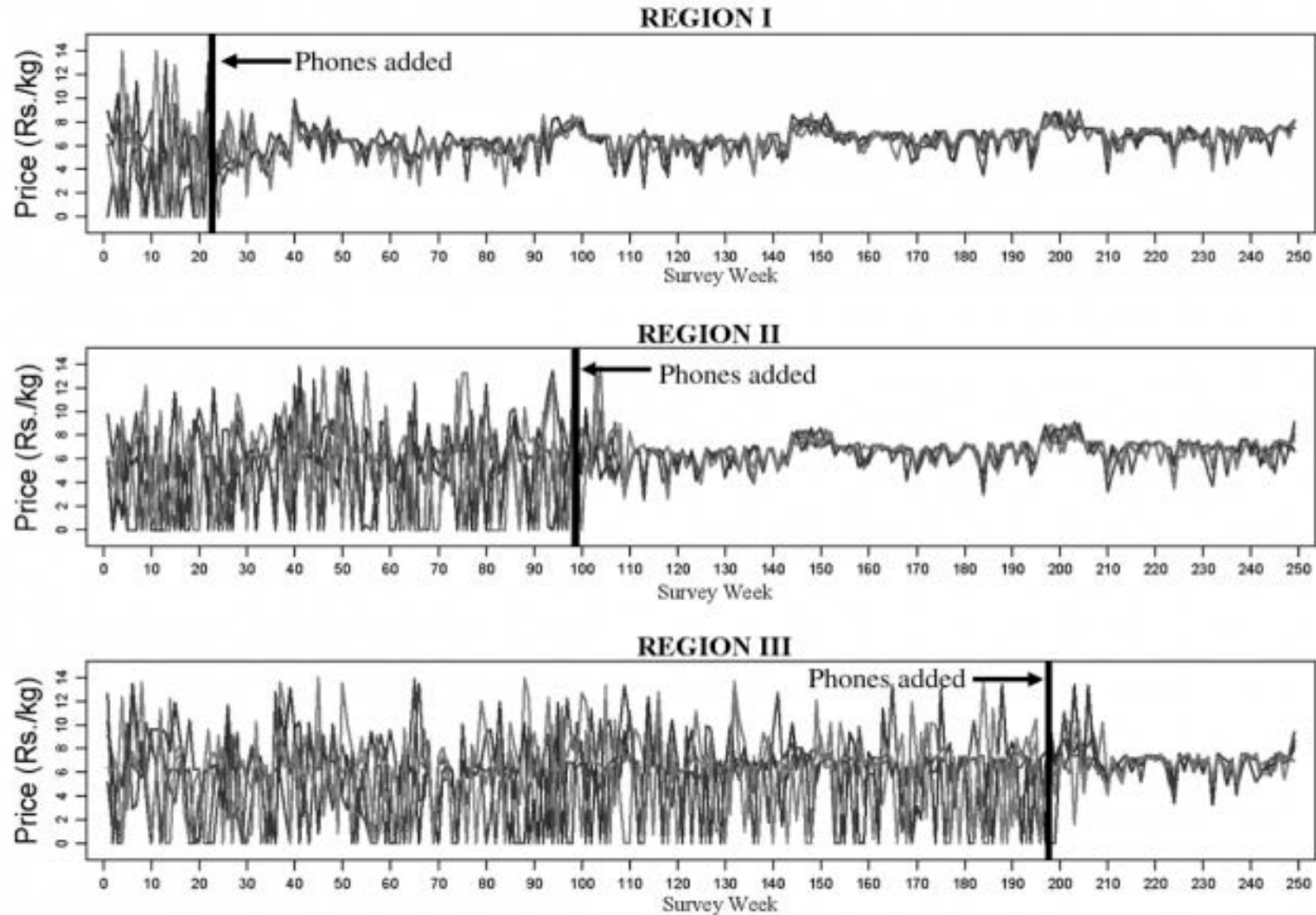
## + Market knowledge

*‘Fish prices...can vary widely among the 17 landing spots around Cochin. Before mobile phones, deciding which would offer the best price was sheer guesswork.’*

*‘On a recent day, [we] turned down an offer of 3,000 Rs for [our] catch in favor of a 12,000 Rs bid elsewhere.’*

– Captain P.A. ‘Joy’ Clarence, captain of the St. Xavier, quoted in newspaper.

# + Price dispersion



# + Increasing the pie



# + How technology increased the welfare “pie”

Cell phones made market price information more transparent and accessible, (reduced information asymmetries) causing reductions in price dispersion (less inefficiency) across markets

## Producers (Supply)

- Higher realized prices
- Less waste

## Consumers (Demand)

- Lower realized prices
- Better availability

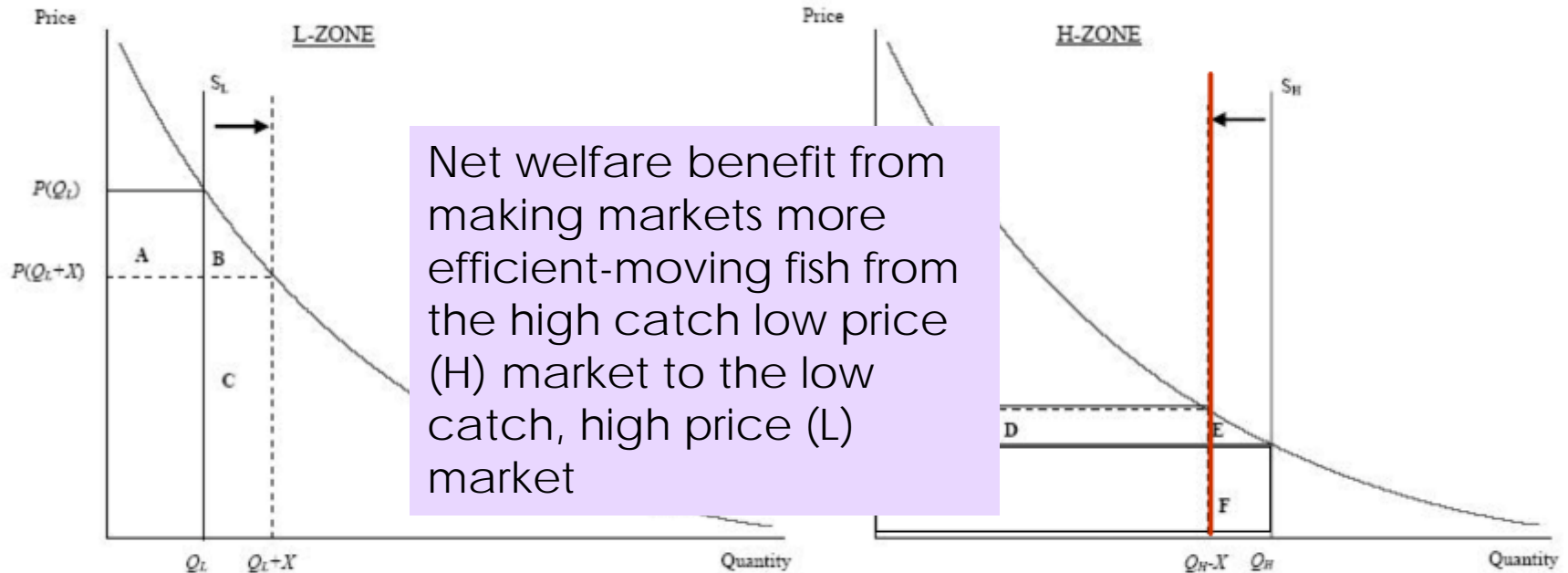


FIGURE I. CHANGES IN WELFARE ASSOCIATED WITH ARBITRAGE

FIGURE I. CHANGES IN WELFARE ASSOCIATED WITH ARBITRAGE

With arbitrage:

Consumers: A+B

Producers: C-A

Net Change B+C

Transfer A

With arbitrage:

Consumers: -D-E

Producers: D-F

Net change: -E-F

Transfer: D



+

# Caveats-generalizable?

35

- **Inelastic supply** (day's catch, perishable) assumption
- **Slope of the demand curve** shapes the distribution of benefits between producers and consumers—what if slope is not as steep? (i.e. for subsistence foodstuff-must have)
  - Also-disintermediation of local middlemen (not mentioned)
- **Background conditions** in commodity markets (prices that are not set locally)
  - Other types of markets?

# + Technological innovation benefits to economy & society

- Access

- Transparency

- Price/cost/efficiency

- Behavioral shifts



# + Example:

leapfrogging: mobile phones and financial innovation





# + Sneak Peak

38



# + Financial markets & info asymmetry inefficiency or opportunity?

Price dispersion  
Bid/Ask Spreads  
Arbitrage  
Volatility  
Illiquidity



# + Example: Could FinTech lower financial intermediation costs?

How much ARE intermediation costs at the macro level?

# + Our questions

- Why is innovation important?
- Why is it scarce?
- What role does technology play? How do you generate innovation?

And

- How do you measure it?



# + Solow Growth Model

Productivity gains from technology fuel economic growth

42

Growth= labor force +  
investment + productivity

$$Y(t) = K(t)^\alpha (A(t)L(t))^{1-\alpha}$$

$Y(t)$  = output, total production

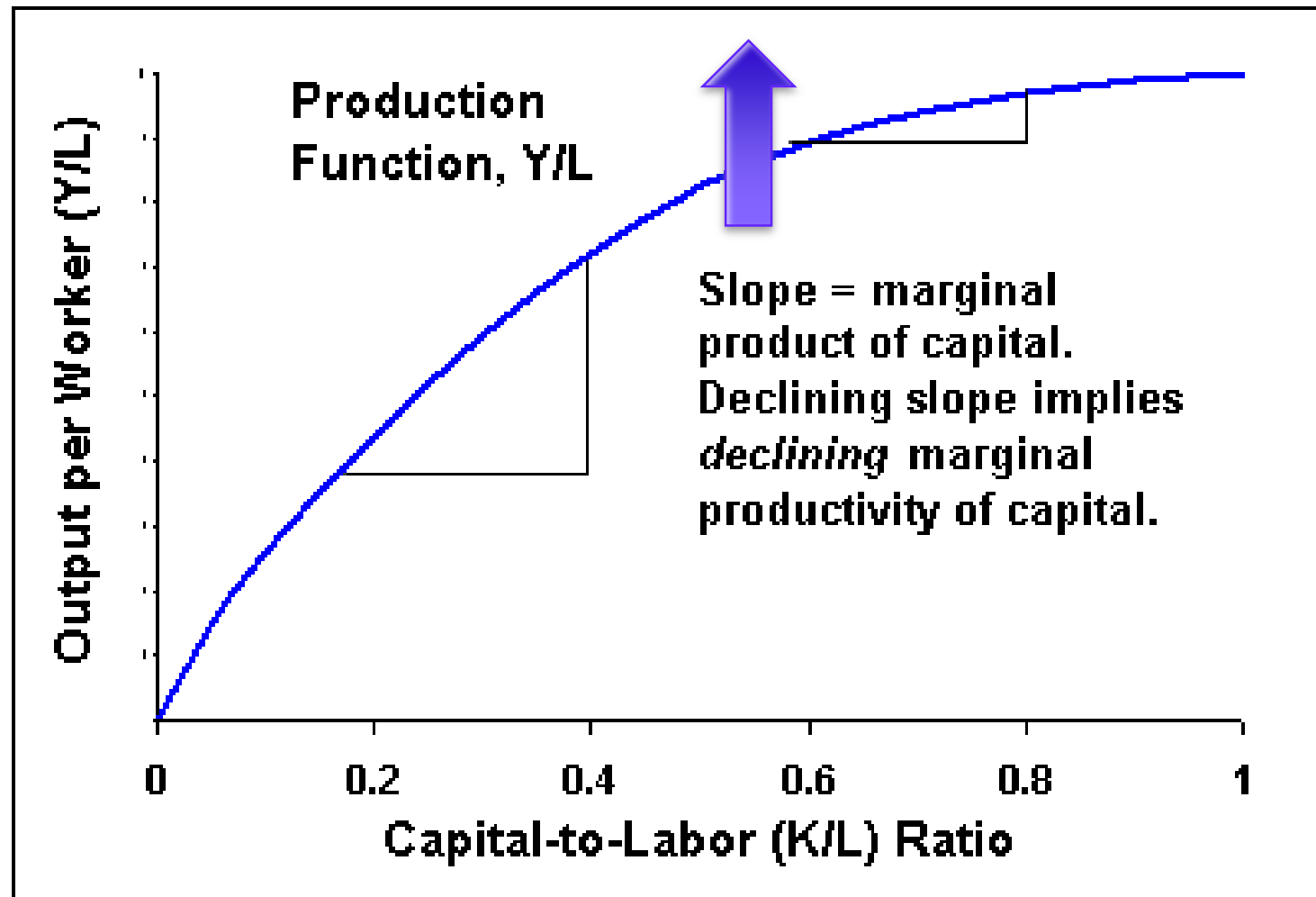
$K(t)$  = capital

$A(t)$  =knowledge

$L(t)$  =labor

$0 < \alpha < 1$  elasticity of output with respect to capital

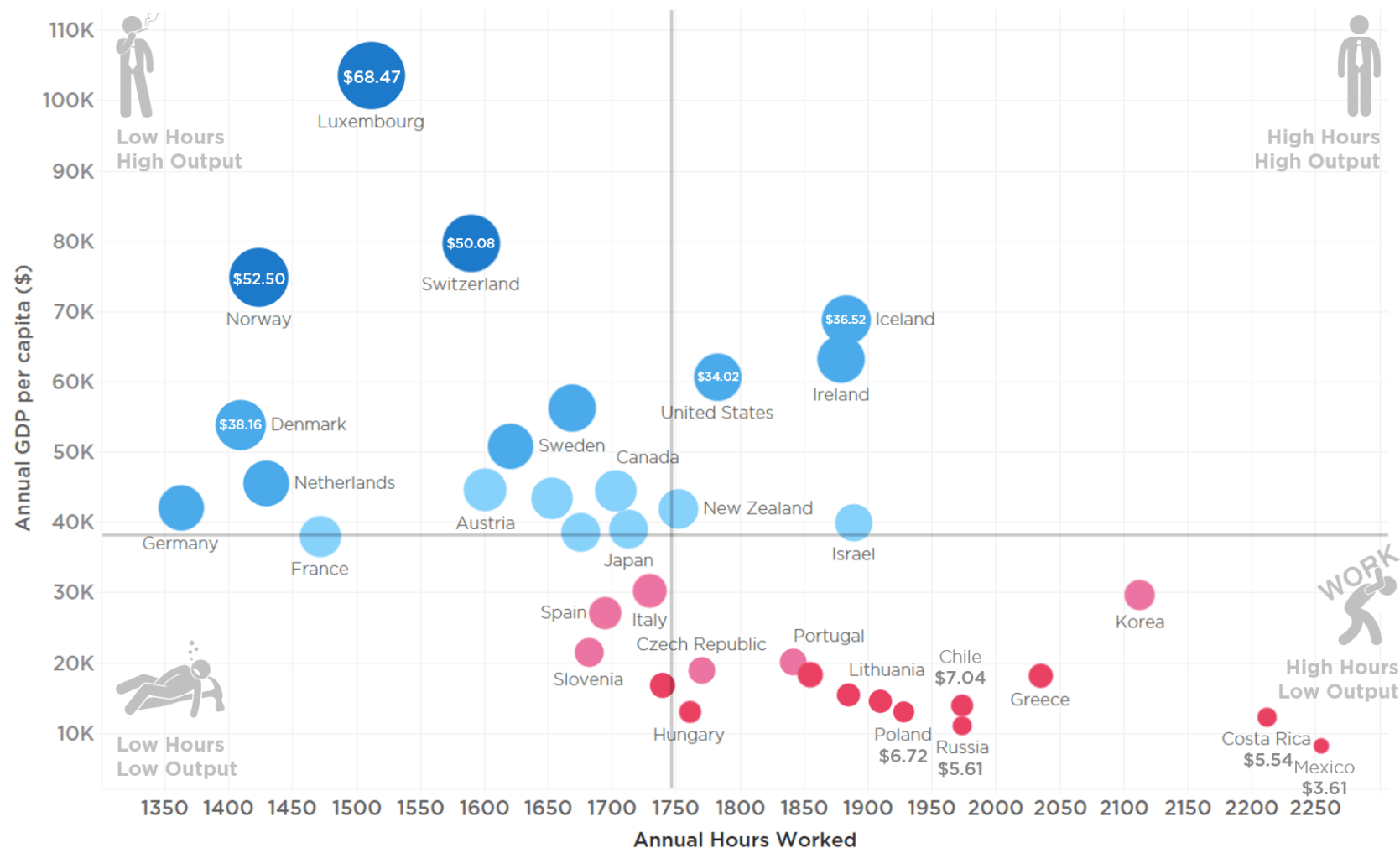
# + Production function





# The World's Productivity 2017

## Productivity Per Person Per Hour



Productivity Per Person Per Hour (Selected 35 Countries)

### Article and Sources

<https://howmuch.net/articles/worlds-most-productive-countries>  
International Monetary Fund; Organisation for Economic Co-operation and Development

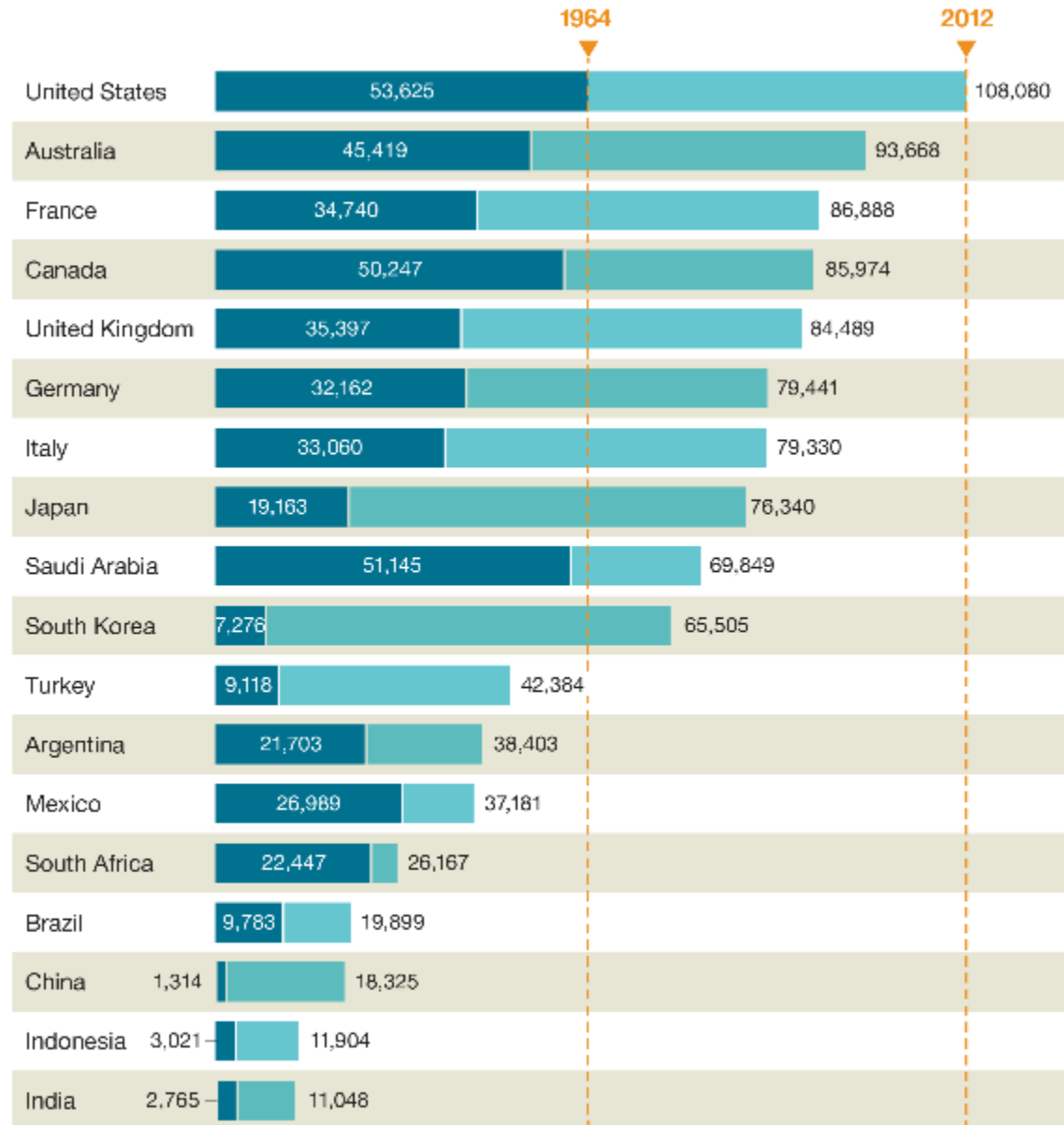


+

# Productivity around the world

Progress toward productivity benchmarks,<sup>1</sup>  
GDP per employee in 1964 and 2012, \$

1964 2012



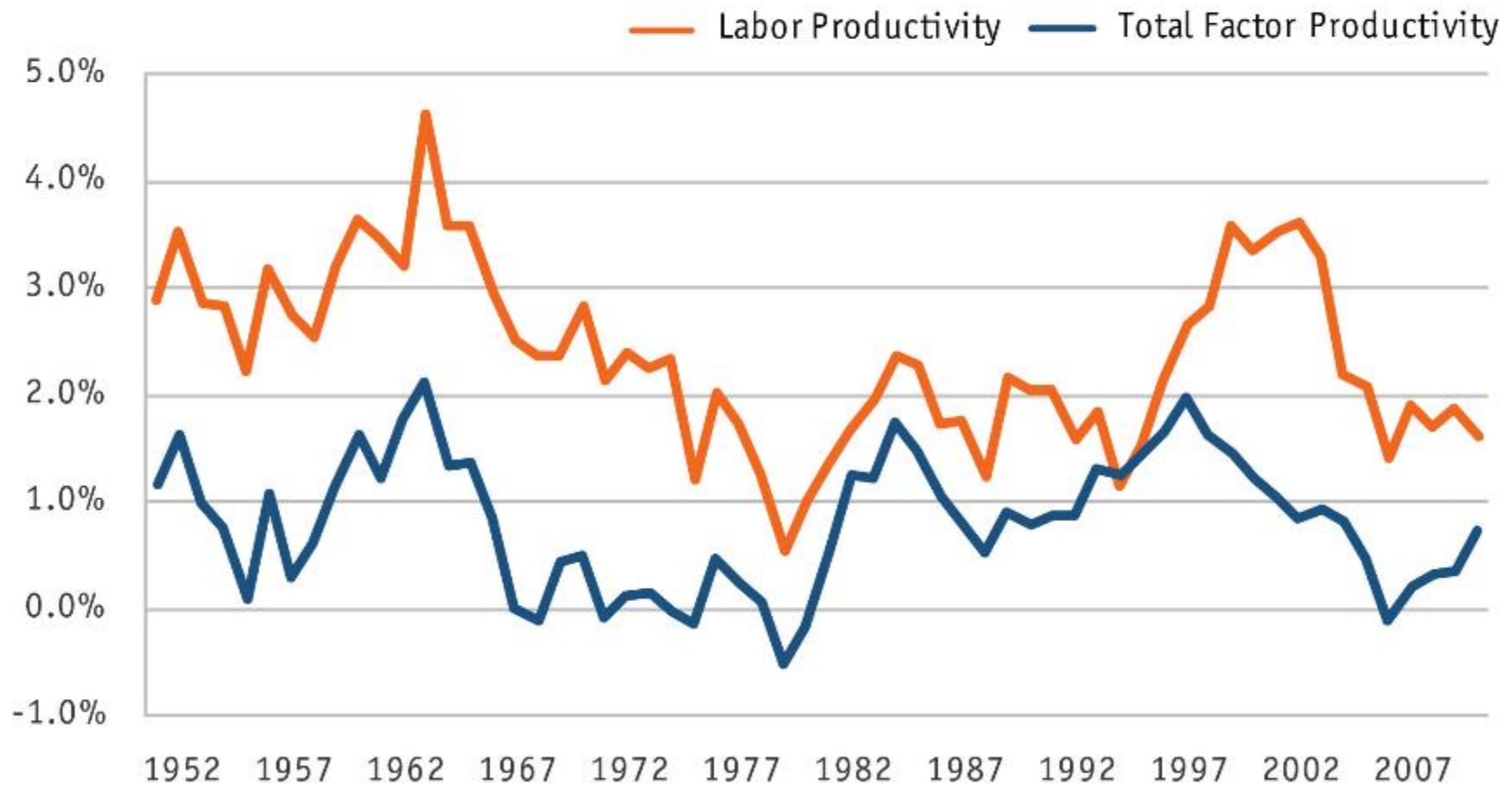
<sup>1</sup>Excludes Russia because of lack of historical data.

Source: Conference Board; McKinsey Global Institute analysis

# + Productivity-US

46

## Growth in U.S. Productivity (5-year moving average)





# + Productivity (driven by innovation, ie technology)

- Capital –diminishing returns, Labor-Lewis tipping point
- Productivity is the residual in the production function (“Solow residual”)-growth not explained by capital or labor
- **Productivity = technological innovation**
- A public good? (Increase the pie)
- Growth and ability to innovate comes from both natural endowment (starting position) and policies encouraging innovation-someone sets the technological frontier and others will reach for it
- Where does technological innovation come from?
- Deserving of policy support-policies can take many forms

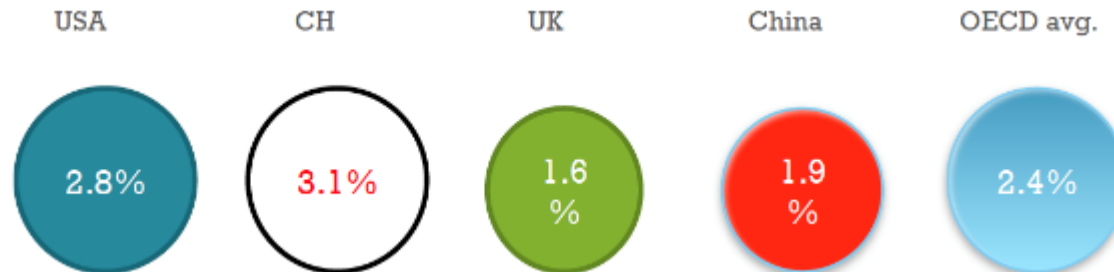
Innovation raw material  
("input") = ?  
Where?

Innovation output = ?

# How to measure it—country innovation scorecard

## INPUT:

R&D % GDP  
(2012)



**OUTPUT:** Triadic  
Patents per  
million pop  
(2012)



But...Patent  
applications (2013)

287,831      1,525      14,972      704,836      2,570,000  
world

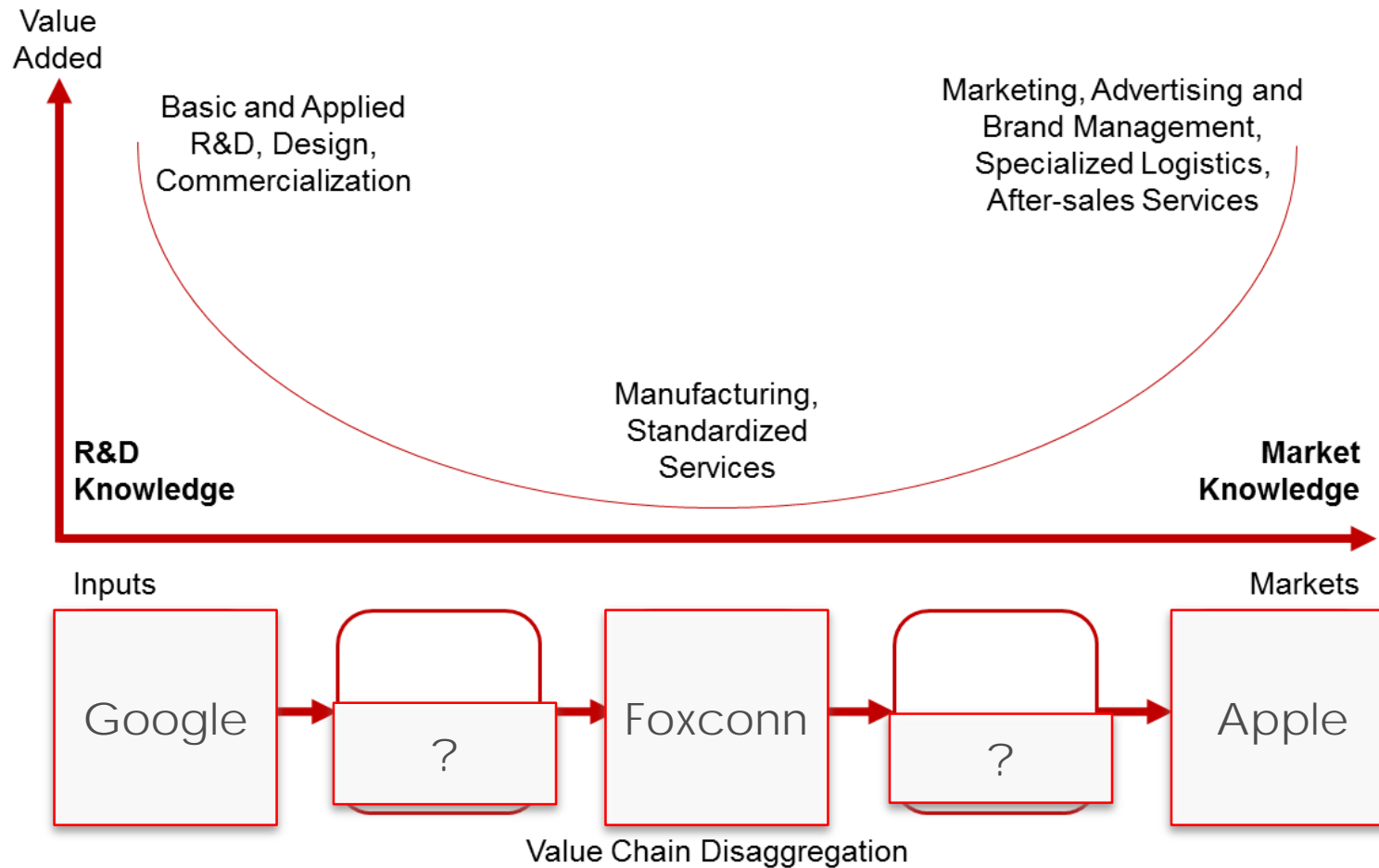
Triadic patents  
share (2010)





# + 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)

# + 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
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)





+

# Innovation model

52

Productivity (growth)

Endowment + Effort (resources + R&D)

Incentives (policy/regulation as a catalyst)

Mechanism (technology)

Evidence (access, costs, risk)

Industries & Firms (Lerner: 2005)

Entrepreneurs



+

# 5 financial functions

**PAYMENTS**

**EQUITY &  
CREDIT**

**MARKETS**

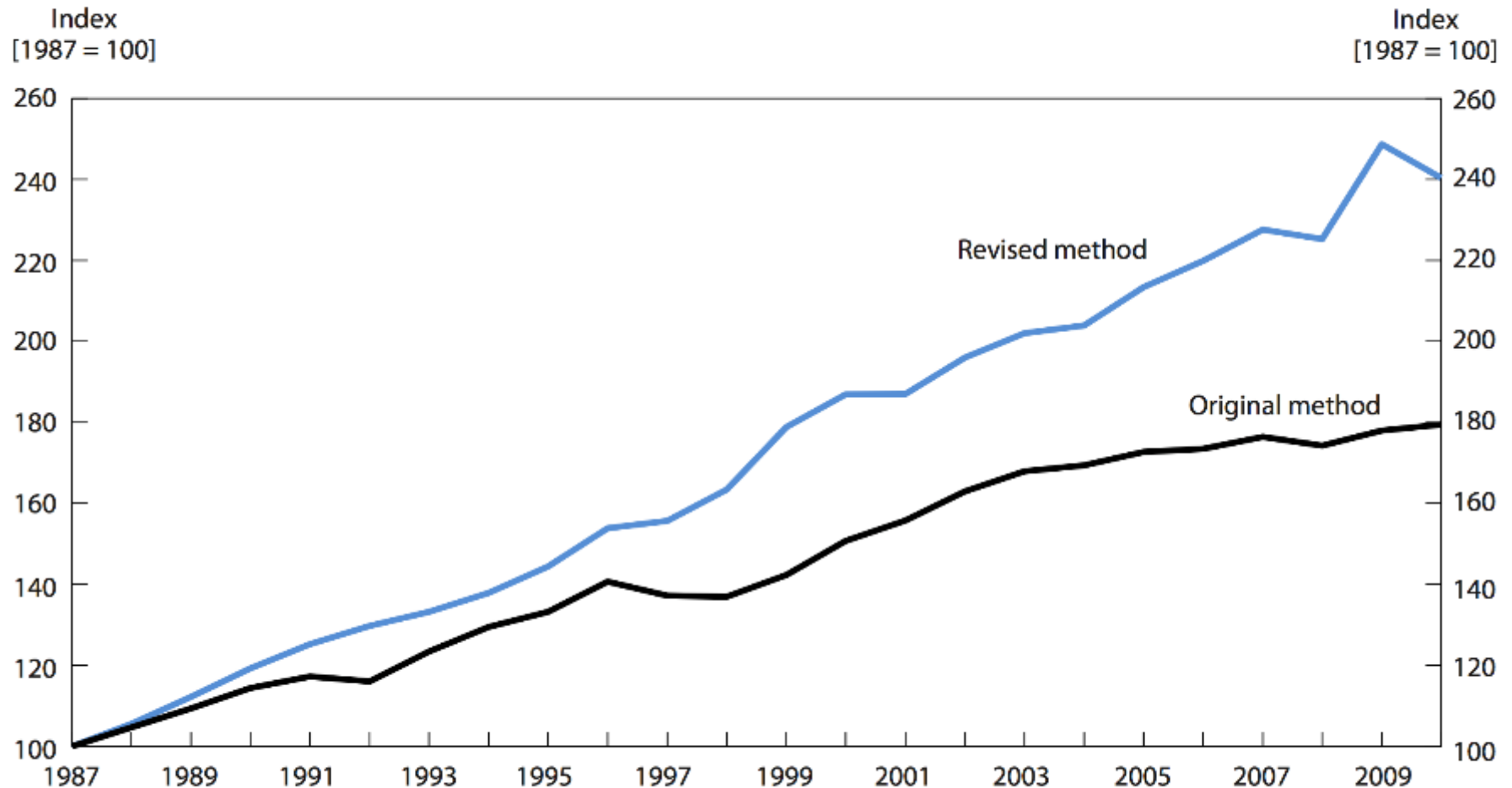
**MONEY  
TRANSFER**

**UNCERTAINTY  
& RISK**



# + Banks labor productivity

**Chart 2. Comparison of banking labor productivity indexes, 1987–2010**



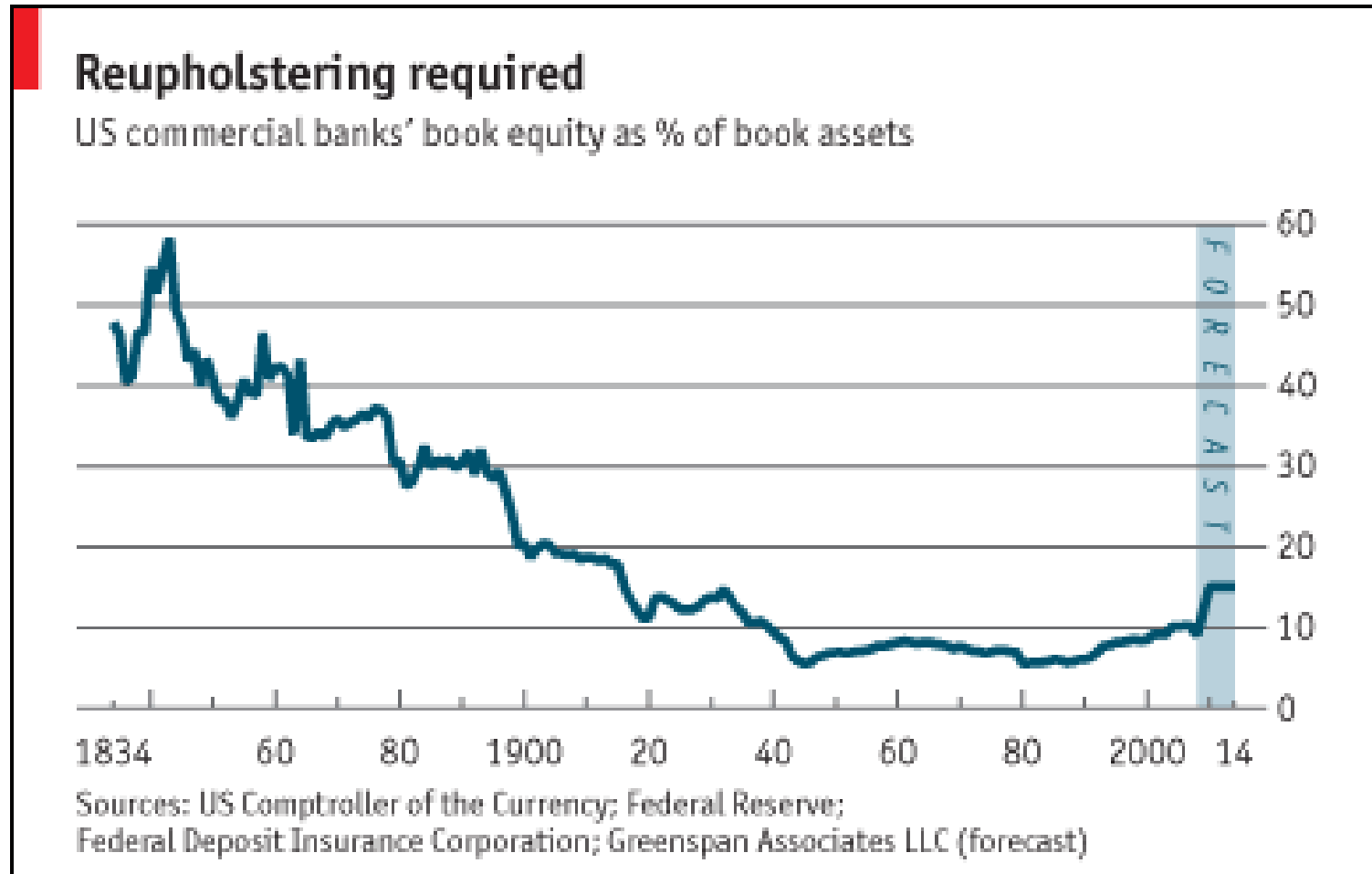
SOURCE: U.S. Bureau of Labor Statistics

Kathleen DeRose source: Royston

4/30/2019



# + Banks capital ratios



But intermediation  
costs haven't  
fallen?



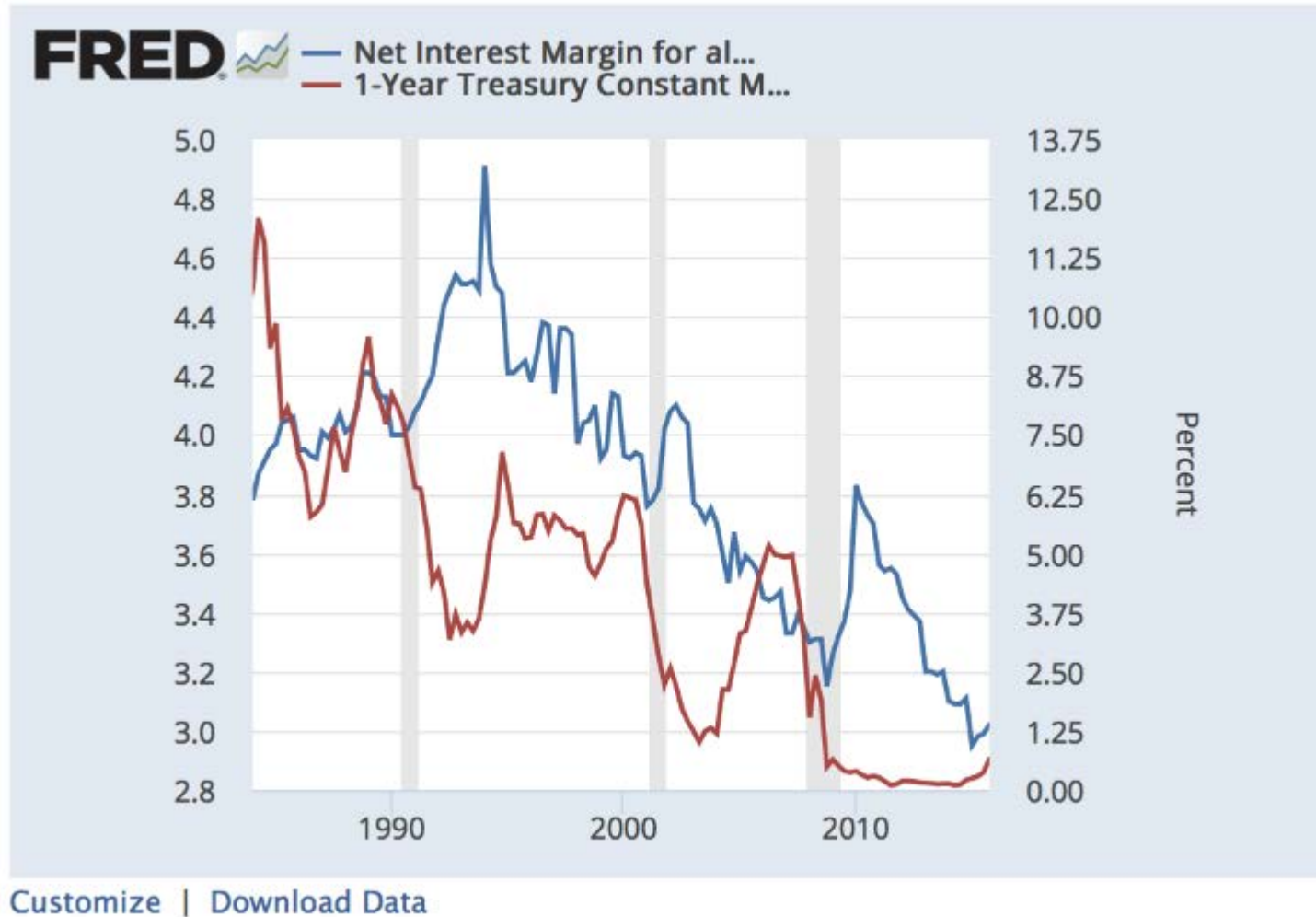


# + What happened in 2008-2009? S&P 500 decline in GFC



# + Low rates, NIM pressure

60



# + Productivity in financial services

- Intermediation costs have not fallen despite rising labor productivity and falling (until the GFC) capital employed—
  - Did banks keep productivity gains for their shareholders and employees?

Now:

- Productivity growth stalled
- Falling employment in financial services accelerating-end of wage growth?
- Rising capital requirements and consolidation (declining ROIC)
- Near zero interest rates and falling NIM
- Falling output and returns

# + Summary

- Innovation is both highly uneven, and vitally important to both growth and to how growth is distributed at the economy, industry and firm level
- Innovation originates from R&D at governments, universities and firms
- Starting conditions and policies shape innovation
- Financial services productivity drivers are at an interesting inflection point and probably partly explain why productivity benefits have not produced lower intermediation costs in aggregate and why FinTech is advancing today

# + Can financial intermediaries innovate their way out?



## + Financial Services Innovation (Micro)

- History of technology innovation in financial services –a debate
- Defining disruptive innovation
- Why now and current trends



+

# 5 financial functions

**PAYMENTS**

**EQUITY &  
CREDIT**

**MARKETS**

**MONEY  
TRANSFER**

**UNCERTAINTY  
& RISK**



# + Financial services technology innovation

- Technology (hw & sw) driven?
- Theoretical finance driven?
- Rent-seeking?
- Impact of regulation?

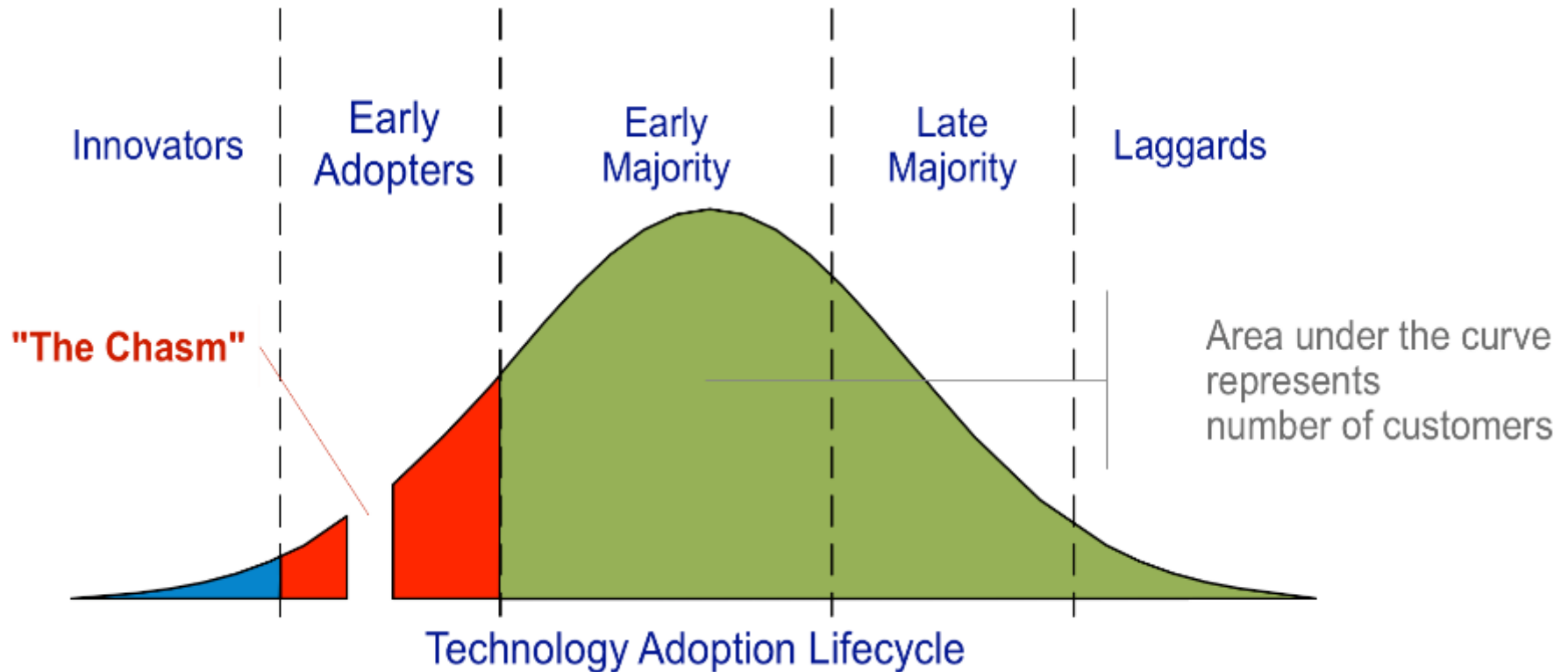
# + Technological innovation in financial services ?



Technology?



# + Technology adoption





# + Technology driven? (Frame & White)

69

- Historical patterns and drivers
- Defined as improving: costs, risks, or products/services
- Types of innovation affecting:
  - Products and services
  - Processes
  - Organizations
- Background conditions and regulation?



# + Technological innovation in financial services

Paul Volcker, February 20, 2009, #MarketsNews, Reuters

Volcker, a former chairman of the Federal Reserve famed for breaking the back of inflation in the early 1980s, mocked the argument that “financial innovation,” a code word for risky securities, brought any great benefits to society. For most people, he said, the advent of the ATM machine was more crucial than any asset-backed bond.

“There is little correlation between sophistication of a banking system and productivity growth,” he said.

# + Technological innovation in financial services?



In our view, derivatives are financial weapons of mass destruction carrying dangers that, while latent, are potentially lethal.

— *Warren Buffett* —

AZ QUOTES

"ATMS led to an **increase** in the number of bank tellers. There are more bank tellers than ever before because banks are more efficient"  
-Eric Schmidt, Exec. Chmn, Alphabet (Google parent) and "job elimination denier"

?

*Courtesy of Diebold Nixdorf*

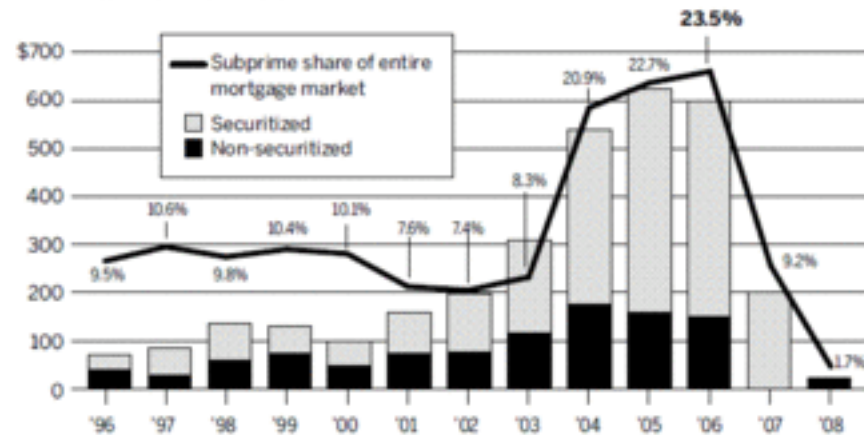
*The company Diebold Nixdorf, which produces ATMs, created this ATM model design in 1967.*

# + Technological innovation in financial services?

## Subprime Mortgage Originations

In 2006, \$600 billion of subprime loans were originated, most of which were securitized. That year, subprime lending accounted for 23.5% of all mortgage originations.

IN BILLIONS OF DOLLARS

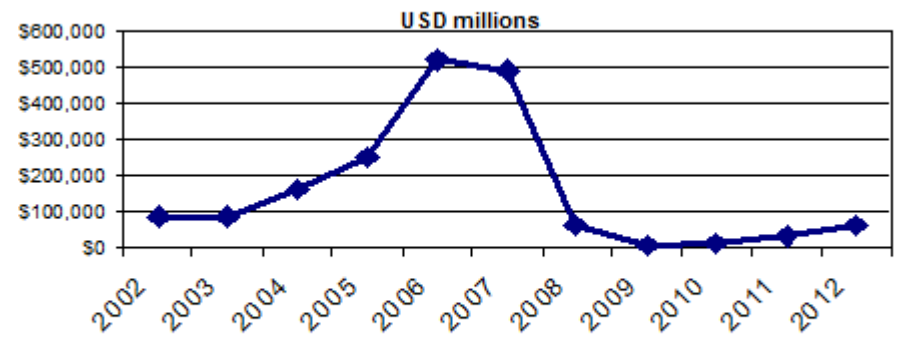


NOTE: Percent securitized is defined as subprime securities issued divided by originations in a given year. In 2007, securities issued exceeded originations.

SOURCE: Inside Mortgage Finance

Rent-seeking or  
"regulatory arbitrage"  
(Greed)

## Global CDO Issuance



Source: [www.sifma.org](http://www.sifma.org)

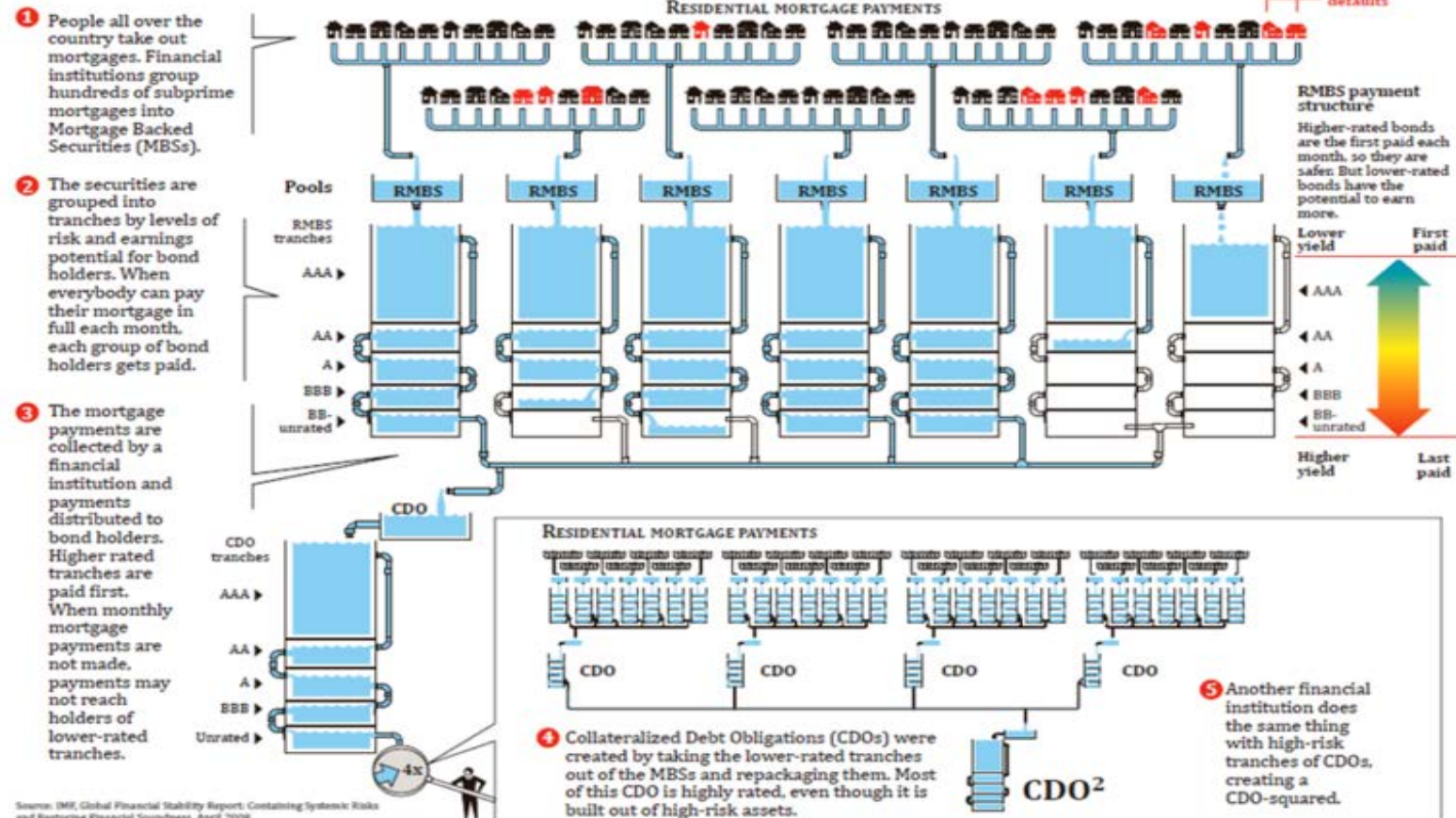


# + Technological innovation in financial services?

## THE THEORY OF HOW THE FINANCIAL SYSTEM CREATED AAA-RATED ASSETS OUT OF SUBPRIME MORTGAGES

In the financial system, AAA-rated assets are the most valuable because they are the safest for investors and the easiest to sell. Financial institutions packaged and re-packaged securities built on high-risk subprime mortgages to create AAA-rated assets. The system

worked as long as mortgages all over the country and of all different characteristics didn't default all at once. When homeowners all over the country defaulted, there was not enough money to pay off all the mortgage-related securities.



Source: IMF, Global Financial Stability Report: Containing Systemic Risks and Restoring Financial Soundness, April 2008.



[https://www.youtube.com/watch?v=B  
VI9SQ-KVmE](https://www.youtube.com/watch?v=BVI9SQ-KVmE)

# + Technological innovation in financial services?

## ROBO ADVISORS



Theoretical advances  
getting adopted in  
practice?



# + Regulators and technology innovation in financial services?





# + Light and Dark sides

## ■ Light Side

- Lower agency costs
- Share risks (hedging)
- Complete the market (access, liquidity, transparency)
- RESULT more efficient capital allocation and stronger growth

## ■ Dark Side

- Opaque structures hide risk and exploit investors biases
- Speculation and Credit expansion
- Boom & Bust
- RESULT financial crises, more fragile financial institutions, weaker growth and more volatility



# + Examples-where do they fit?

- Adjustable Rate Mortgages?

- Debit cards, online banking

- Risk models

- 401k advice

# + Examples-where do they fit?

- Adjustable Rate Mortgages?
- TAX REFORM ACT OF 1986

- Debit Cards, online banking
- TELECOMMUNICATIONS, COMPUTING SPEED

- Risk models
- NEW STATS TECHNIQUES + COMPUTING PWR + REGS

- 401k advice
- BEHAVIORAL FINANCE

## + Mini-debate

81

*Financial* innovation is an  
unalloyed benefit to  
society

YES?

NO?



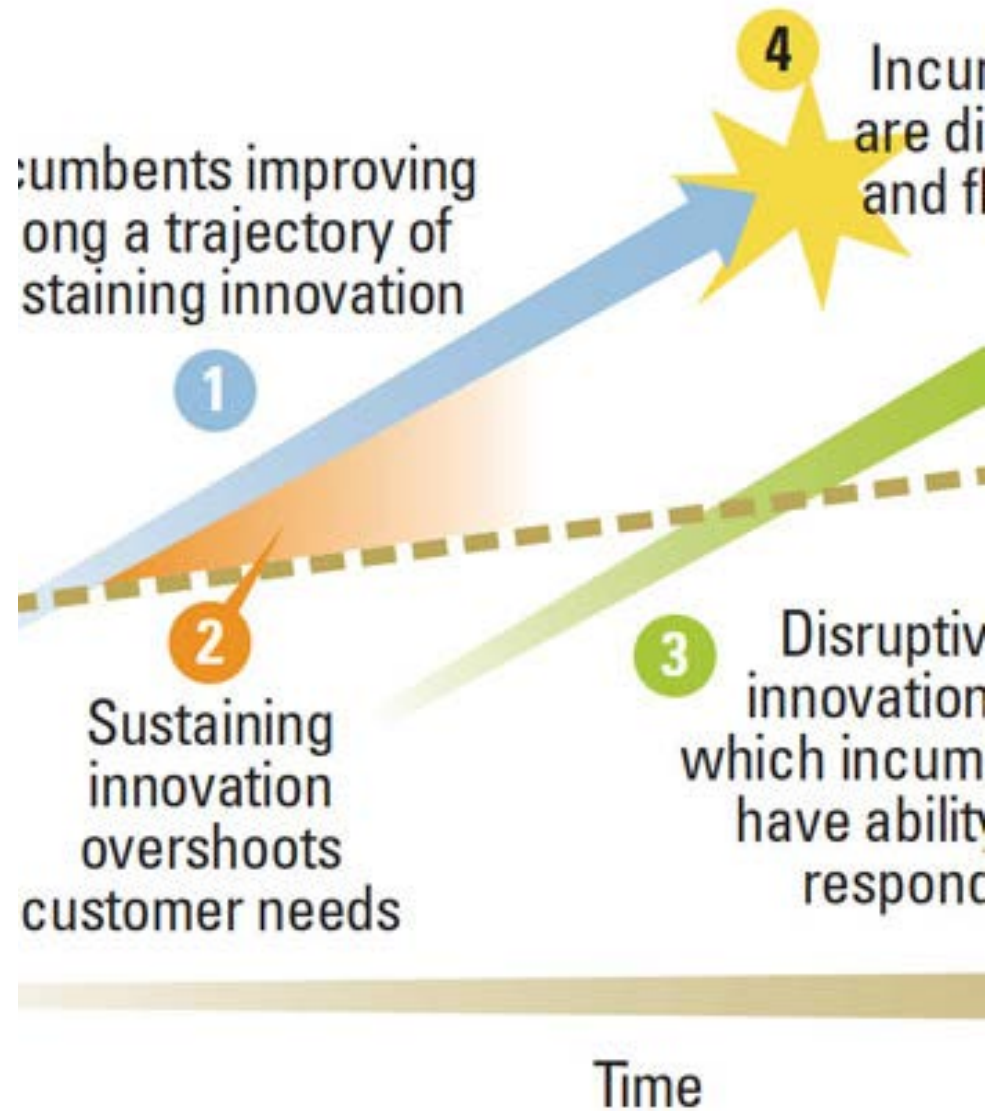


# + Summary: technology enabled innovation in financial services

- **Productivity/business processes/automation/organization**
  - Follows advances in technology and patterns of technology adoption
- **Products and services = relationship with customers?**
  - Potential to improve access, transparency and costs?
  - Theoretical advances key enablers
  - Rent-seeking and exploitation
  - Understanding or even shaping consumer behavior?
- **Role of regulation AND other macro forces**
- **Light and dark side**



# What is disruptive innovation?





*If I had asked my  
customers what they  
wanted they would have  
said a **faster horse**.*

**Henry Ford**

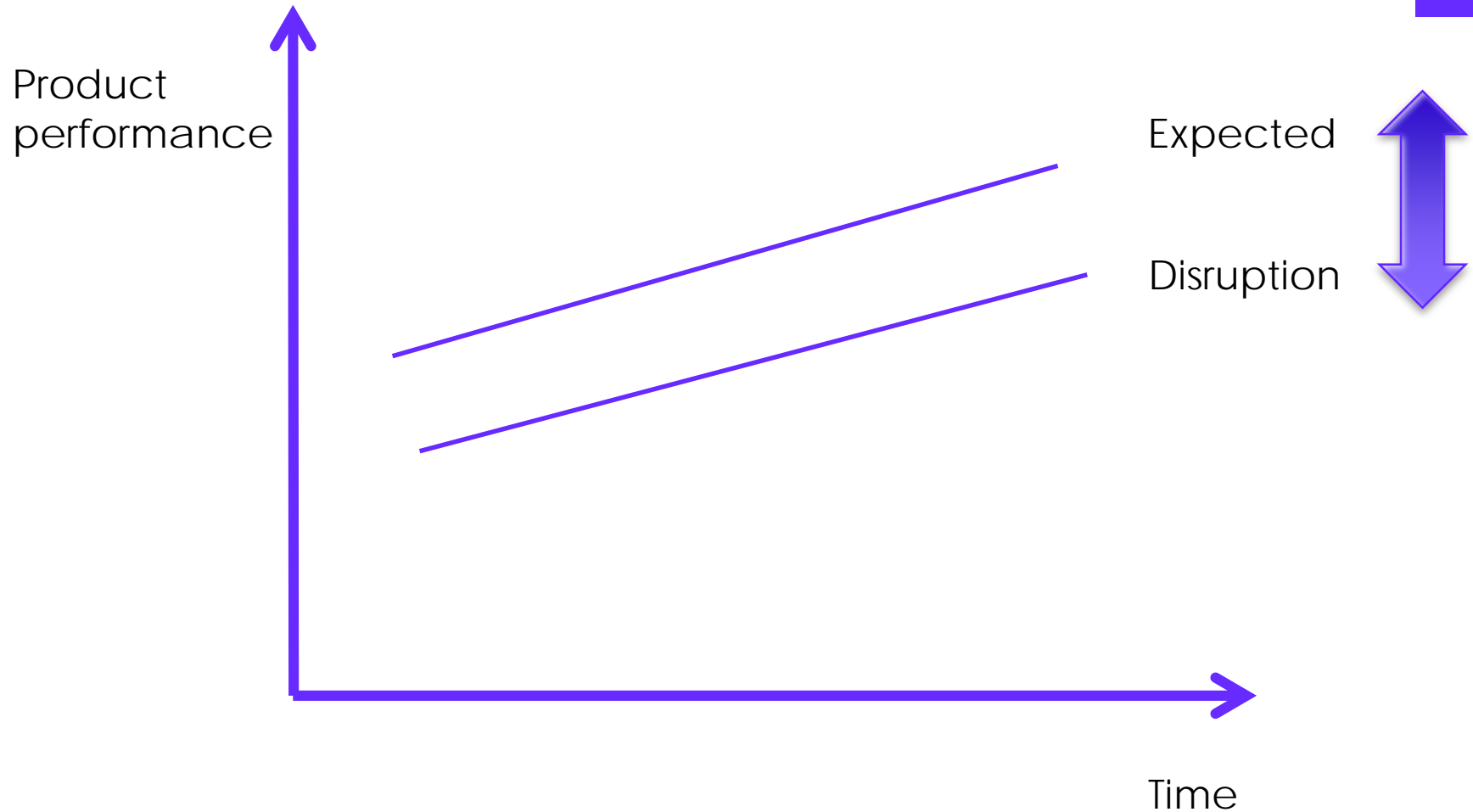


# + Disruption

- What defines disruptive innovation?
- Clayton Christiansen 1995
  - Paradox of staying close to the customer (incumbents v new entrants)
  - Disruptive v. sustaining innovation
    - Performance attributes (price umbrella)
    - Target market (neglected low end or new)
  - Recommended responses
- Clayton Christiansen 2015-why Uber is not an innovator
  - What are the modifications? Why?
    - Predictive ability of the model for incumbents and startups
- Are there other models of how innovation happens?

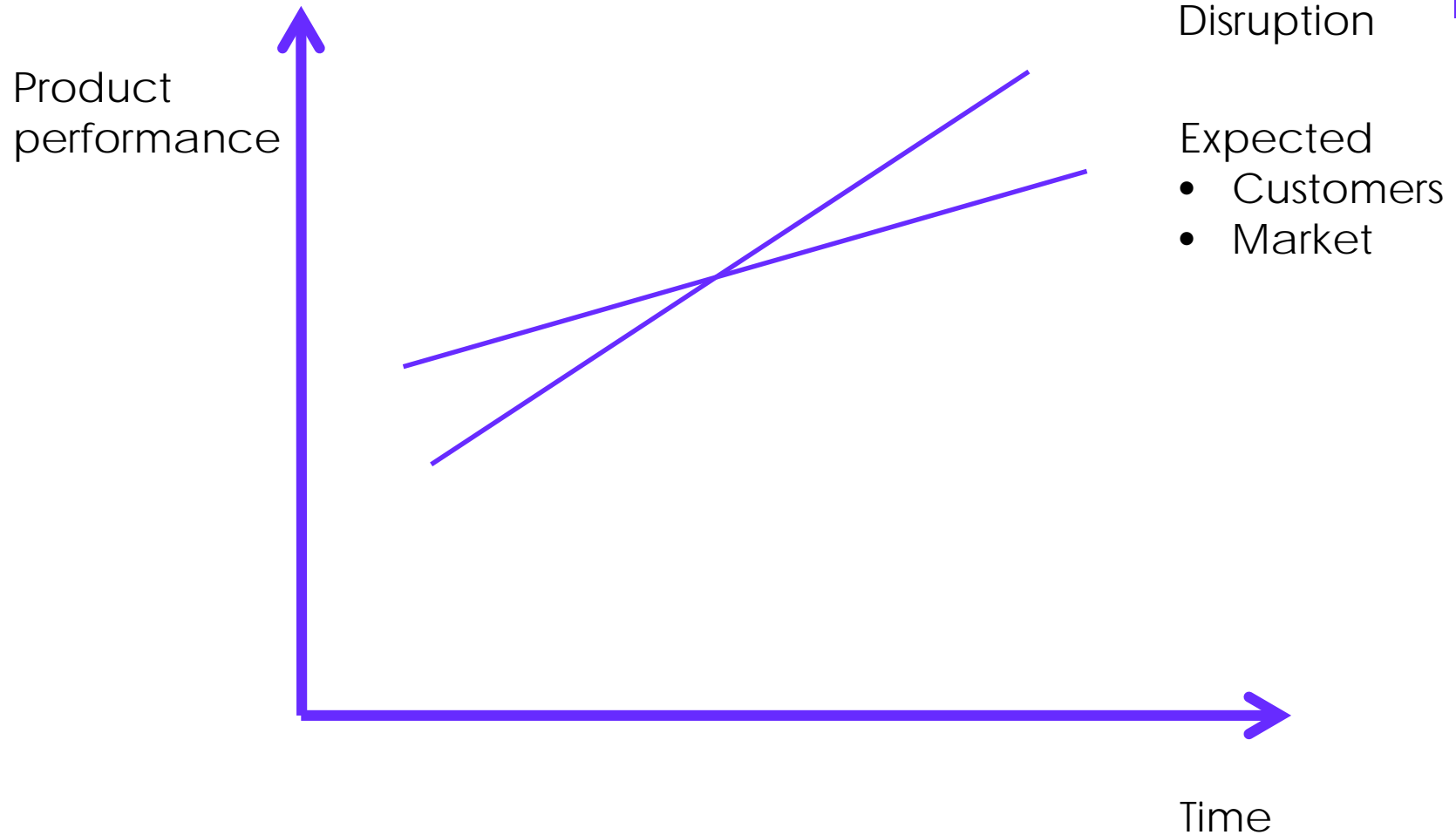
# + Innovation trajectories #1

86



# + Innovation trajectories #2

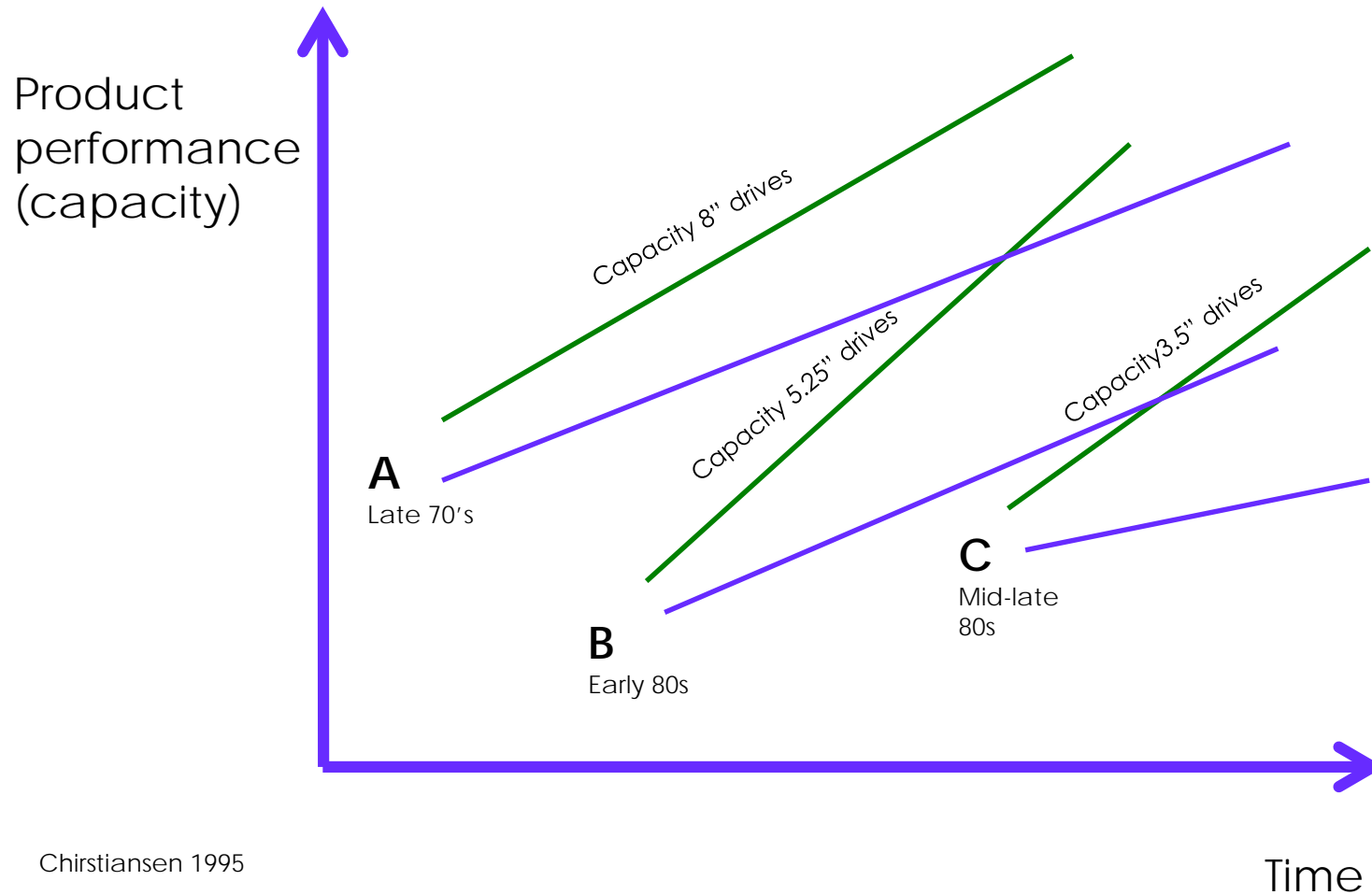
87





# + Innovation trajectories #3

disk drive market



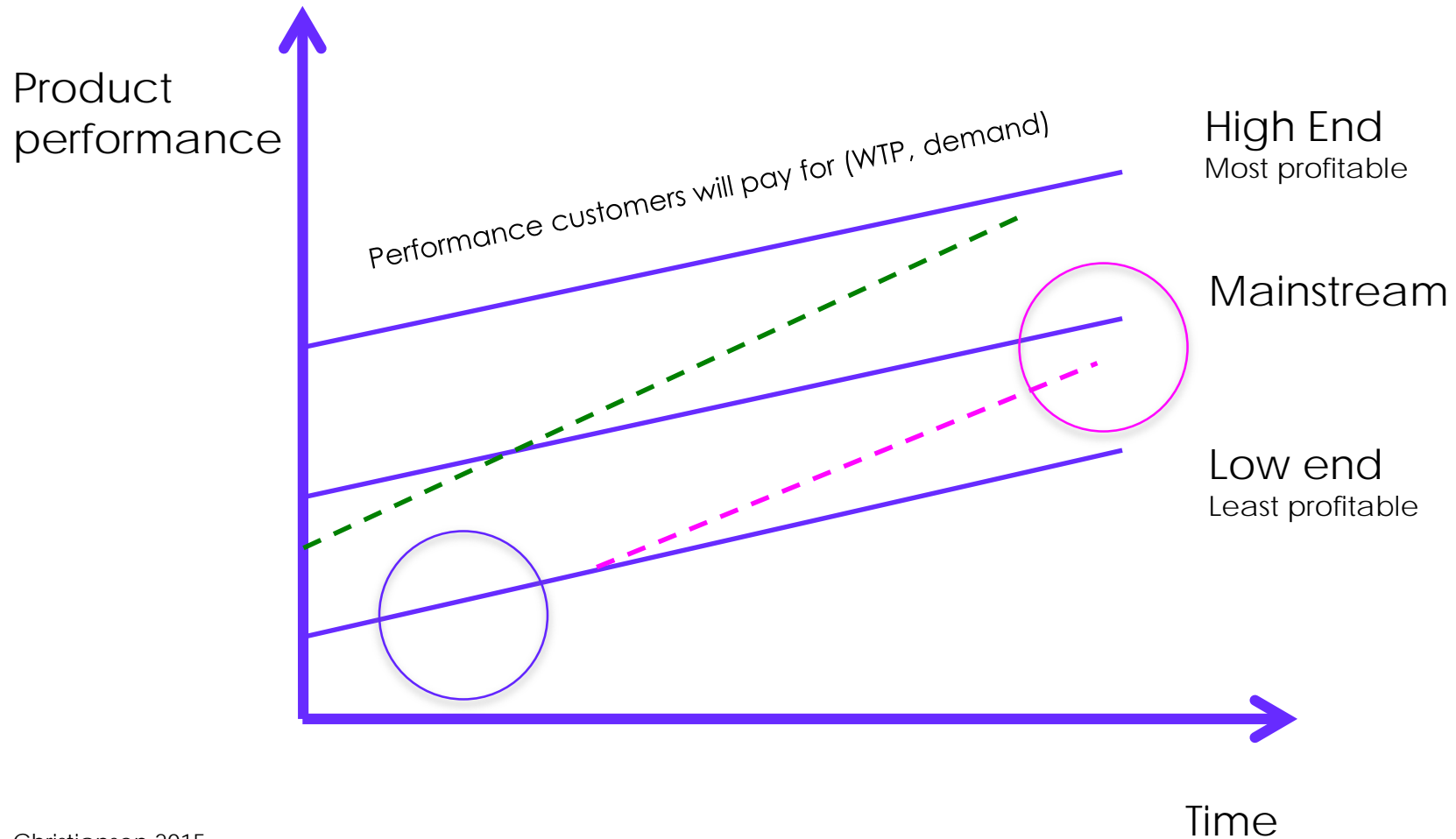
Christiansen 1995

Kathleen DeRose

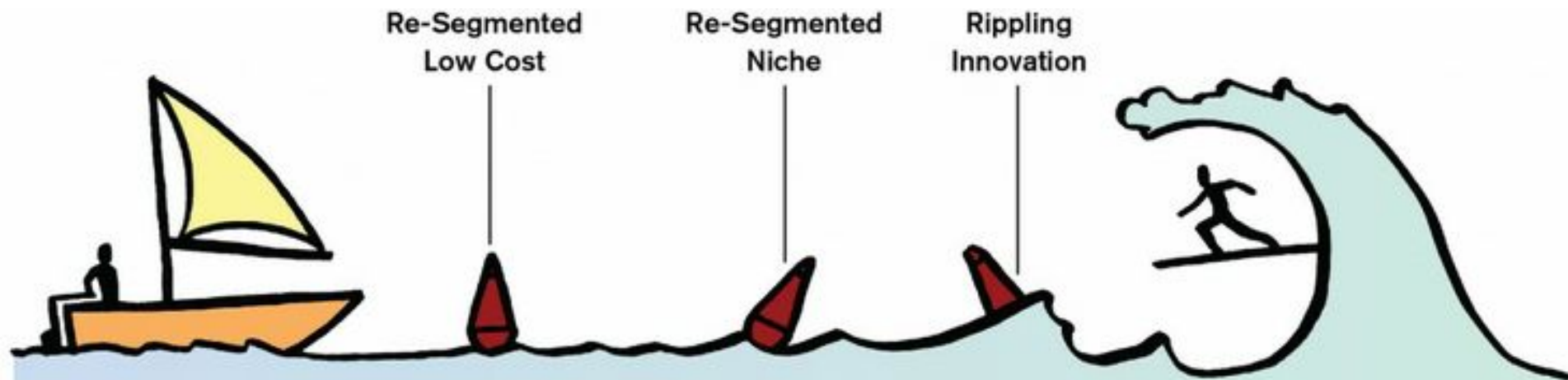
4/30/2019



# + Innovation trajectories #4







## Sustaining Innovation

Problem is well understood

Existing Market

Innovation improves performance, lower cost, incremental changes

Customer is believable

Market is predictable

Traditional business methods are sufficient

## Disruptive Innovation

Problem not well understood

New Market

Innovation is dramatic and game changing

Customer doesn't know

Market is unpredictable

Traditional business methods fail



# + Uber?

91



# + Disruption locations?????

■ Pain points

■ Profit points

## Businesses and consumers

### Non-value adding activities

### Many FTE in Operational Procurement process

Manual entry of order confirmations, invoices, etc

Solve issues, such as PO-Invoice mismatches

Errors, causing double entries

Call supplier for Order and delivery confirmation

Suppliers without up-to-date and up-to-speed IT-infrastructure

Supplier contact because of missing information on the Order



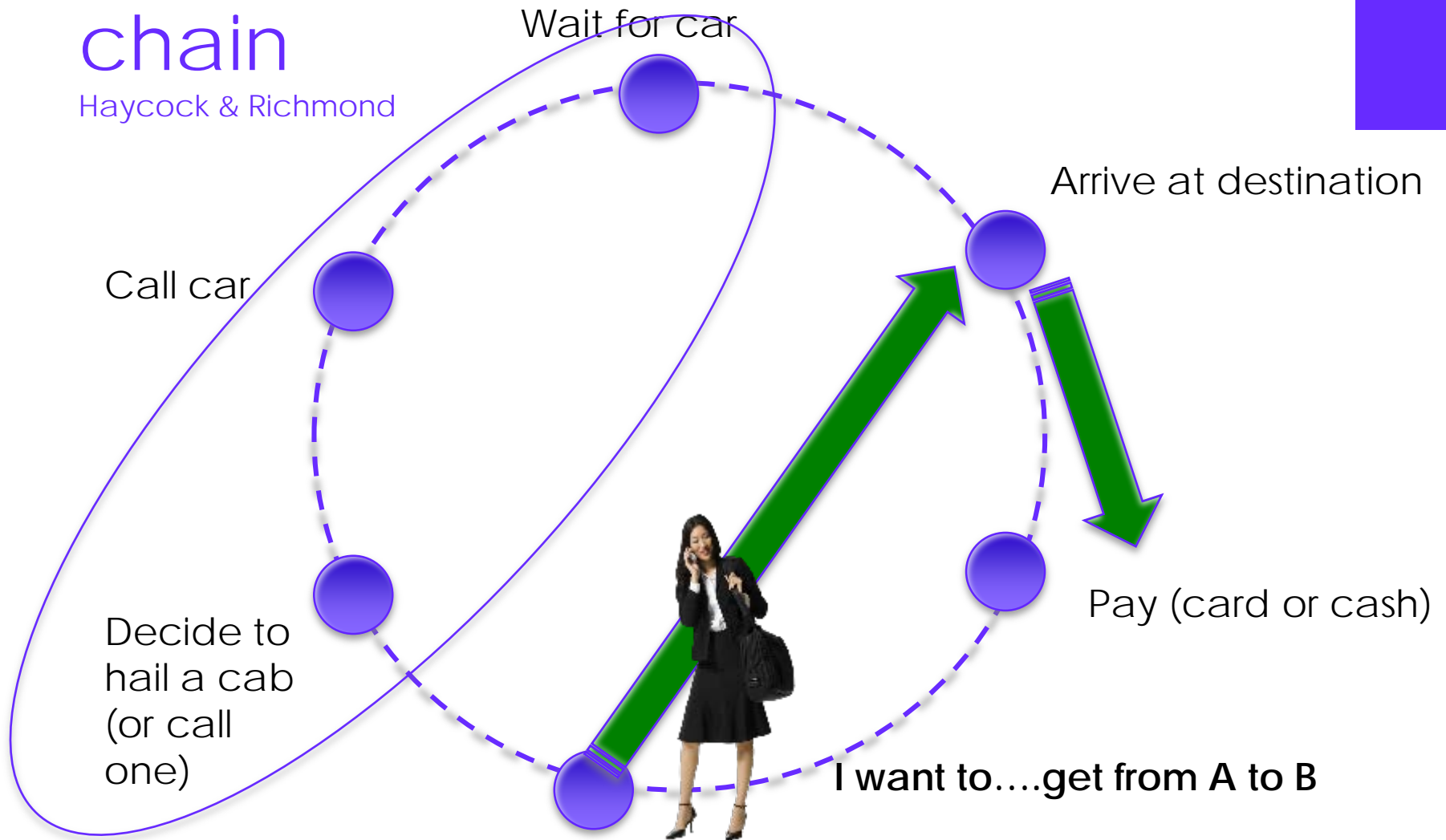
# + Uber-Christiansen's arguments

- Fails the “low end foothold test”
- Fails the “new market (new customer segment) test”
- An anomaly
  - Taxi regulations
  - Disruptive to “black cars”

What is he missing?

# + Output: shorter, better value chain

Haycock & Richmond



# + Peer to Peer (P2P) what you have to do Einav et al (2016)

## ■ Search

- Match heterogeneous and fragmented buyers and sellers
- Aggregate information and reduce transactions costs/frictions

## ■ Price

- Use price to organize the market
- Optimize stochastic supply and demand
- Price discrimination based on data gathered on the platform

## ■ Trust and reputation

- Insure the proper level of service/quality
- Minimum standards (licensing or certification)
- Ratings and feedback

# + Conditions for P2P –when can you do it?

- Reduce up front fixed costs of entry (cost per unit, volume)
- Advertising and marketing costs (crowding out dedicated capacity)
- Highly variable demand better suited to highly elastic supply (transforming established supply into swing capacity)



# Stochastic S/D optimization

from operations research

97

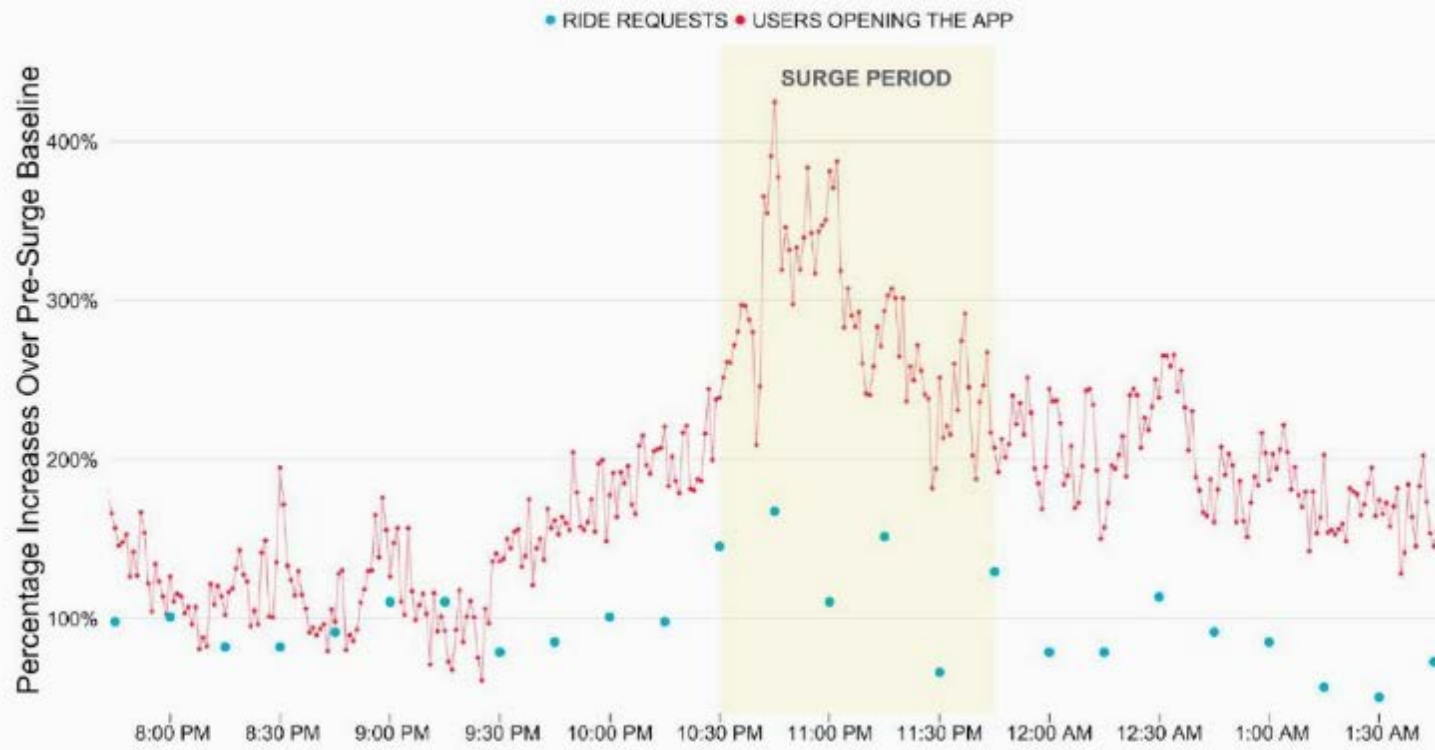
- Many businesses have this problem: airline seats, hospital beds, widget inventory
- Set objective i.e. minimizing inventory, maximizing cash flow when supply and demand are unpredictable
- Understand sources of volatility in the business, i.e. delivery times, sales rates
- Express uncertainty as probability distributions on those parameters
  - 10% chance sell 500 units, 50% sell 1000, 40% sell 800



# + Stochastic demand-Uber

98

**Figure 1:** Demand for Uber Spikes Following Sold-Out Concert on March 21, 2015



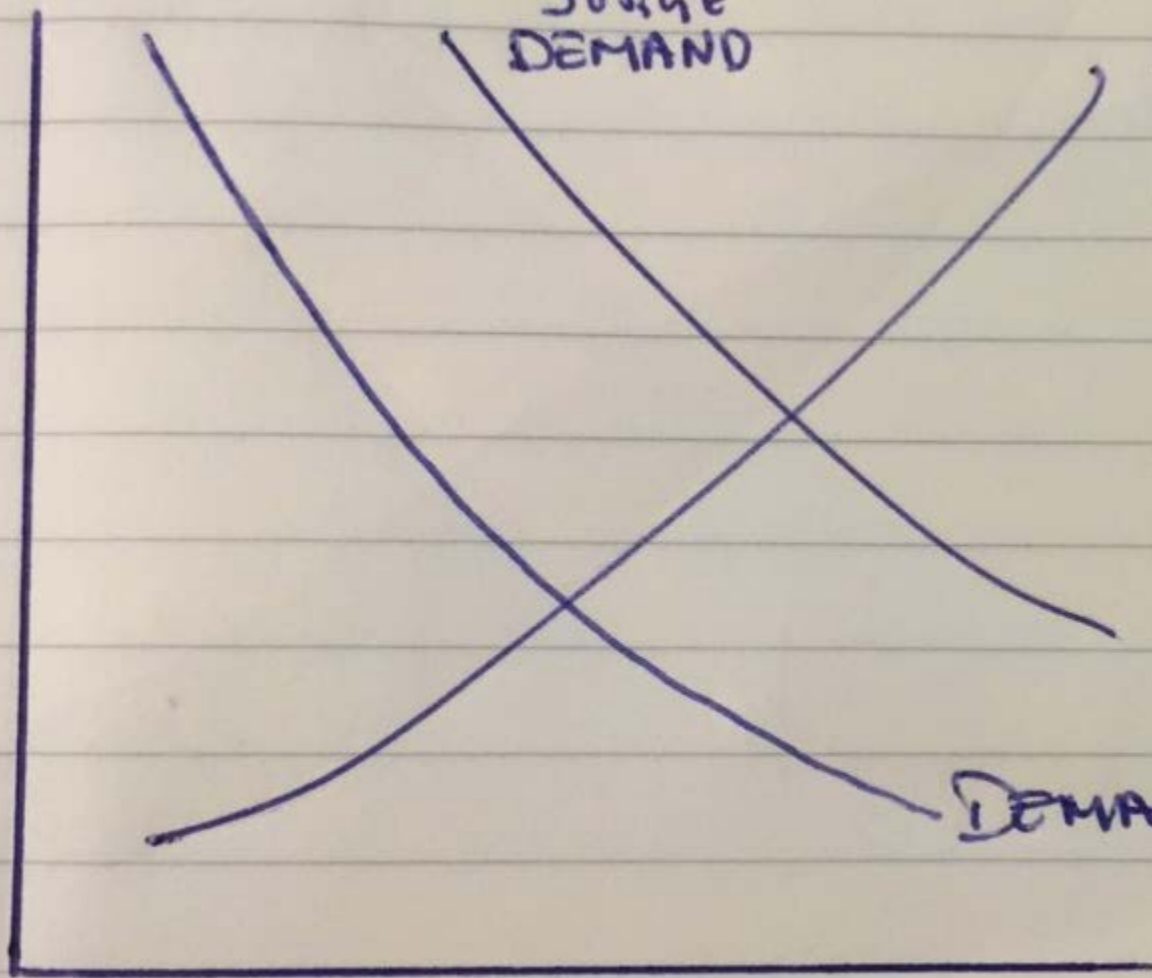
PRICE

SURGE  
DEMAND

SUPPLY

DEMAND

QUANTITY



# Total pickups

BOROUGH	CHANGE IN APRIL-JUNE PICKUPS, 2014 TO 2015		
	UBER	TAXI	NET
Brooklyn	+1,123,969	+299,388	+1,423,357
Queens	+655,525	+191,974	+847,499
Manhattan	+4,045,735	-3,685,504	+360,231
Bronx	+126,283	-265	+126,018
Staten Island	+3,920	+192	+4,112
Manhattan (core)	+3,818,179	-3,830,621	-12,442

## Are Ubers Supplementing Or Replacing Cabs?

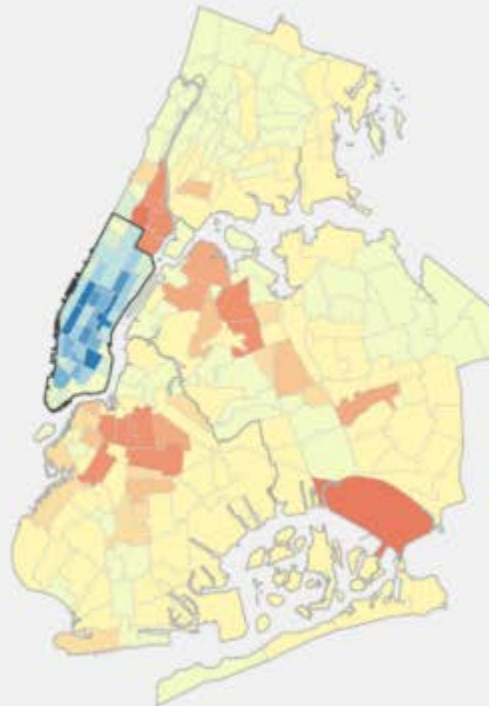
Change in number of Uber and taxi pickups by taxi zone, April-June 2014 versus April-June 2015



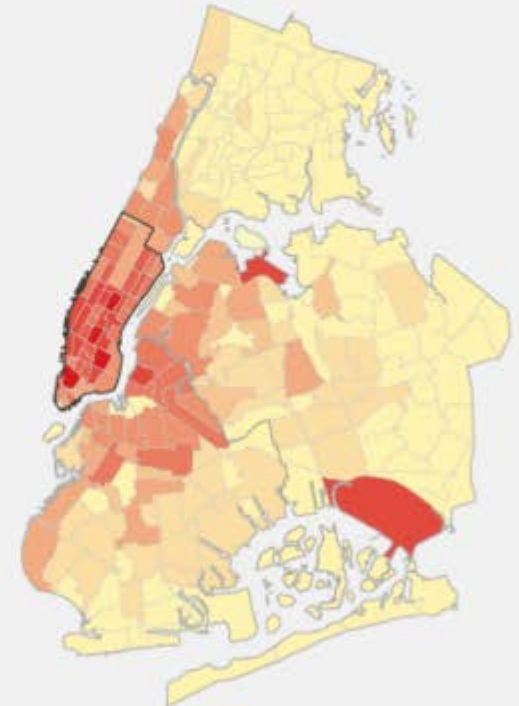
CABS + UBER



CABS ONLY

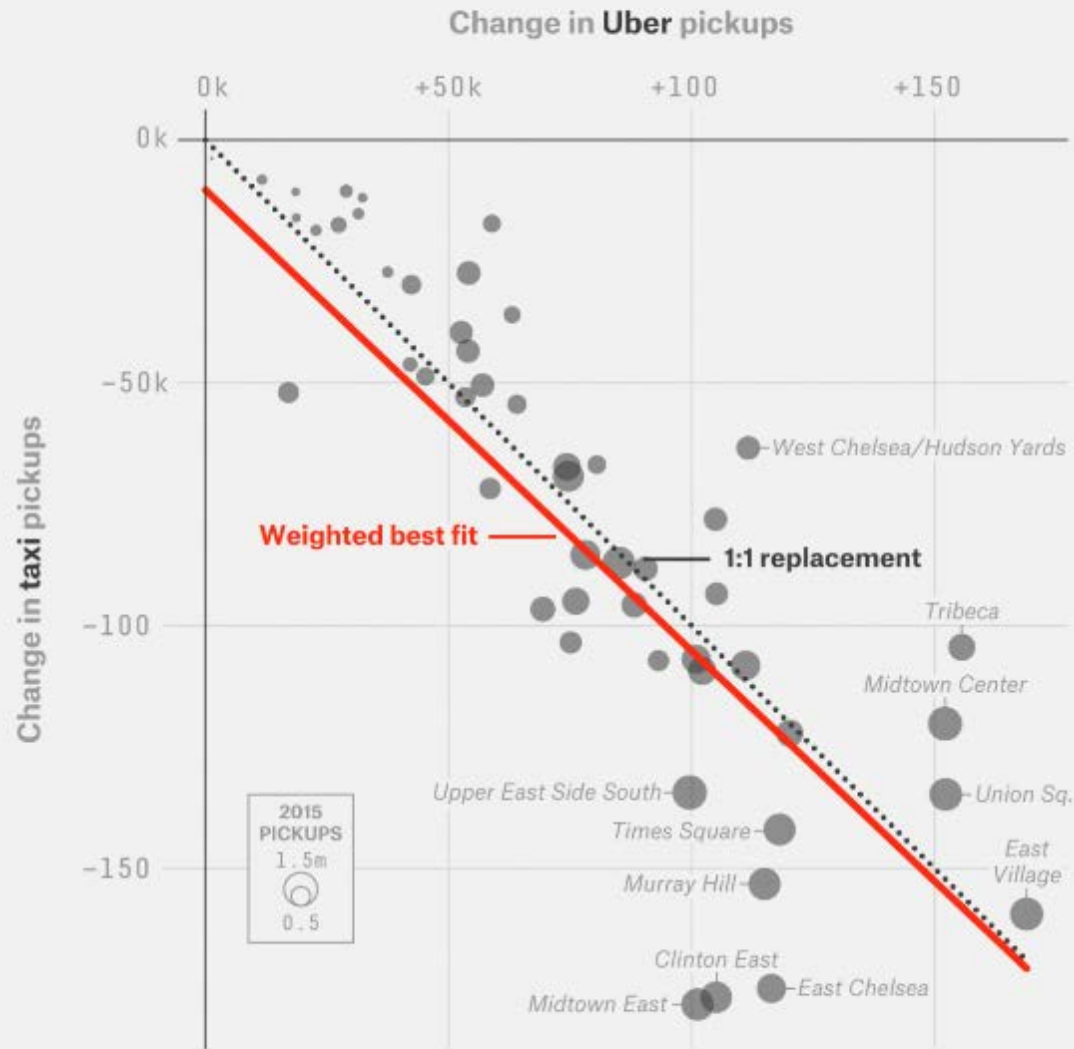


UBER ONLY



## Uber Is Replacing Cabs Throughout Manhattan

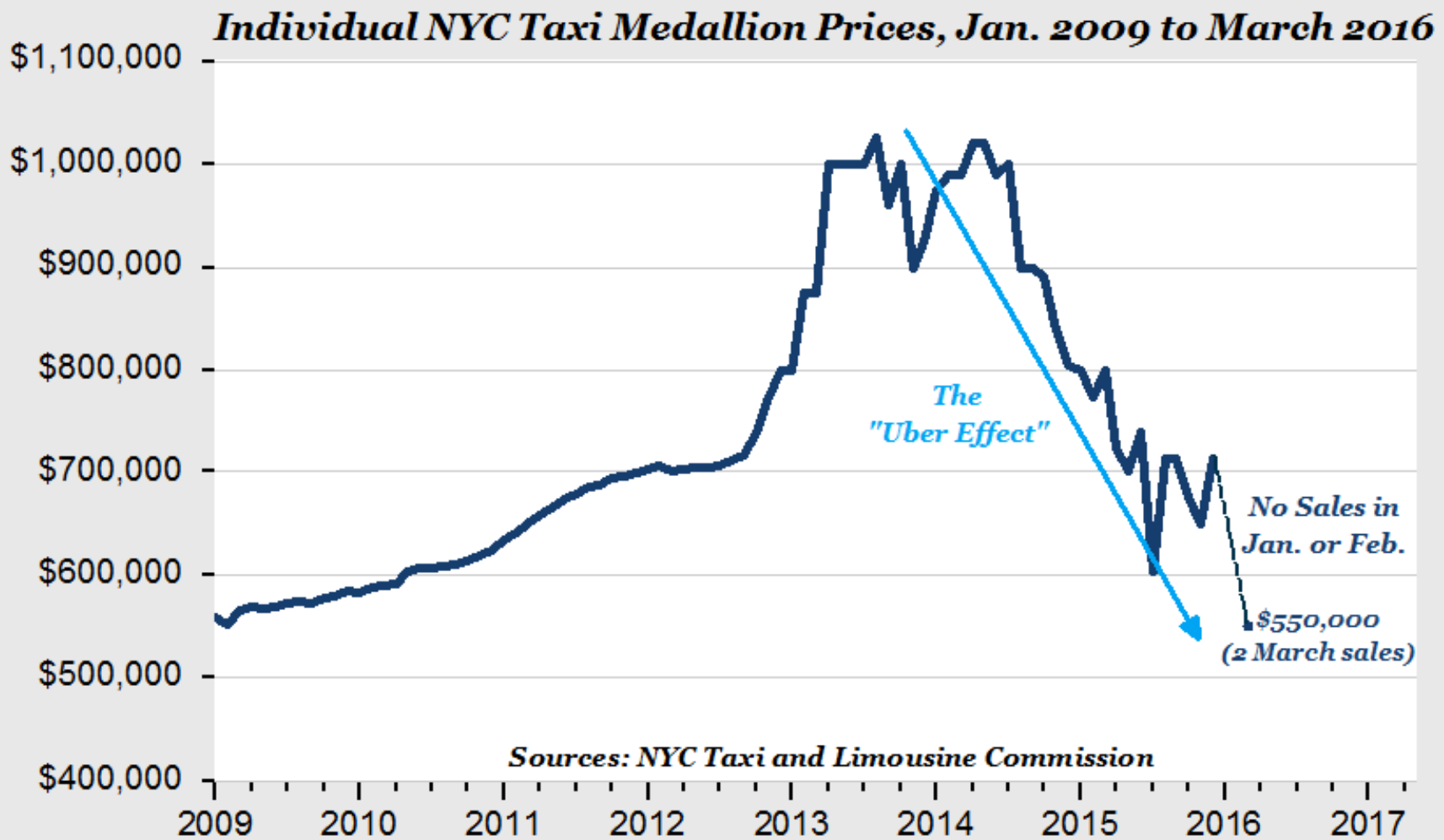
Change in taxi pickups compared with change in Uber pickups by taxi zone in borough's core, April-June 2014 versus April-June 2015



Core consists of zones south of 110th street on the West Side and 96th street on the East Side (where green Boro taxis can't make pickups)

Substitution  
in  
Manhattan

## Price of a taxi medallion

Carpe Diem **AEI**

# + Regulation (Uber)

104

- When? Path dependency of platform markets
- Consumers:
  - Sign of market failure? (need for protections)
  - Sign of protectionism of incumbents?
- Producers:
  - Flexible workers -efficiency
  - Labor laws, benefits



# Christiansen

is he right that Uber is not a disruptive innovation?

Do his criteria for sustaining versus disruptive innovation make sense in the platform era with network effects?

Do his remedies for incumbents to drive innovation make sense?  
Will they have the skills?



# + Platforms in financial services



# + Why now? Tech mega forces

- Lifespan of the average S&P500 corporation

- 1960: 60 years
- 2015: 20 years

- Network effects: path to 1 billion users

- Microsoft: 26 years
- Facebook: 8.7 years

- Low interest rates

- 1980: 20%
- 2015 < 0%

- Cost to launch a tech startup

- 2000: \$5 million
- 2015: \$5000

# + Why now? FinTech mega forces

- Shifting **geographic** and **demographic** loci of wealth

- **Regulatory** scrutiny, complexity and **cost**

- Informed buyers pressure **prices**, reconfiguring **margins**

- **Mobile** technology is ubiquitous and creates new user **expectations**



+

# 5 financial functions

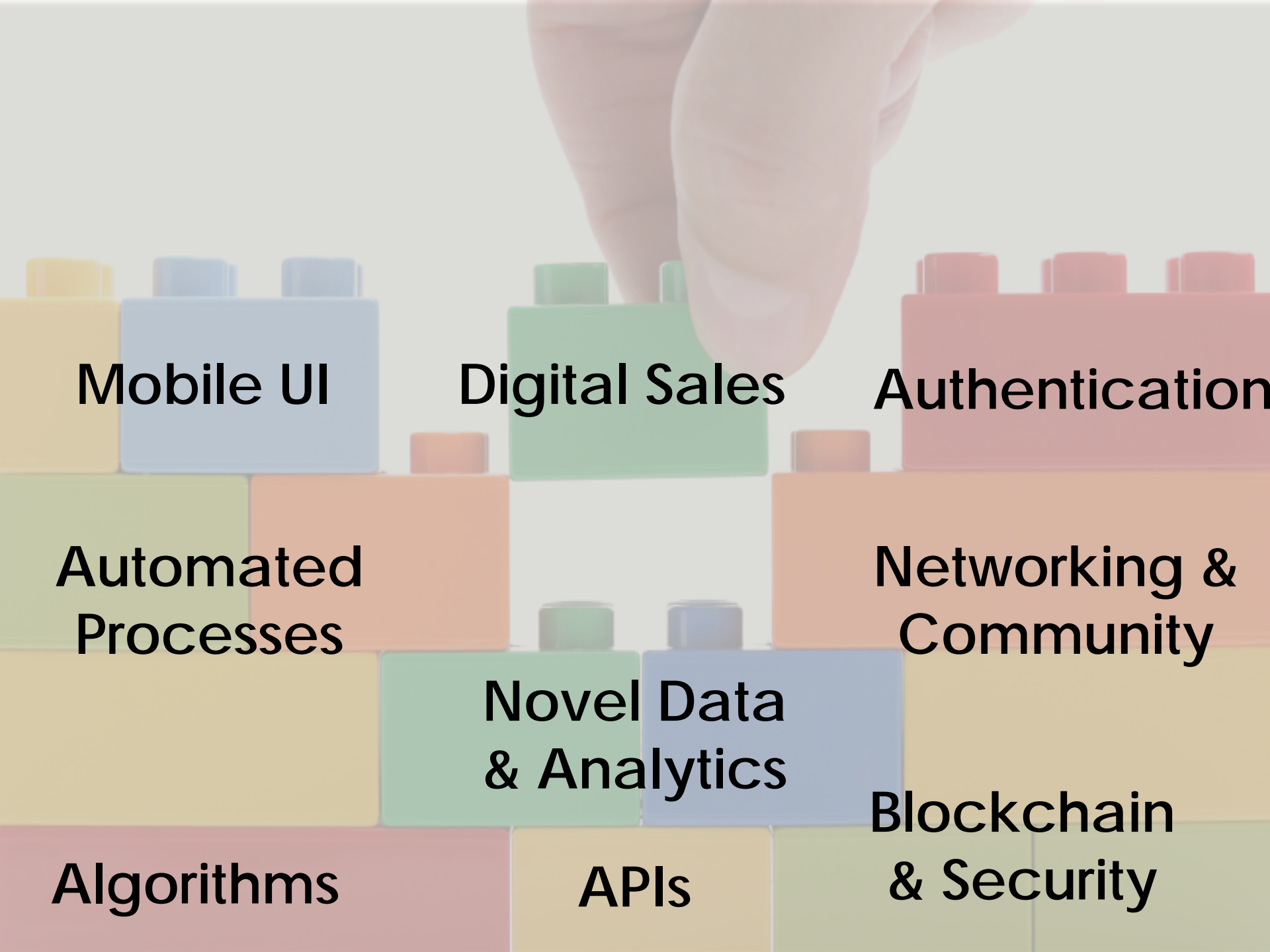
**PAYMENTS**

**EQUITY &  
CREDIT**

**MARKETS**

**MONEY  
TRANSFER**

**UNCERTAINTY  
& RISK**



**Mobile UI**

**Digital Sales**

**Authentication**

**Automated  
Processes**

**Networking &  
Community**

**Novel Data  
& Analytics**

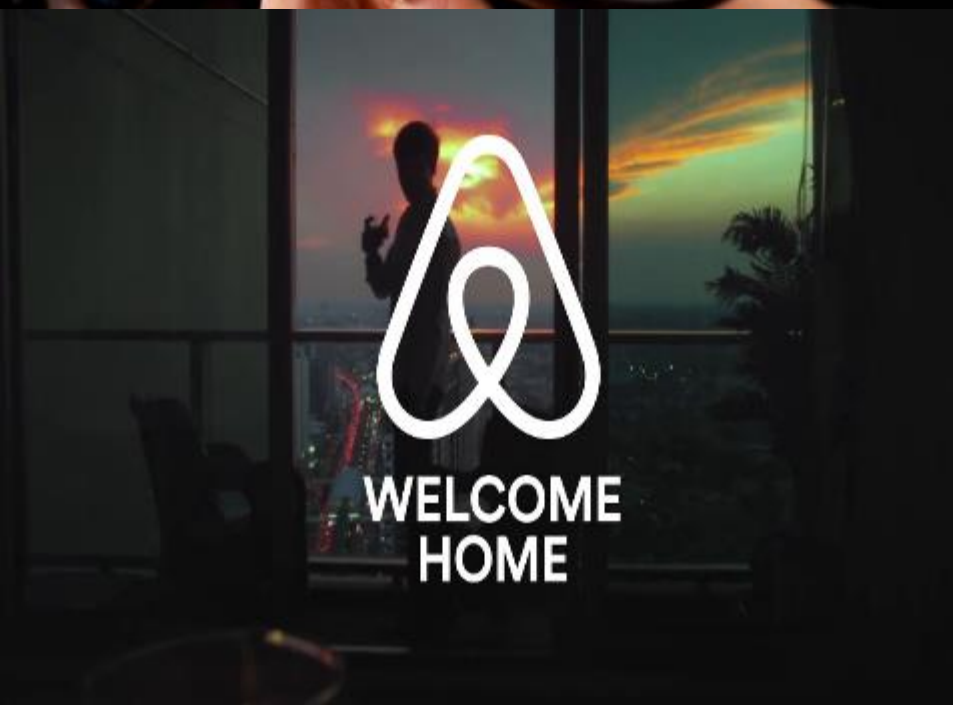
**Algorithms**

**APIs**

**Blockchain  
& Security**



**NETFLIX**



**amazon.com**



# venmo

The easiest way to  
pay your friends.



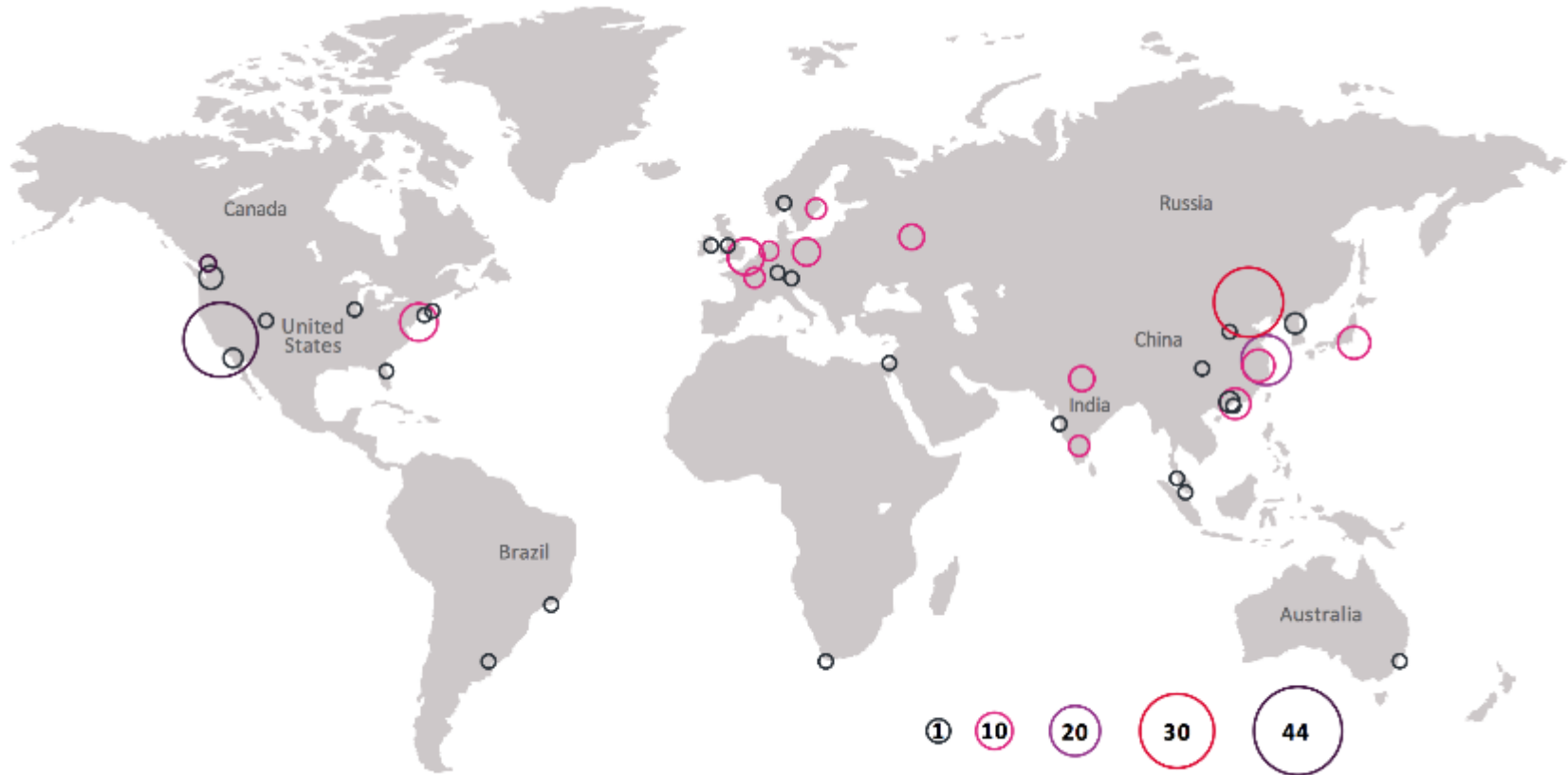
# Betterment



# TransferWise

# + Where are the platforms? Why?

GEOGRAPHY OF PLATFORMS: CITIES BY NUMBER OF COMPANY HEADQUARTERS



SOURCE: Global Platforms Survey, The Center for Global Enterprise, 2015

**FIGURE 3**



# + Platform definition-network benefits



## Network Externalities

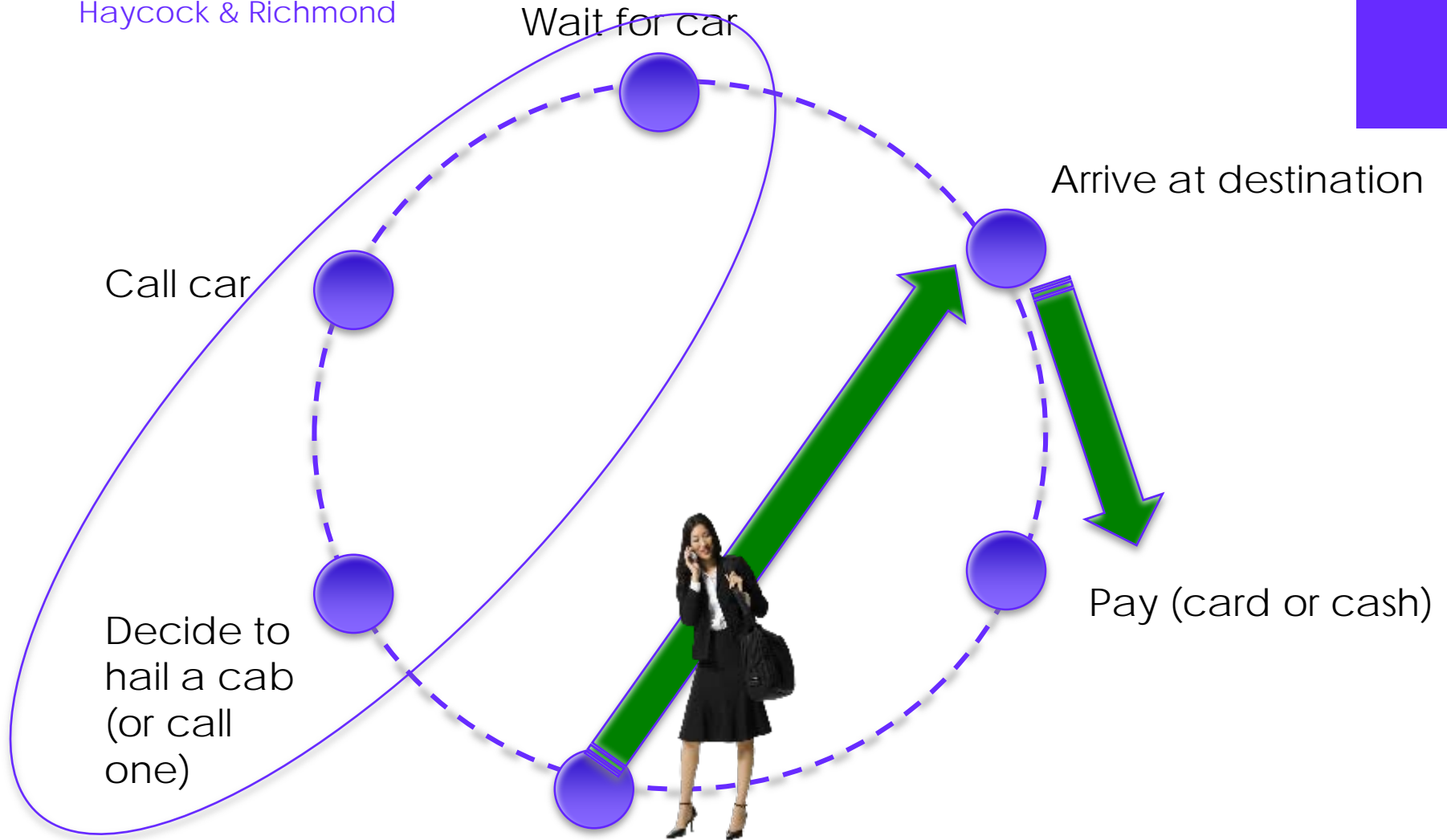
- Also known as “network spillovers” is one of the most important characteristics of many high-technology industries.
- In simplest terms, a product has network externalities if the value to any one user rises with the total number of users who also utilize that product.



[www.jpgeugenio7.blogspot.com](http://www.jpgeugenio7.blogspot.com)

# + Value chain-UBER

Haycock & Richmond



I want to....get a car from A to B.

# + FinTech categories-banking



# + Wrap up

- Productivity is driven by innovation and matters to growth and how benefits are distributed
- Technology drives innovation. It's scarce and needs encouragement. Economies and businesses strive to reach the technology frontier
- Definition of disruptive innovation (v. sustaining)
- Financial services innovation similar/different
- Challenges of innovation at the firm level
- Platforms challenge traditional thinking about innovation