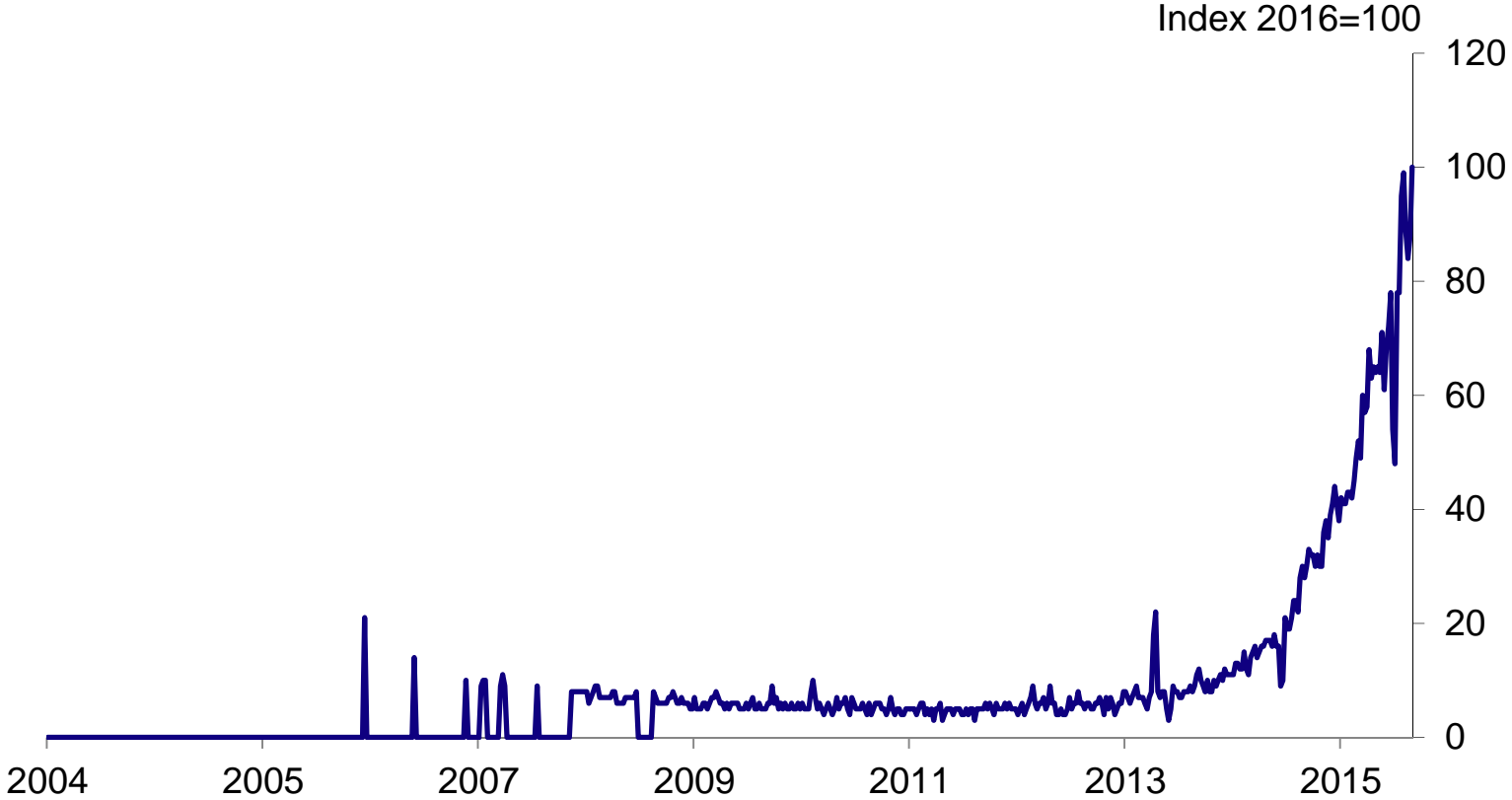BANK OF ENGLAND

FINANCE VERSION 2.0?

Andrew G Haldane

Joint Bank of England/London Business School Conference on "*Is there an industrial revolution in financial services?*"

7 March 2016

The "FinTech" Phenomenon

Index 2016=100

Source: Google Analytics. Notes: Chart shows an index of the number of google searches for the term "FinTech".

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Selected Recent FinTech Reports

- World Economic Forum:
  - *"The Future of Financial Services: How disruptive innovations are reshaping the way financial services are structured, provisioned and consumed"*
  - *"The Future of FinTech A Paradigm Shift in Small Business Finance"*
- Government Office for Science:
  - *"FinTech Futures: The UK as a World Leader in Financial Technologies"*
- European Central Bank
  - *"Virtual Currency Schemes – a further analysis"*
- ECUREX with Deutsche Bundesbank
  - *"Digital Currencies: Principles, Trends, Opportunities, and Risks"*
- Committee on Payments and Market Infrastructure:
  - *"Digital Currencies"*
- McKinsey:
  - *Annual Global Banking Reviews 2014 and 2015*
- Accenture:
  - *"The Future of Fintech and Banking: Digitally disrupted or reimagined?"*
- Ernst and Young (commissioned by UK Trade & Investment)
  - *"Landscaping UK Fintech"*
- BNY Mellon
  - *"Innovation in Payments: The Future is Fintech"*

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The "FinTech" Problem

"The most important financial innovation that I have seen the past 20 years is the automatic teller machine."

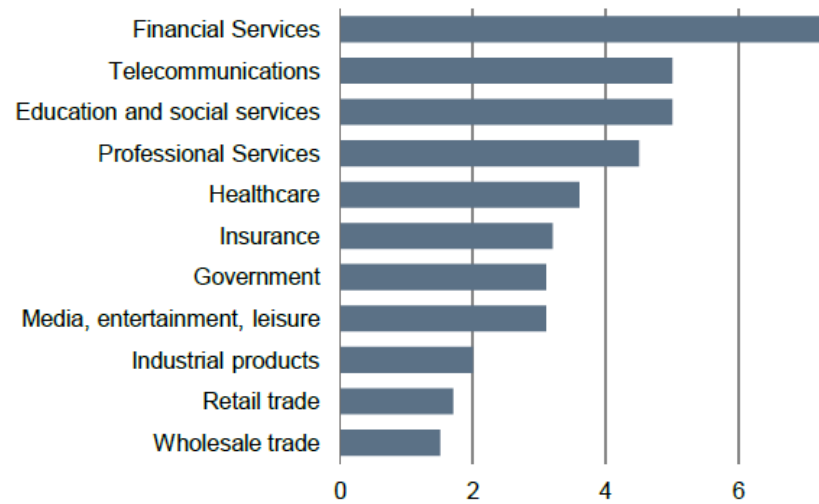➢ Paul Volcker, December 2009

New Financial Technologies

- Finance is a market in information – information technology should matter!

- Distributed/peer-to-peer model
  - world wide web, second-hand goods, publishing, music, taxis, accommodation etc
  - massive productivity improvements in cutting out the middle person
  - reduced trading times, cutting costs, widening access

- Big data in this distributed network
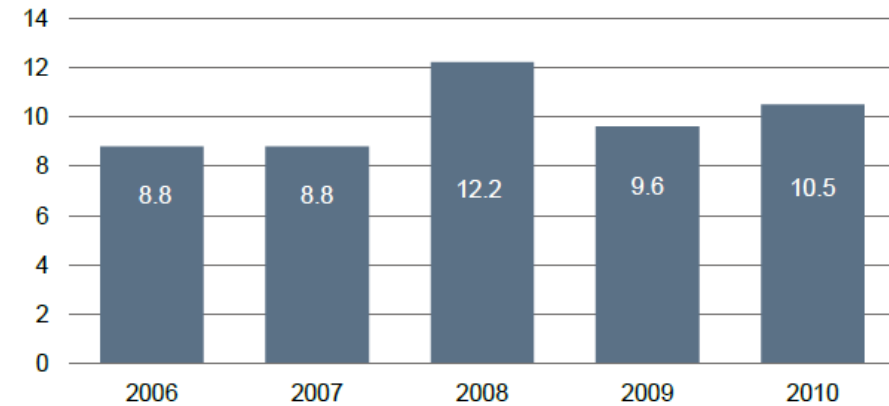 - pricing/marketing using granular data

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Cost of Bank IT Systems

Total IT spending as % of revenues or gross output

IT costs as % of revenues for European Banks

Source: Deutsche Bank (2012), "*IT in Banks: What does it cost?*"; Boston Consulting Group; Forrester Research inc.

The "Sharing Economy" - AirBnB

– Averages 425,000 guests per night, totaling more than 155 million guest stays annually — nearly 22% more than Hilton Worldwide.

– Valuation exceeds well-established global hotel chains like Hyatt.

- 76% of Airbnb properties are actually outside the main hotel districts, suggesting complementarity of their offering.

- Although also likely to have an impact on hotel industry. Recent study suggested an 8-10% impact on other hotels' revenues in Texas.

Sources: Byers and Zervas (2016), "*The Rise of the Sharing Economy: Estimating the Impact of Airbnb on the Hotel Industry*"; Finley (2013), "*Trust in the sharing economy*"; PWC (2015), "*The sharing economy*".

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The "Sharing Economy" - Uber

– Over one million rides on a daily basis. Market valuation now higher than Ford and General Motors

– Cheaper than conventional taxi's in most US cities, even excluding tips

– Surge pricing algorithm to equilibrate supply and demand

– Several taxi firms copied their business model – "Uberification"

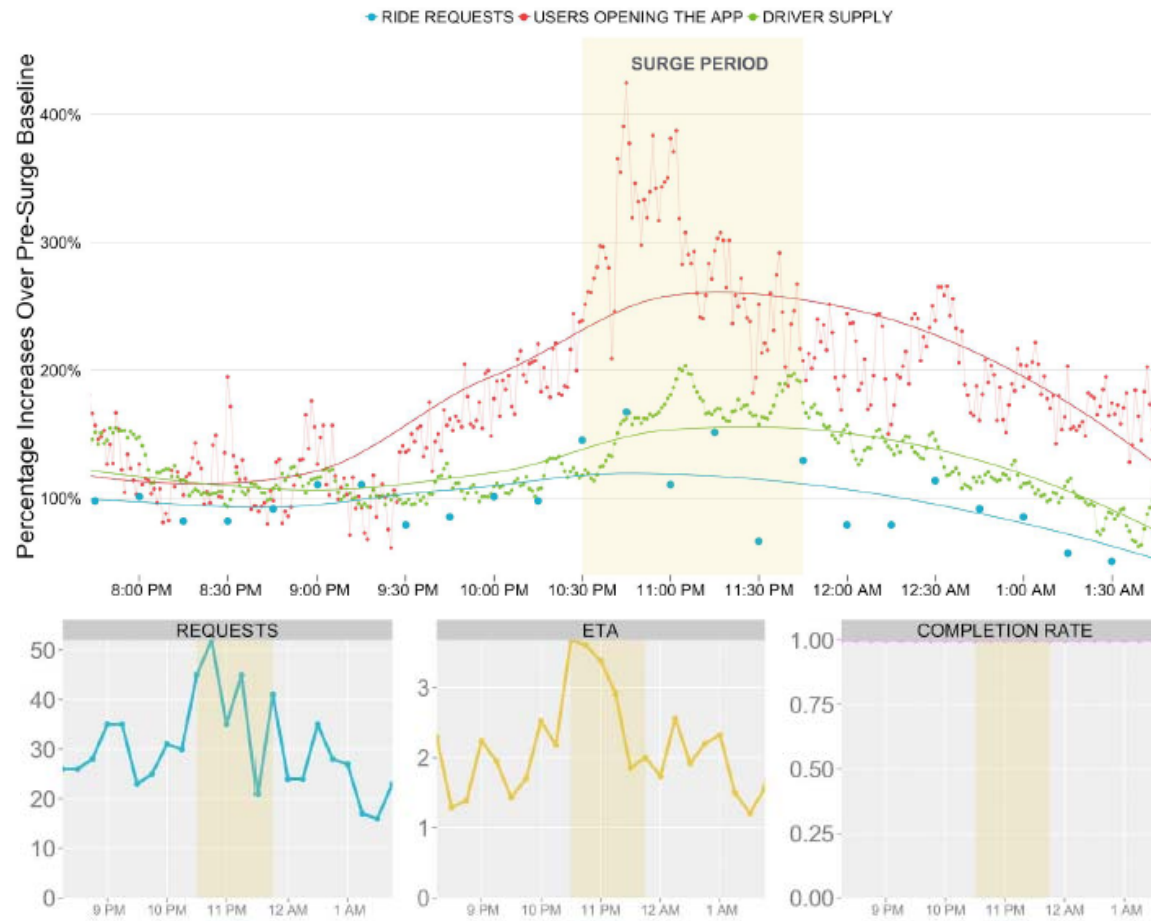– Key feature in both is the ability to harness consumer feedback and build <u>trust</u> in the system.

Sources: Hall et al (2016), "*The effects of Uber's surge pricing*"; Finley (2013), "*Trust in the sharing economy*"; PWC (2015), "*The sharing economy*", Forbes (2015), "*At $68 Billion Valuation, Uber Will Be Bigger Than GM, Ford, And Honda*".

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Uber's Surge Pricing

Surge Pricing in Action - March 21, 2015
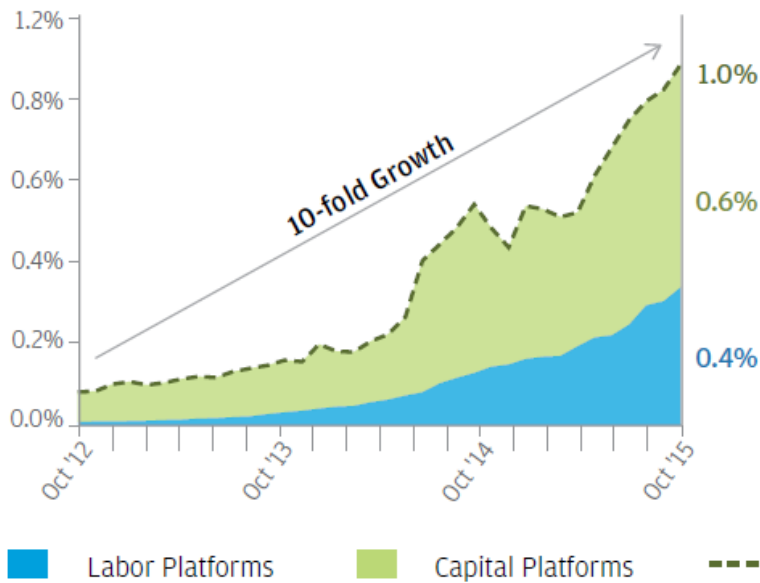### Ariana Grande sold out show at Madison Square Garden

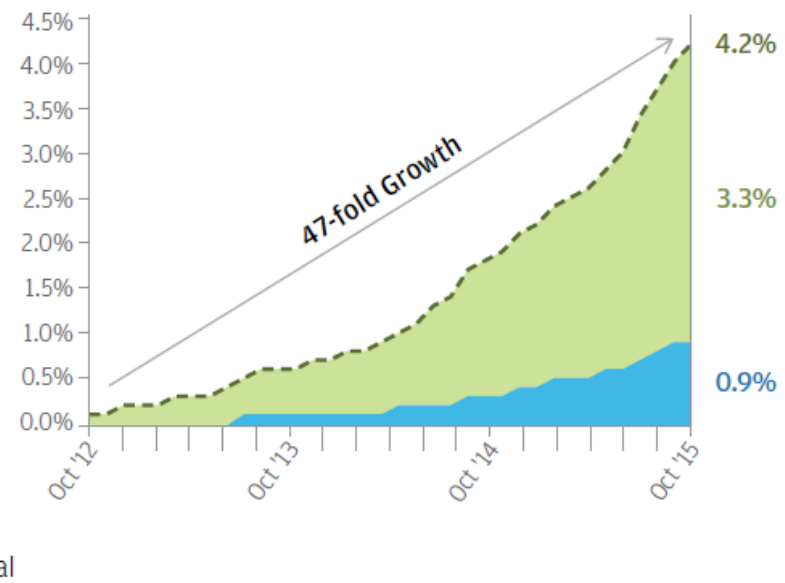Source: Hall et al (2016), "*The effects of Uber's surge pricing*".

Changing the Nature of Work

Percentage of adults participating in the Online Platform Economy in each month

10-fold Growth

1.0%
0.6%
0.4%

Cumulative percentage of adults who have ever participated in the Online Platform Economy

47-fold Growth

4.2%
3.3%
0.9%

Labor Platforms   Capital Platforms   - - - Total

Source: JP Morgan Chase Institute (2016), "*Paychecks, Paydays, and the Online Platform Economy*".

• Data from 1 million US Chase bank accounts show a large rise in income generated from online platforms, such as: Uber, AirBnB, Ebay.
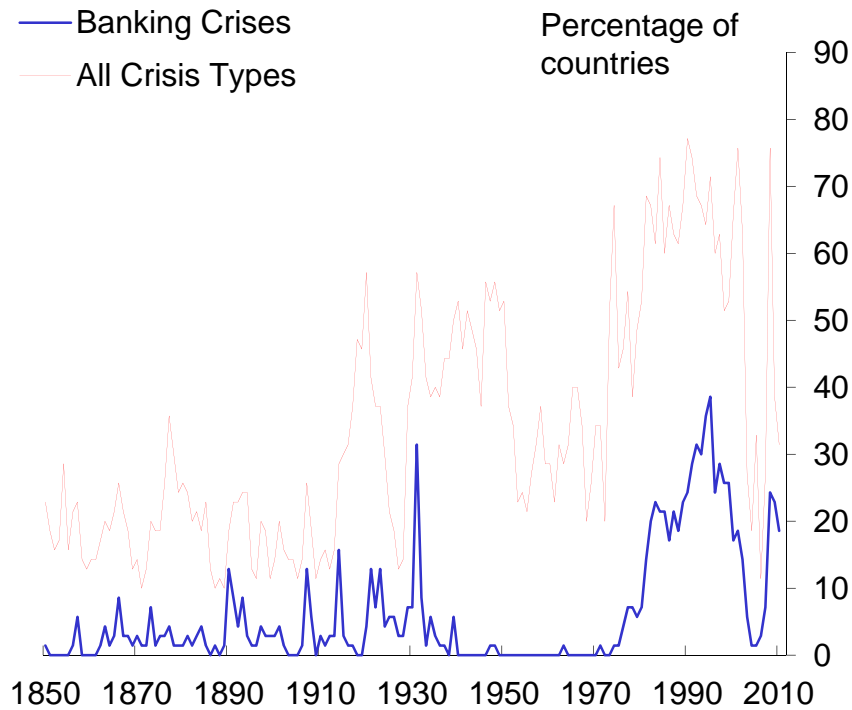
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Why it Might Matter for Finance

- <u>Stability</u> of financial system
    - New entrants = diverse ecosystem

- <u>Efficiency</u> of financial system
    - Lower margins + higher volumes = higher productivity

- <u>Democracy</u> of financial system
    - Greater access + lower cost = social value

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Stability of Financial System

Incidence of Banking Crises

— Banking Crises
— All Crisis Types

Percentage of countries

Global Banks – Scale and Complexity

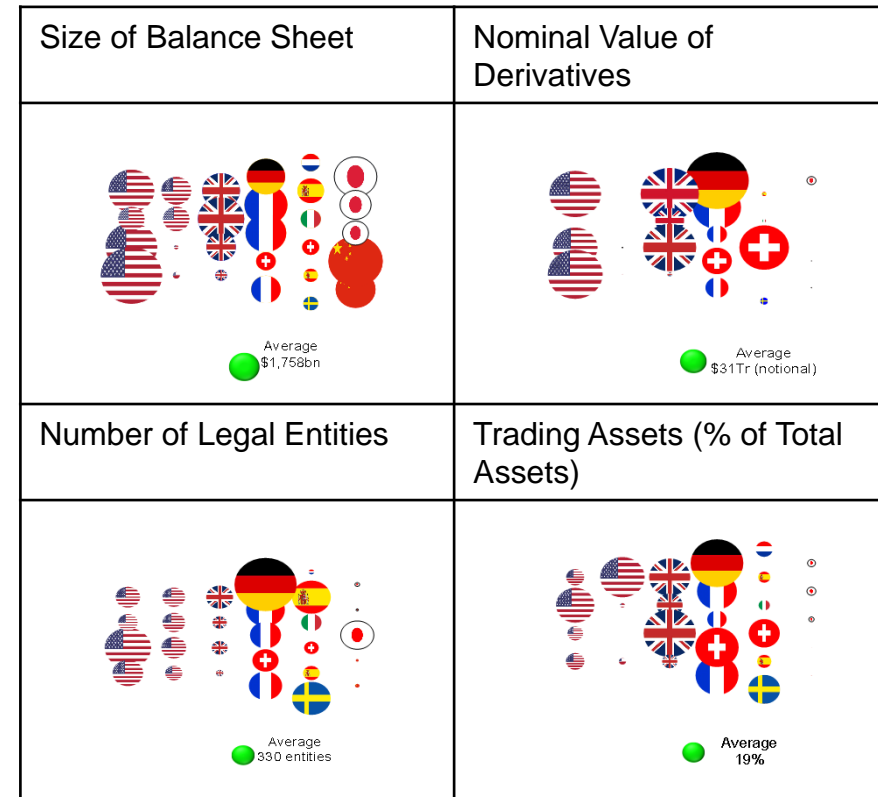| Size of Balance Sheet	Nominal Value of Derivatives
Average $1,758bn	Average $31Tr (notional)
Number of Legal Entities	Trading Assets (% of Total Assets)
Average 330 entities	Average 19%

Sources: Reinhart and Rogoff (2011), updated and extended version of dataset constructed by Lane and Milesi-Ferretti (2007) and Maddison (1995). For further details see Haldane (2014), "*Managing global finance as a system".*
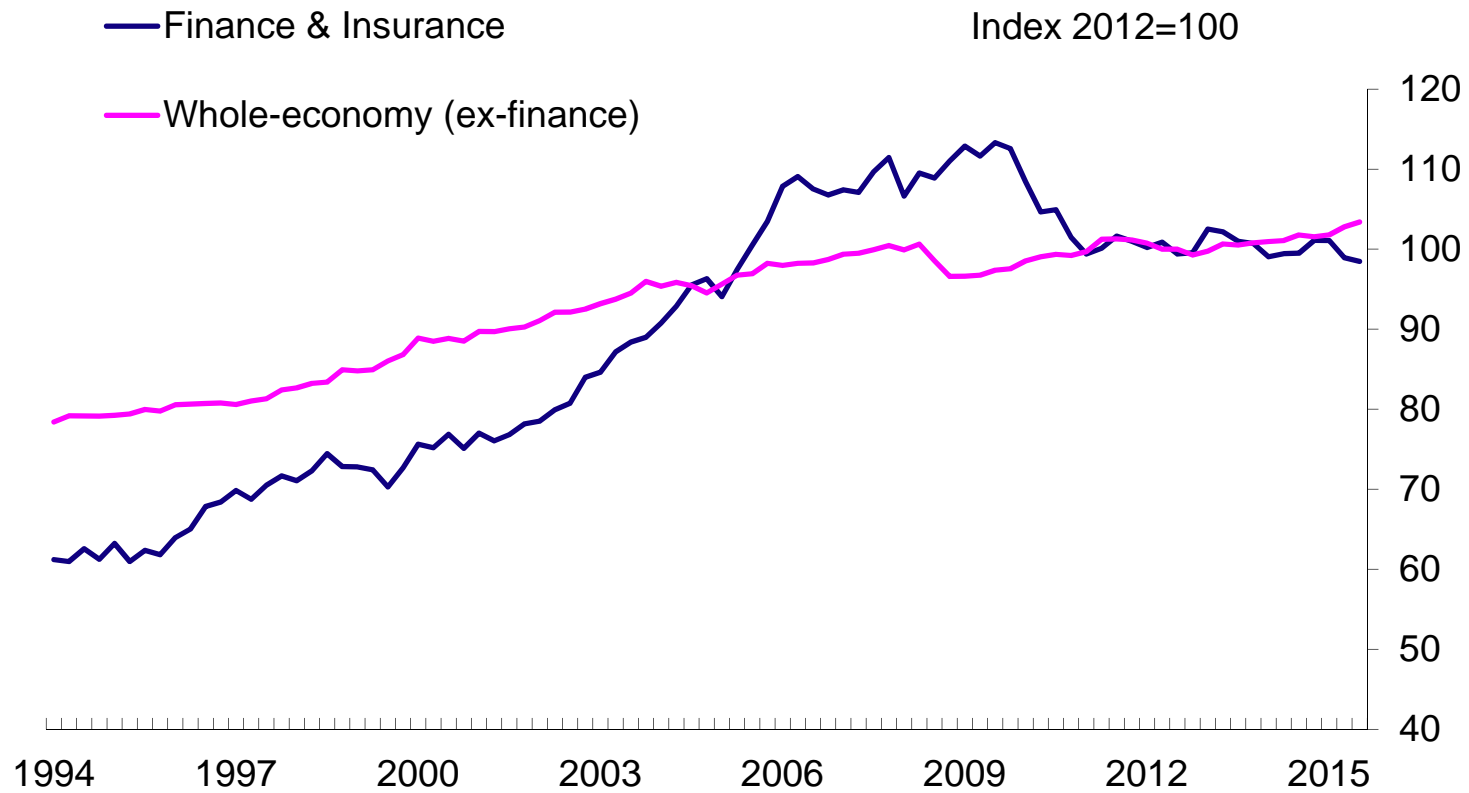
Sources: SNL Financial, FDIC, bank annual reports, Bank calculations.
Notes: For further details please see Haldane (2015), "*On microscopes and telescopes*".

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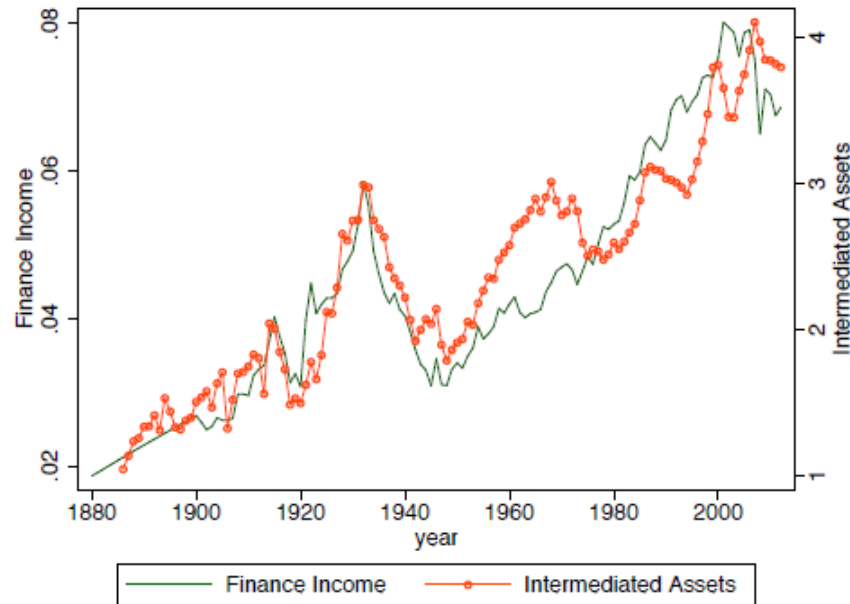# Efficiency of the Financial System

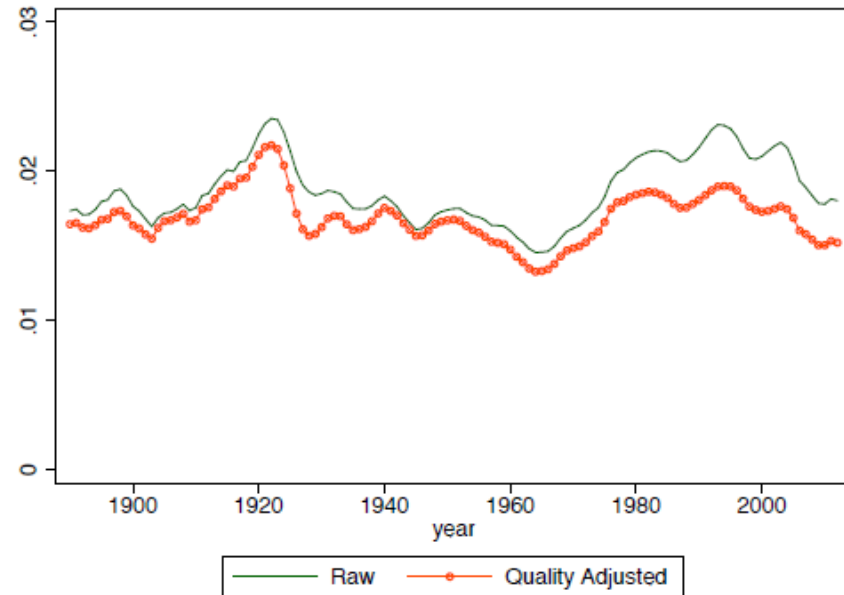## UK Labour Productivity

Source: ONS; Bank calculations.

Efficiency of Financial System

US Finance Income and
Intermediated Assets over GDP

US Unit Cost of Financial Intermediation

Source: Philippon (2014), "*Has the U.S. Finance Industry Become Less Efficient? On the Theory and Measurement of Financial Intermediation*".
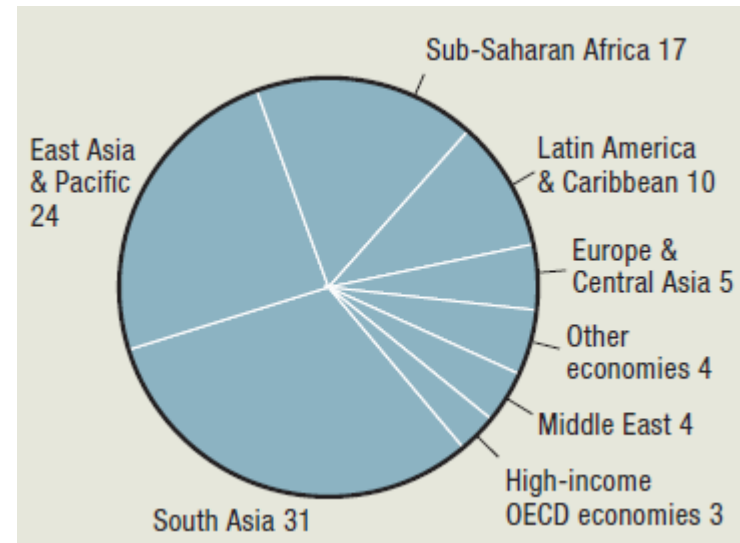
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Democracy of Finance

World population with a bank account

51% of the world's adult population had an account

2.5 BILLION UNBANKED

2011

62% of the world's adult population have an account

2 BILLION UNBANKED

2014

Adults without an account by region, 2014

Sub-Saharan Africa 17

East Asia & Pacific 24

Latin America & Caribbean 10

Europe & Central Asia 5

Other economies 4

Middle East 4

High-income OECD economies 3

South Asia 31

- Around 2 billion adults worldwide without a bank account.
- 10 million US households, and 1.5 million UK adults are also unbanked.

Sources: World Bank Global Findex Database; US Federal Deposit Insurance Corporation (2013); UK Financial Inclusion Annual Monitoring Report (2015).
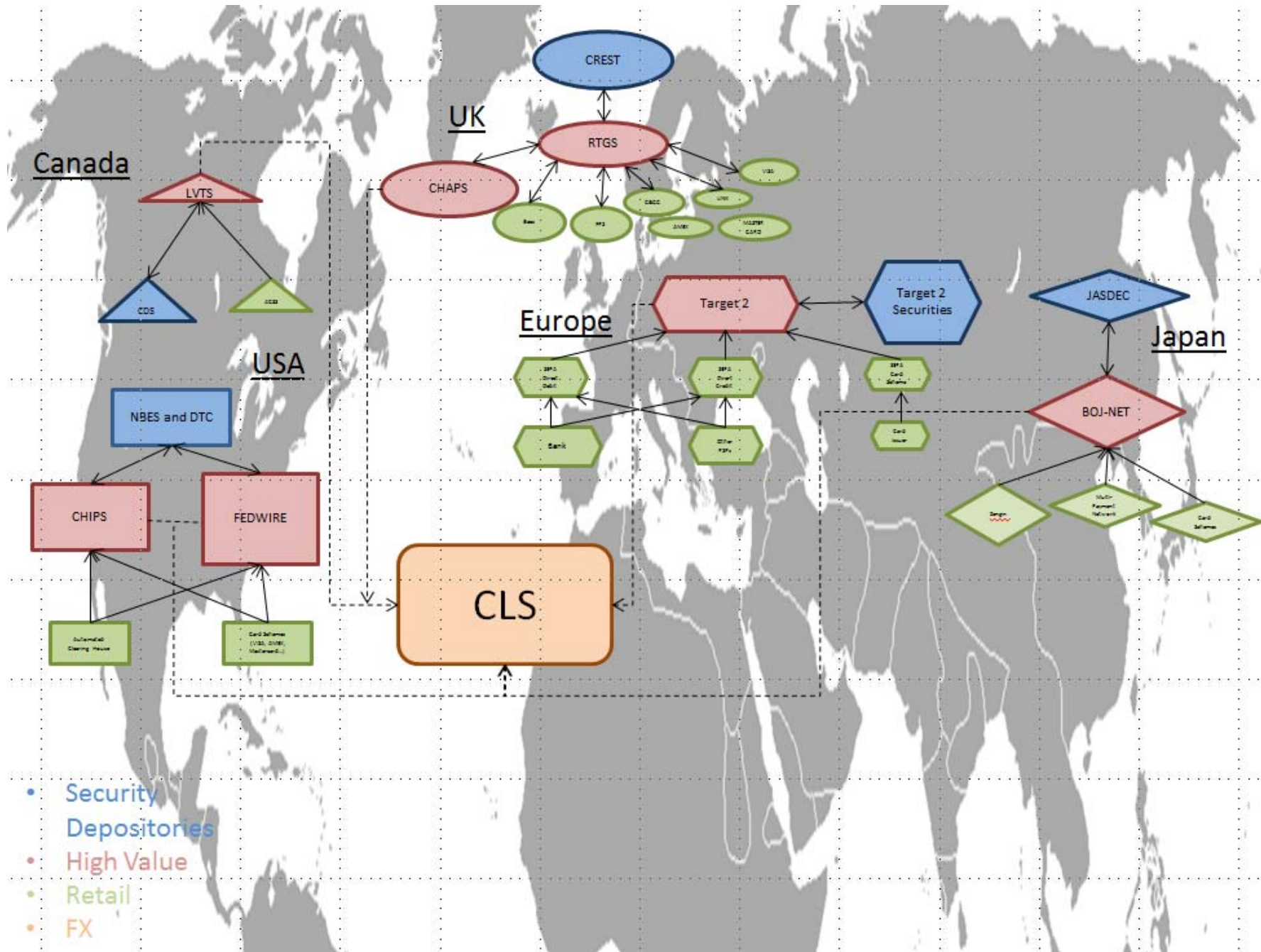
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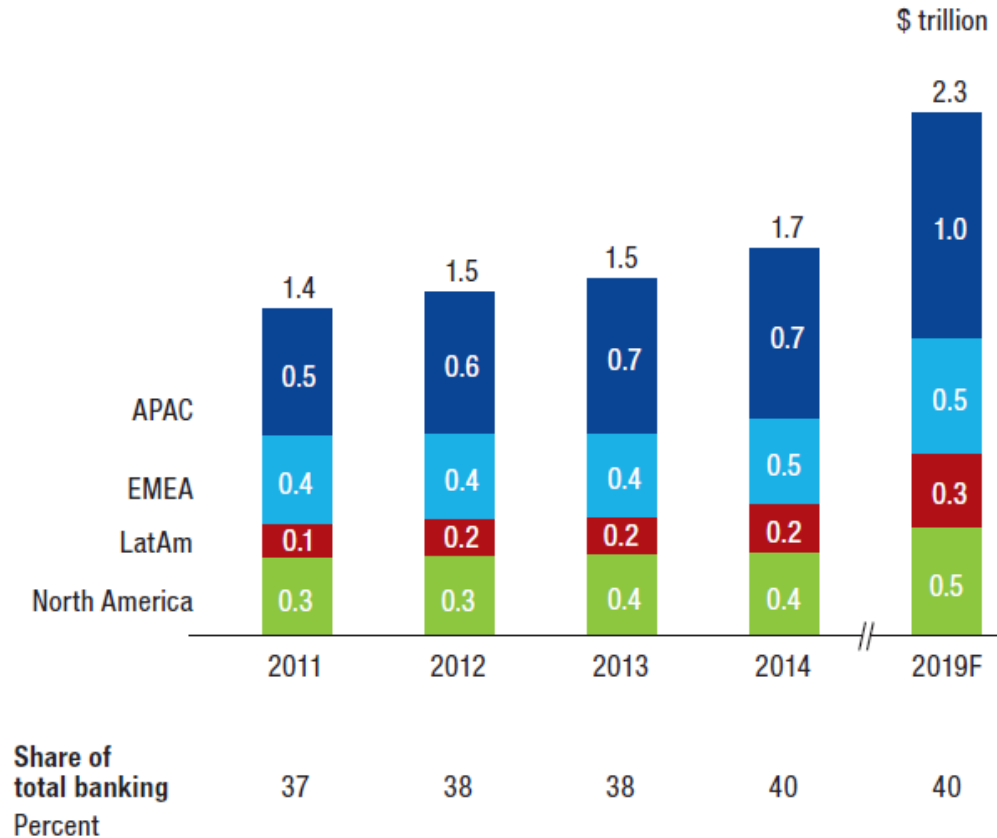
Future Of Finance?

- "Payments"

- Lending

- Insurance

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Payments Architecture – "Spaghetti Junction"

Legend:
- Security Depositories
- High Value
- Retail
- FX

Payments as a Source of Profit

Payments Revenue to Banks

$ trillion

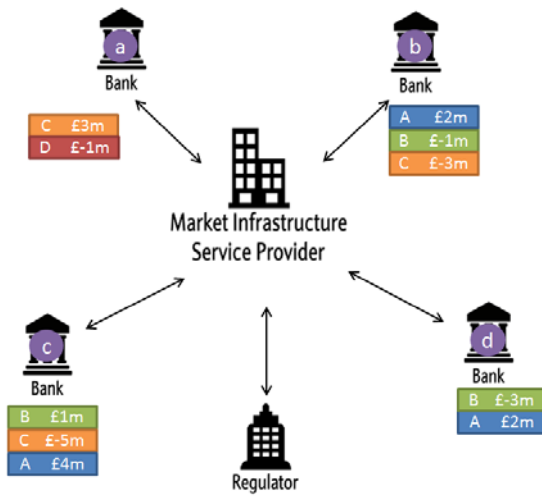|	2011	2012	2013	2014	2019F
Total	1.4	1.5	1.5	1.7	2.3
APAC	0.5	0.6	0.7	0.7	1.0
EMEA	0.4	0.4	0.4	0.5	0.5
LatAm	0.1	0.2	0.2	0.2	0.3
North America	0.3	0.3	0.4	0.4	0.5
Share of total banking Percent	37	38	38	40	40

Source: McKinsey (2015), "*Global Payments 2015: A Healthy Industry Confronts Disruption*".
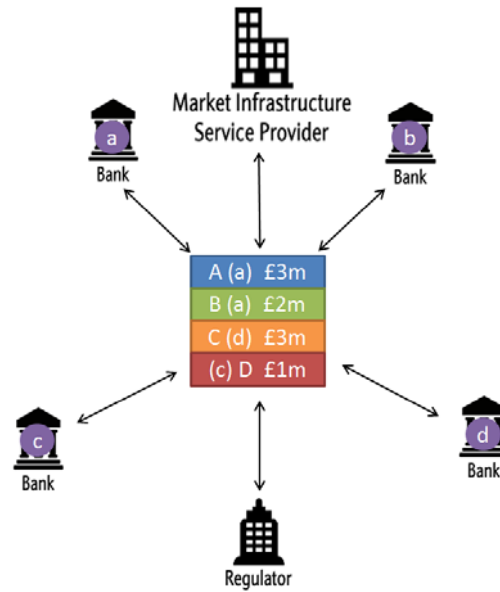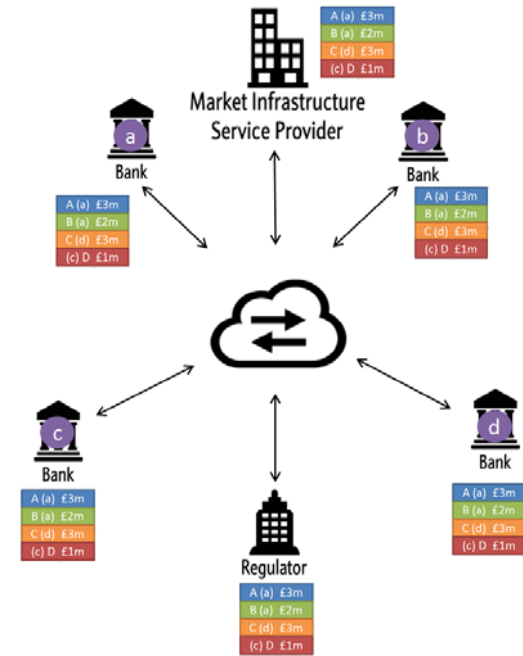
Three Models of Payments

Separate Ledgers   Central Ledger   Distributed Ledger

- Common ledger: "money is memory" (Kocherlakota (1996)).

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Opportunities and Threats

- "Smart contracts" – money, payments, FX, commodities, etc?

- Common standards/language – interoperability, lessons from the web?

- Cyber risks – greater or lesser?

- Privacy - public v private goods, open v closed networks?
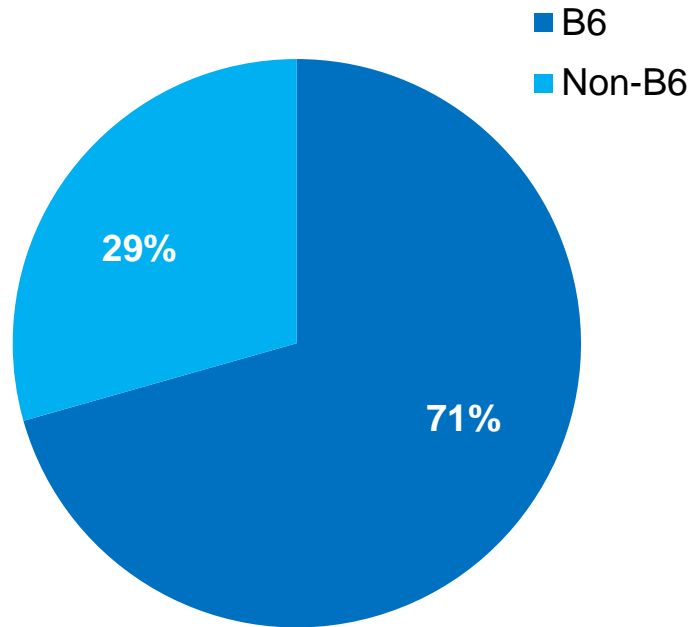
- Digital currencies - private or public?

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Real World Examples

- Payments/money – Coinbase, PayPal, Circle, M-Pesa

- Securities – ASX with Digital Asset Holding, SETL

- FX – Stellar, TransferWise, Ripple

- Derivatives – US Commodity Futures Trading Commission

- Invoicing – IDA Singapore with Ripple and Standard Chartered

- Commodities – itBit, GFT
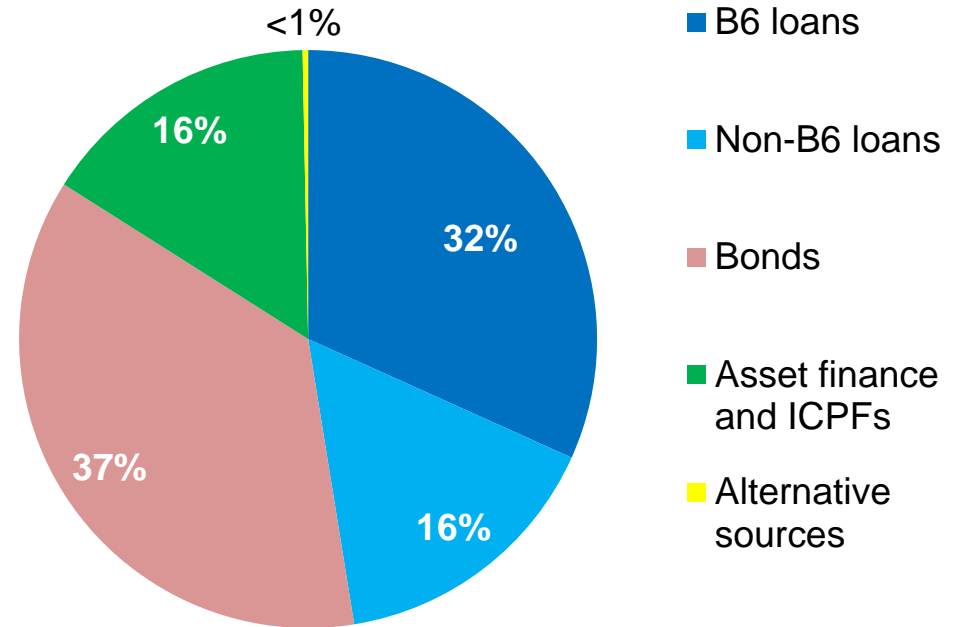
- Equities - NASDAQ

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The Existing Architecture of Lending

Total stock of bank lending (secured and unsecured) to **households**
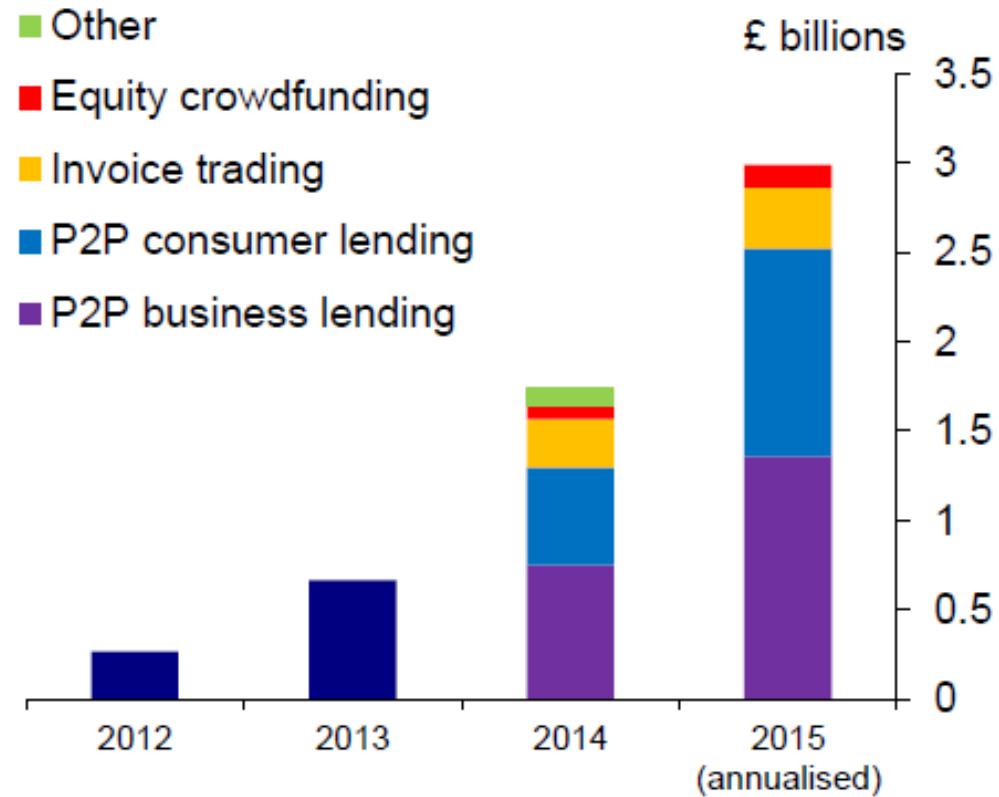
Source: Bank of England.

Total stock of debt to **businesses**

Sources: ABFA, FLA, Nesta, ONS, Bank of England. Notes: Non seasonally adjusted. Share in the stock. Data are to end-December 2015, with the exception of Bonds and ICPFs which are to end-September 2015. Excludes equity finance. Alternative sources includes Peer to Peer finance and crowdfunding.

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Growth of P2P

Source: NESTA for 2012-2014; AltFi Liberum Volume Index UK for 2015 (data to 12 October). Notes: See McCafferty (2015), "*UK business finance since the crisis – moving to a new normal?*" for further details.

Opportunities and Threats

- Can critical mass be attained? Bad apple risks

- P2P v "Handelsbanken" model? Hard v soft data

- How "alternative" is alternative finance?

- Information barriers to entry - credit registers and Big Data?

- Regulation of new banks and non-banks
  - when is there a systemic threat?

Insurance Industry

- Car insurance

- Health/Life insurance

Driverless Cars

- In 2020, Google plans to launch a self-driving car which:
  - has already driven nearly one million miles
  - doesn't get tired and irritable
  - doesn't swerve into lamp posts or require a driving test
  - has an in-built chauffeur - in the form of a rotating laser taking 1.3 million recordings per second
  - can drive better than you!

- Will anyone own a car in future?
  - Reduced car demand through pooling?

- By eliminating the element of human blunders, driverless cars are forecast to reduce motor accidents by up to 90%.

Source: Bank Underground (2015), "*Driverless Cars: Insurers Cannot be Asleep at the Wheel*".

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Impact on Car Insurance Market

- 90% fall in premiums?

- Impact on distribution of premiums - equalise quotes across ages/genders/risk types?

- Insurance for car <u>companies</u> rather than <u>drivers</u>?

- How to deal with cyber-security issues?

- Important legal implications for liability – who to blame when/if there is a crash?

Health/Life Insurance and Big Data

- Can Big Data make inroads into <u>adverse selection</u> and <u>moral hazard</u> problems?

- Telematics **-** more information from customers' <u>wearable devices</u>
  - 63% of insurer executives believe wearable technologies will be adopted broadly by the insurance industry by 2017 [*Accenture (2015)*]
  - But less than 1 in 4 consumers are willing to share their health information [*PWC (2014)*]

- Calibrating existing <u>insurance risk models</u> with richer human behaviour data
  - Tailored premiums by tracking lifestyle habits and social networks?

- Improved ability to detect <u>fraud</u> by mining unstructured Big Data?
  - For example anomaly detection, developing predictive models, network analysis to facilitate effective investigations.

- Re-evaluating <u>individual risk</u> vs <u>risk pooling</u>. If you could perfectly predict health outcomes from DNA data, would everyone self-insure?

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Conclusion

…. Finance Version 2.0?

…. time to remove the question mark? ….