University of BRISTOL

Financial Technology

Lecture 9: Part One

COMSM0019: Internet Economics and Financial Technology

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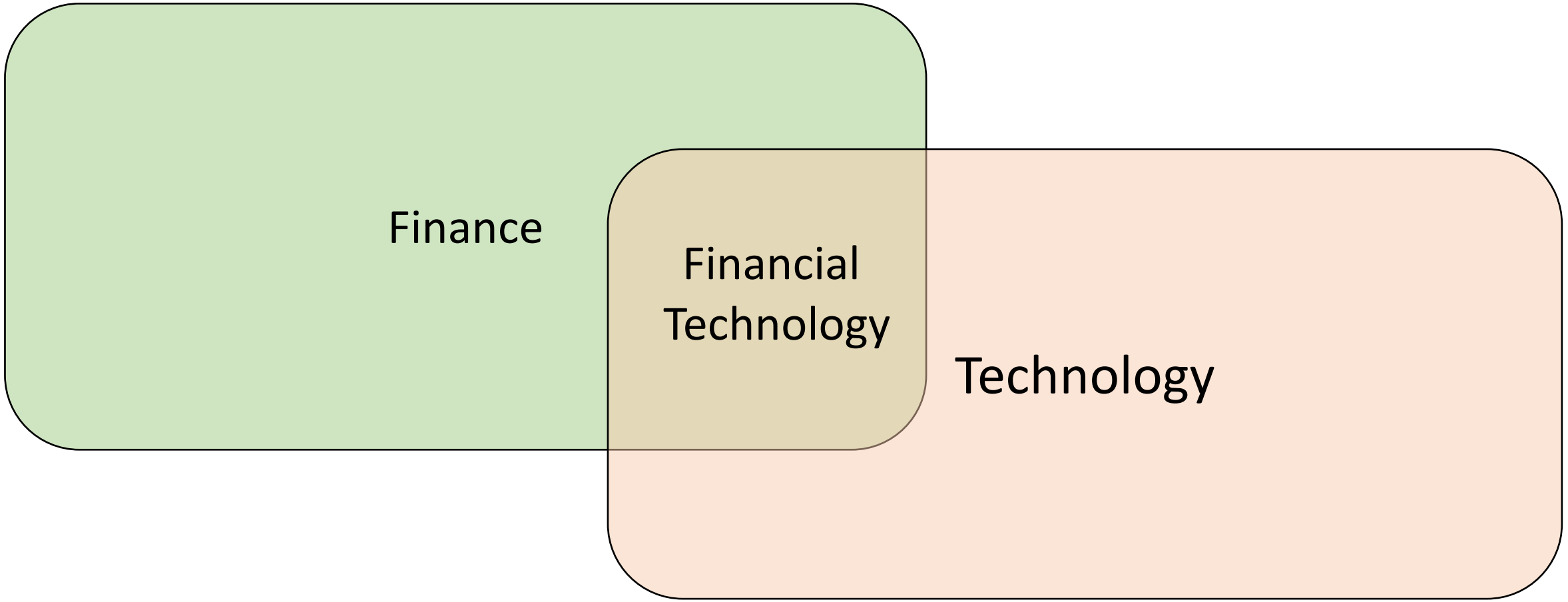
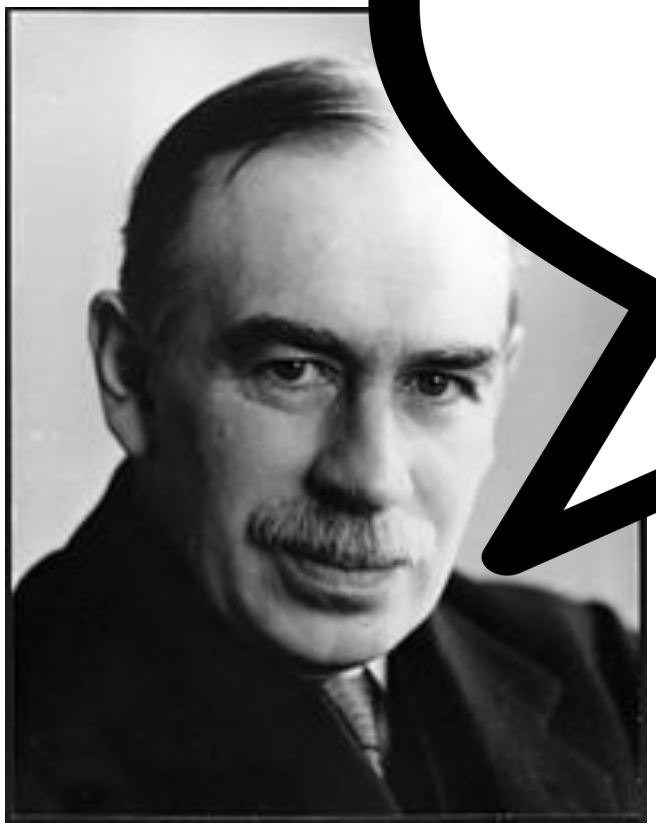


Financial Technology – where finance and technology meet

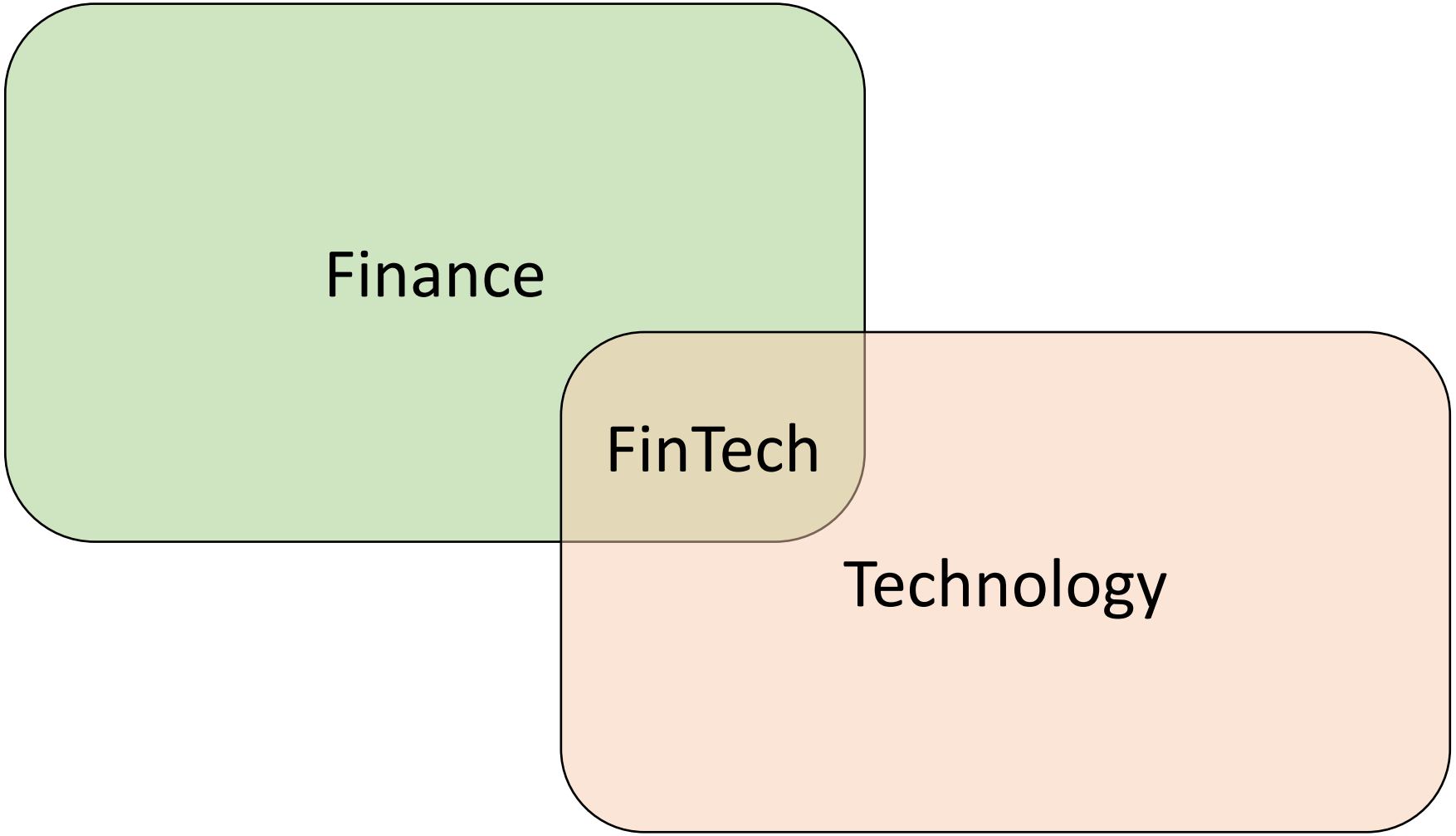
amazon



The inhabitant of London could order by telephone, sipping his morning tea in bed, the various products of the whole earth, in such quantity as he might see fit, and reasonably expect their early delivery upon his door-step

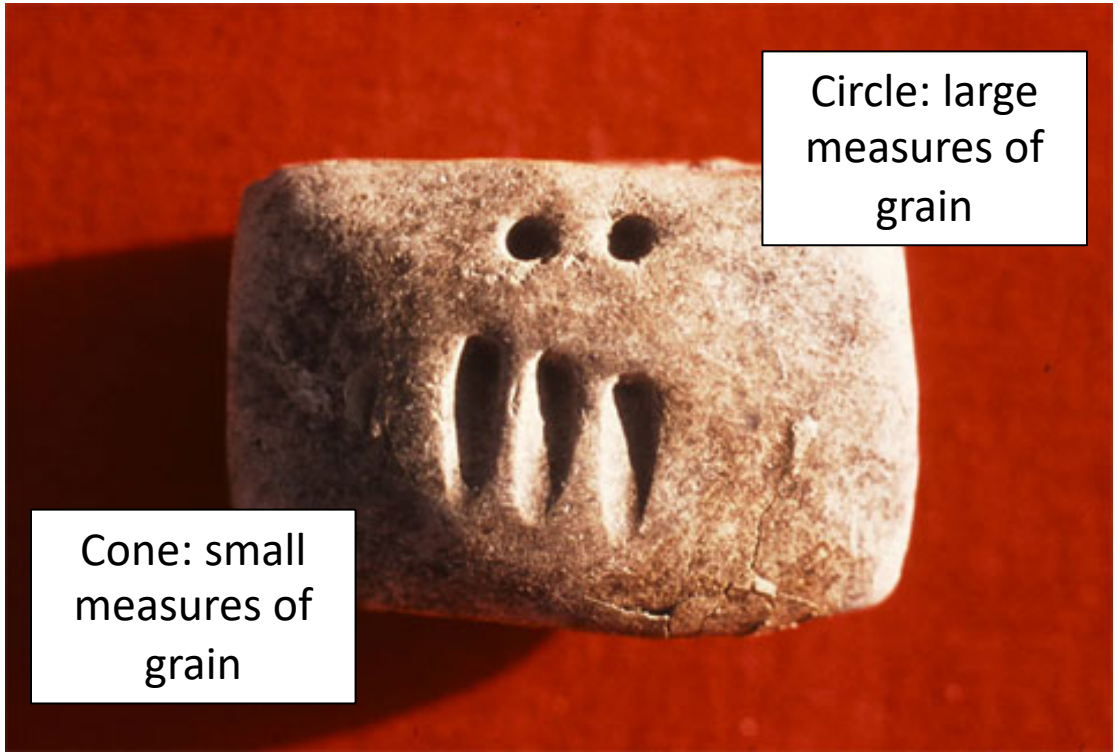
deliveroo

John Maynard Keynes, **1920**, *The Economic Consequences of the Peace*



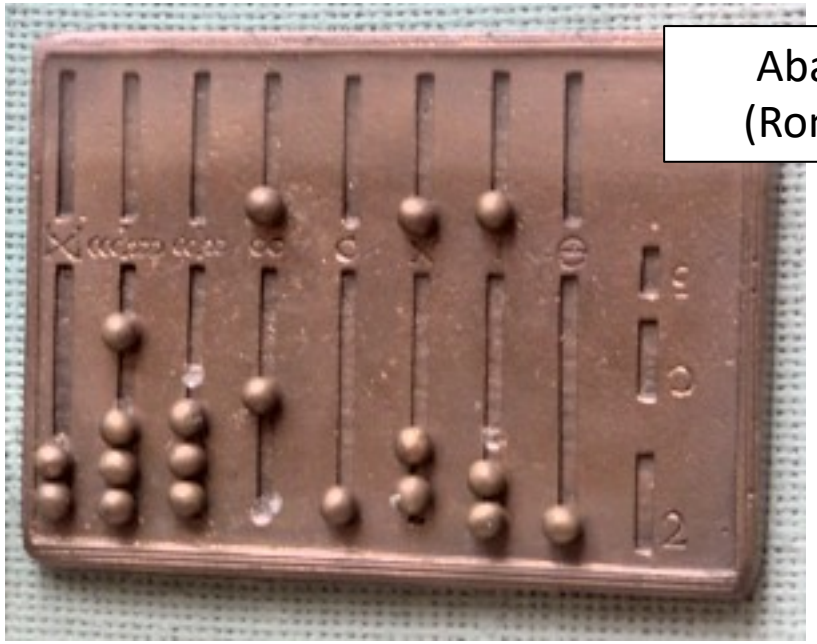
FinTech: A new term for an old relationship…

Writing technologies



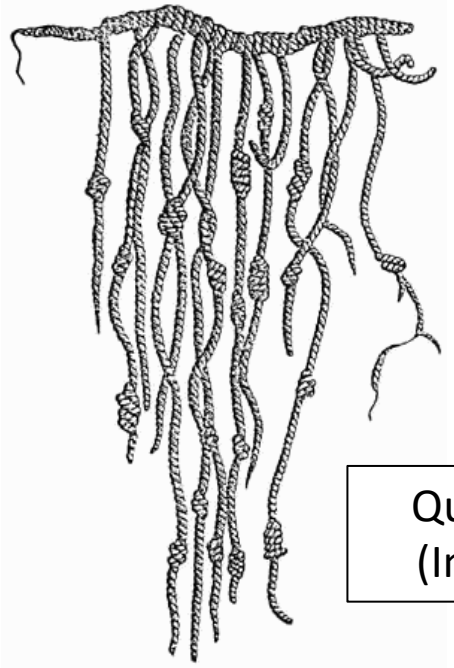
Impressed tablet from Godin Tepe, Iran, ca. ***3200 BC****. Courtesy Denise Schmandt–Besserat, with permission from Cuyler Young Jr., Royal Ontario Museum, Toronto*
https://sites.utexas.edu/dsb/tokens/from-accounting-to-writing/

Calculating technologies



Abacus
(Roman)

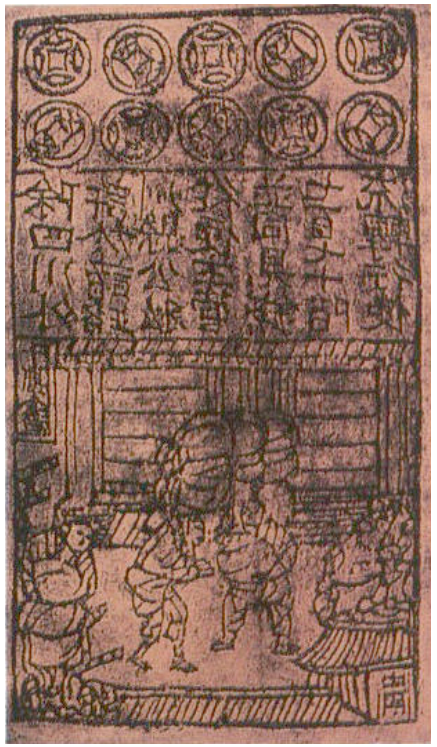
Invented c. 2500 BCE
Used by merchants and traders for calculating



Quipu
(Inca)

c. 1500
Coloured knotted cords used to record numerical data

Paper technologies



11th Century: Song Dynasty *Jiaozi*, the world's earliest paper money.

Paper technology: Allows us to store values with no limit… just keep adding zeros

Source text, and **recommended reading:**

Arner, D.W., Barberis, J.N., Buckley, R.P.: **The evolution of fintech: A new post-crisis paradigm?** University of Hong Kong Faculty of Law Research Paper No. 2015/047; UNSW Law Research Paper No. 2016-62. (Oct 01 2015), http://dx.doi.org/10.2139/ssrn.2676553

FinTech 1.0

From analogue to digital

1866 - 1967

FinTech 1.0: From analogue to digital

Late 19th Century: the first age of globalization

Telegraph, railroads, steamships, etc. enabled global inter-linkages allowing for rapid transmission of financial information, transactions, and payments around the world

Post-war period:

- Rapid progress in communications and IT technology, initially developed during the war
- Commercial computers (IBM)
- Telex communications and fax machine (Xerox Corporation)

From analogue to digital

- 1949: Diners Club (buy food, rent hotels rooms)

  Network effect, how to reach critical mass?
- 1958: BankAmericard (now Visa) – mailed 60,000 cards to every customer in Fresno, California with limit of $500

  Lots of fraud – but take a loss, but build the network
- 1960: Bank of America had 1 million cards in circulation

  It worked!
- 1960s: Magnetic strip added to speed up transaction (previously, shop assistant had to call bank for verification)

  We've gone digital
- 1966: several bank card associations joined together to establish the Inter-bank Card Association (now MasterCard)

  Agreeing standards to grow the network

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FinTech 2.0

Digitalisation of trad. financial services

1967-2008

Digitalisation of traditional financial services

Automated Teller Machine (ATM)

- 1967: UK, Barclays. Access to money 24/7

  Technology replaces financial service (the bank teller)

- 1970s, 80s: networks appear, more functionality
  (by 1986, 200 networks in US alone)

  Network effects, build critical mass

- 1998: One consolidated ATM network in UK (LINK) – use any machine for any bank

  Inter-operability / Standardisation

- Offer services on top, e.g., mobile phone top-ups

  Leverage the network to supply services on top

FinTech 2.0: Digitalisation of financial services

Payments

- 1968, UK: Inter-Computer Bureau was established, forming the basis of today's Bankers' Automated Clearing Services (BACS),
- 1970, USA: Clearing House Interbank Payments System (CHIPS) was established
- 1970s: Fedwire became electronic rather than telegraphic system
- 1973, Worldwide Interbank Financial Telecommunications (SWIFT) for international payments

Financial Markets

- 1971, NASDAQ, USA: Electronic trading exchange
- 1984, Bloomberg Terminal (Michael Bloomberg, financial data / trading systems)

Online Banking

- 1995, Wells Fargo, first to use WWW to provide online account checking
- 2005, ING Direct, HSBC Direct , UK - first direct banks without physical branches

By early 21st Century, the majority of banks' internal processes and interaction with customers had become digitalized. Profits were higher than ever, banks were on top of the world…


CHRISTIE'S
LEHMAN BROTHERS

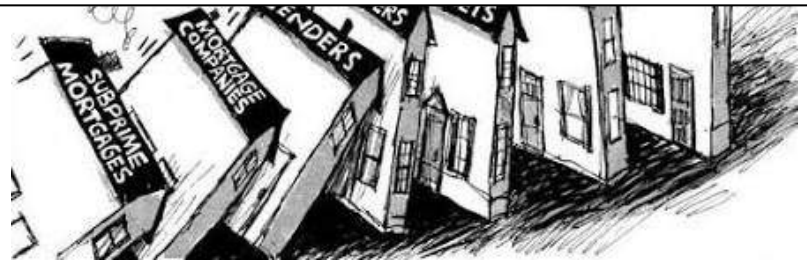

A PERFECT STORM
FORECLOSURES
HOUSING MARKET
SUB-PRIME LOANS
garyvarvel.com


WELL, THERE GOES THE NEIGHBORHOOD....
MIKE LUCKOVICH
SUBPRIME MORTGAGES
MORTGAGE COMPANIES
LENDERS
HOME BUILDERS
MARKETS
U.S. ECONOMY
WORLD ECONOMY


financial crisis
Crash of

- Since 2008 global financial crisis, **banks have lost consumer trust**
- 2015 survey showed the level of trust Americans have in CitiBank is 37%, whilst trust in Amazon and Google is 71% and 64% respectively
- **Opportunities for new firms to enter the arena of financial services**

Survey Shows Americans Trust Technology Firms More Than Banks and Retailers, LET'S TALK PAYMENTS (Jun. 25, 2015), http://letstalkpayments.com/survey-shows-americans-trust-technology-firms- more-than-banks-and-retailers/



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FinTech 3.0 / 3.5

Democratisation: FinTech & TechFin

2008 -

Financial Technology Today: The key players

Traditional Finance

Tech start-ups

Big Tech

Traditional banking / financial services firms

- Adding technology to streamline/automate their traditional business models
- E.g., online banking / mobile application
- A form of **incremental innovation**

Digitalisation: Incumbent finance adding digital technology to legacy services

Start-up technology companies

- Using technology to introduce new financial services
- Finance designed from the ground-up (e.g., cryptocurrencies)
- **Disruptive innovation**

FinTech: Agile, start-up technology companies developing new forms of finance from the ground-up

New finance through technology

Giant technology companies

- Use current technology dominance to move into financial services
- To streamline technology process and lock in users
  - (e.g., Apple Pay, AliPay)
- Leverage **positive network externalities**
- Leverage **customer data**

TechFin: Big Tech companies moving into finance

Financial Technology: **Definitions**

- Digitalisation:
  - Using digital technology to automate a traditional financial service (**incremental innovation**)
  - E.g., adding a new banking app to access legacy back-end systems
  - Key institutions: a traditional bank (e.g., HSBC)
- FinTech:
  - Using technology to introduce new financial services designed from the group up (**disruptive innovation**)
  - E.g., Cryptocurrency and decentralized payments system / peer-to-peer loans and payments
  - Key institutions: start-up tech companies
- TechFin:
  - Leveraging current position as dominant technology platform to overlay financial services (**disruptive**)
  - E.g., Apple offering ApplePay, Alibaba offering AliPay, Facebook hoping to introduce Libra cryptocurrency
  - Key institutions: big tech companies. **Rationale:** to lock-in users and collect more data

Note: There is nothing stopping a traditional banking firm, or Big Tech company, introducing new disruptive FinTech through spin-outs (and this trend may start to emerge).

No consensus on the definitions

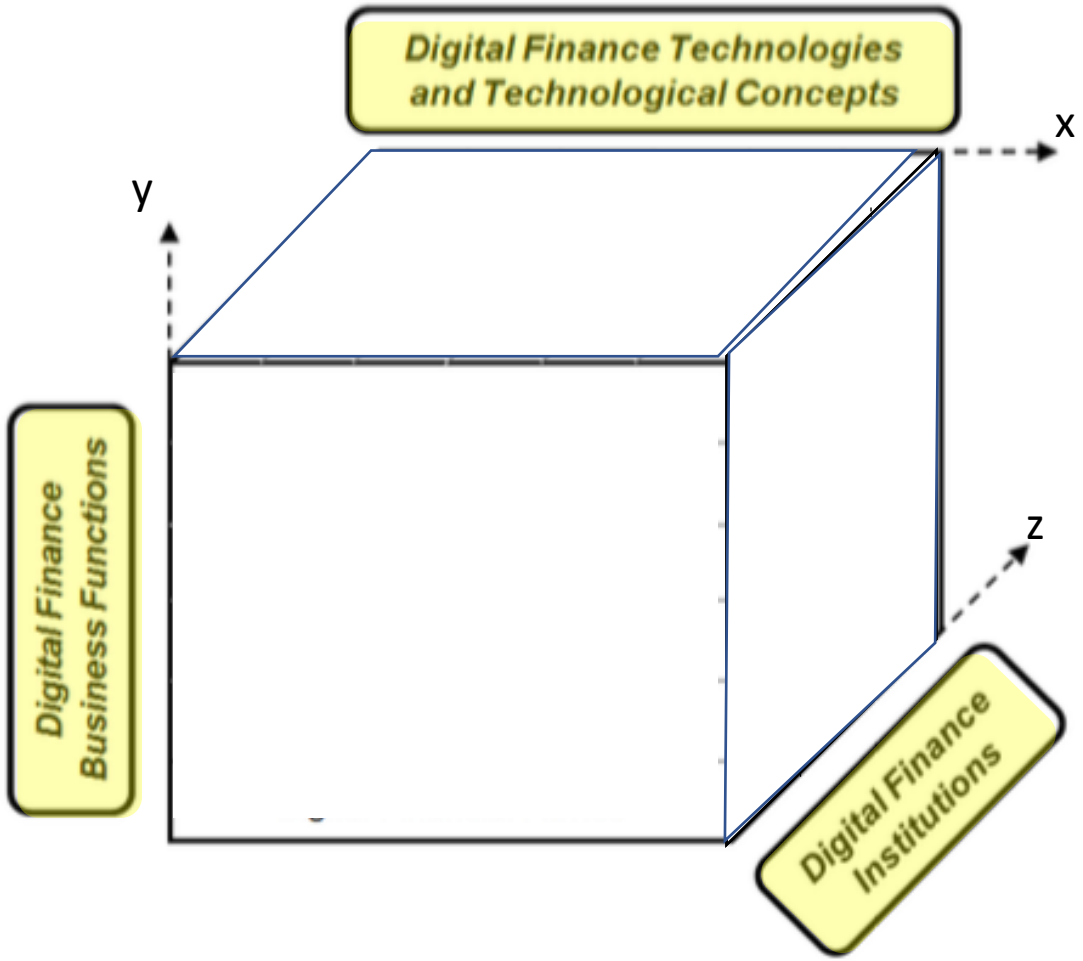
- **Digitalisation** of finance, **FinTech**, and **TechFin** have no universally recognised definitions
- Often, “FinTech” is used to describe all three cases
  - A “buzz” word – everyone wants to be “doing” FinTech
- Alternatively, “FinTech” is used to describe the union of what we call FinTech/TechFin
  - New financial technology developed by technology companies, rather than traditional finance firms
- By teasing apart the definitions, we begin to better understand
  - The main players
  - The drivers behind the technology
  - What makes a success
  - What the future may hold

Defining TechFin

- TechFin is the least well-defined, and is not used consistently. Where does it come from?
- **Jan 7 2016,** Chris Skinner (independent financial analyst/commentator)
  - Classification based on **innovator** (FinTech) vs **incumbent** (TechFin). *"A bank is a Techfin firm"*
  - This ignores the Big Tech companies (would they be FinTech?)
- **26 Jul 2016**, Ryan Shea, Thomson Reuters
  - Classification based on **disruptive** (FinTech) vs **incremental** (TechFin) innovation
  - This ignores the Big Tech companies (would they be FinTech?)
- **May 2016**, Janos Barberis, Academic (Law) and FinTech specialist
  - **TechFins** *"characterised by their capacity to leverage the data gathered in their primary business into financial services"*
  - *This is closest to our preferred definition.*

http://www.digitalistmag.com/customer-experience/2016/01/07/fintech-or-techfin-03925833
https://blogs.thomsonreuters.com/financial-risk/fintech-innovation/fintech-versus-techfin-technology-offer-real-innovation-simply-improve/
http://www.theasianbanker.com/updates-and-articles/from-fintech-to-techfin:-data-is-the-new-oil

Digital finance cube

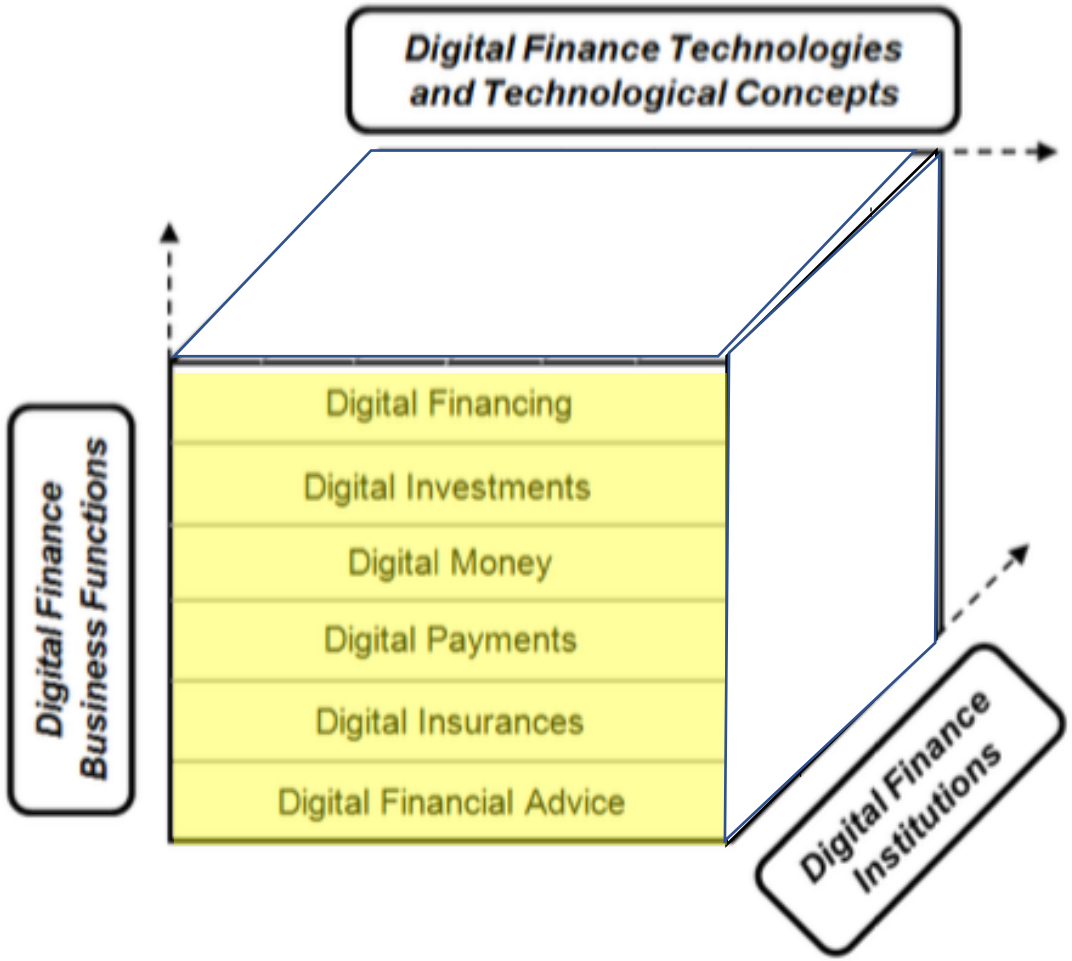


3-D space of:

- Technologies (x-axis)
- Finance functions (y-axis)
- Institutions (z-axis)

Gomber, Koch, and Siering (2017) Digital Finance and FinTech: Current Research and Future Research Directions, Journal of Business Economics, 87(5), July 2017, pp. 537-580. https://doi.org/10.1007/s11573-017-0852-x

Digital finance cube



Functions

- Financing
- Investments
- Money
- Payments
- Insurance
- Advice

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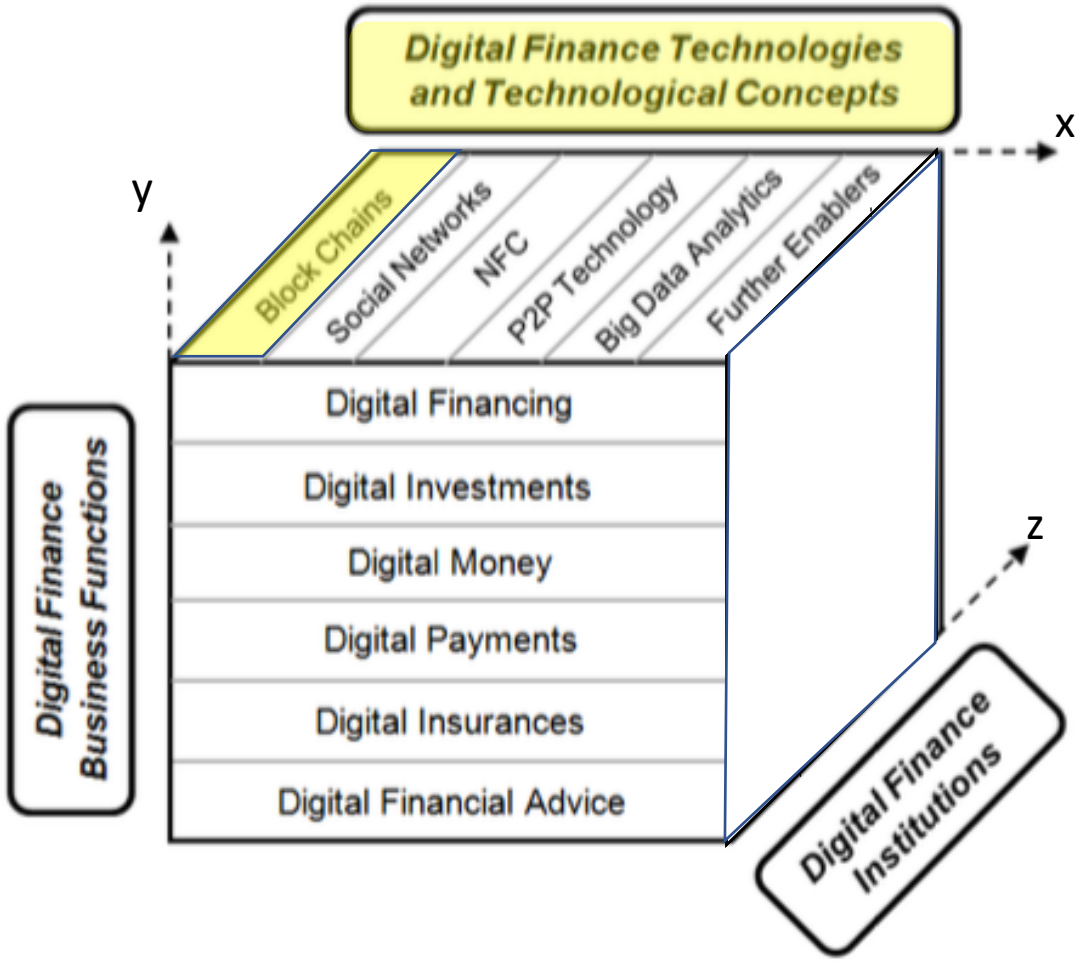

Blockchain: Ordered and timestamped distributed public ledger containing entire history of verified and valid transactions.

Cryptocurrencies,payments, e.g., Bitcoin

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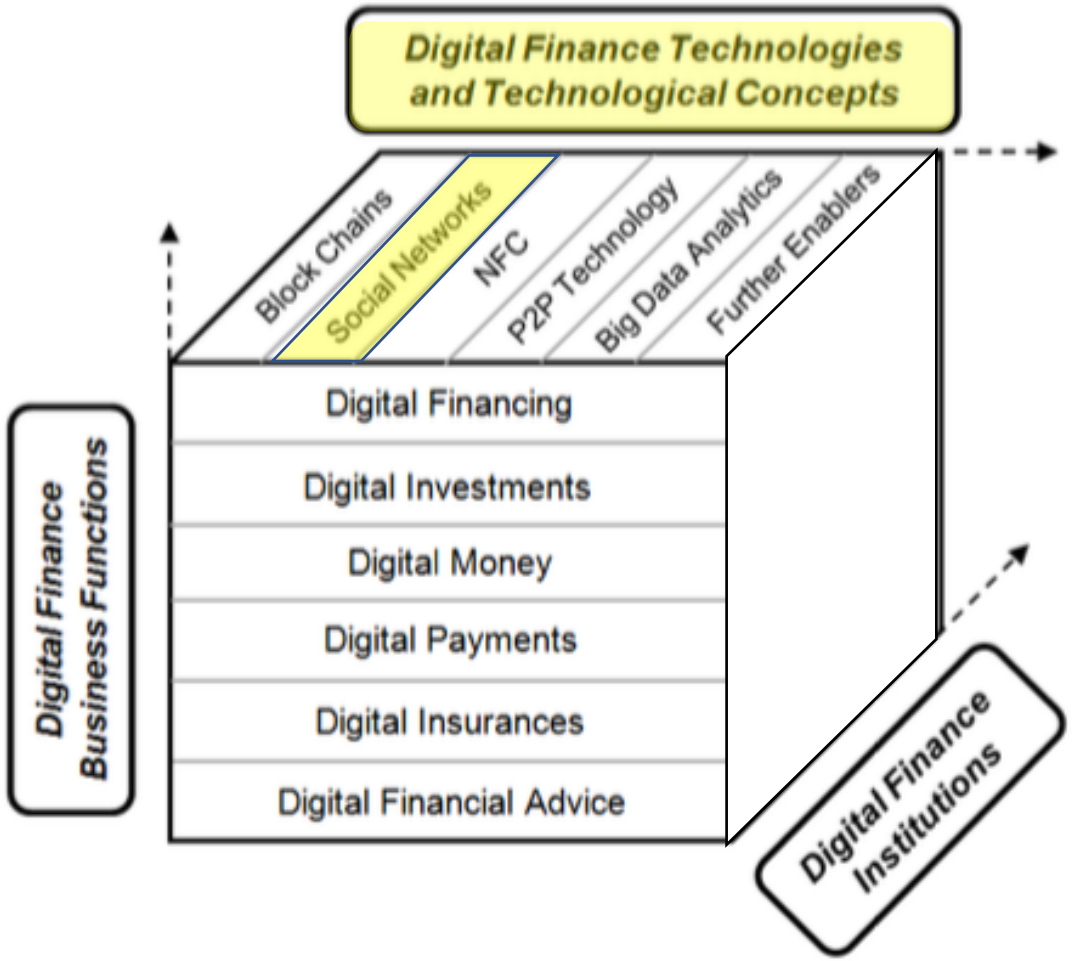

Social Networks: web-based services that allow individuals to construct (semi-) public profile, share connections with other users, view and traverse connections within the system.

Targeted sales and marketing, e.g., Facebook; Payments, e.g., WeChat Pay

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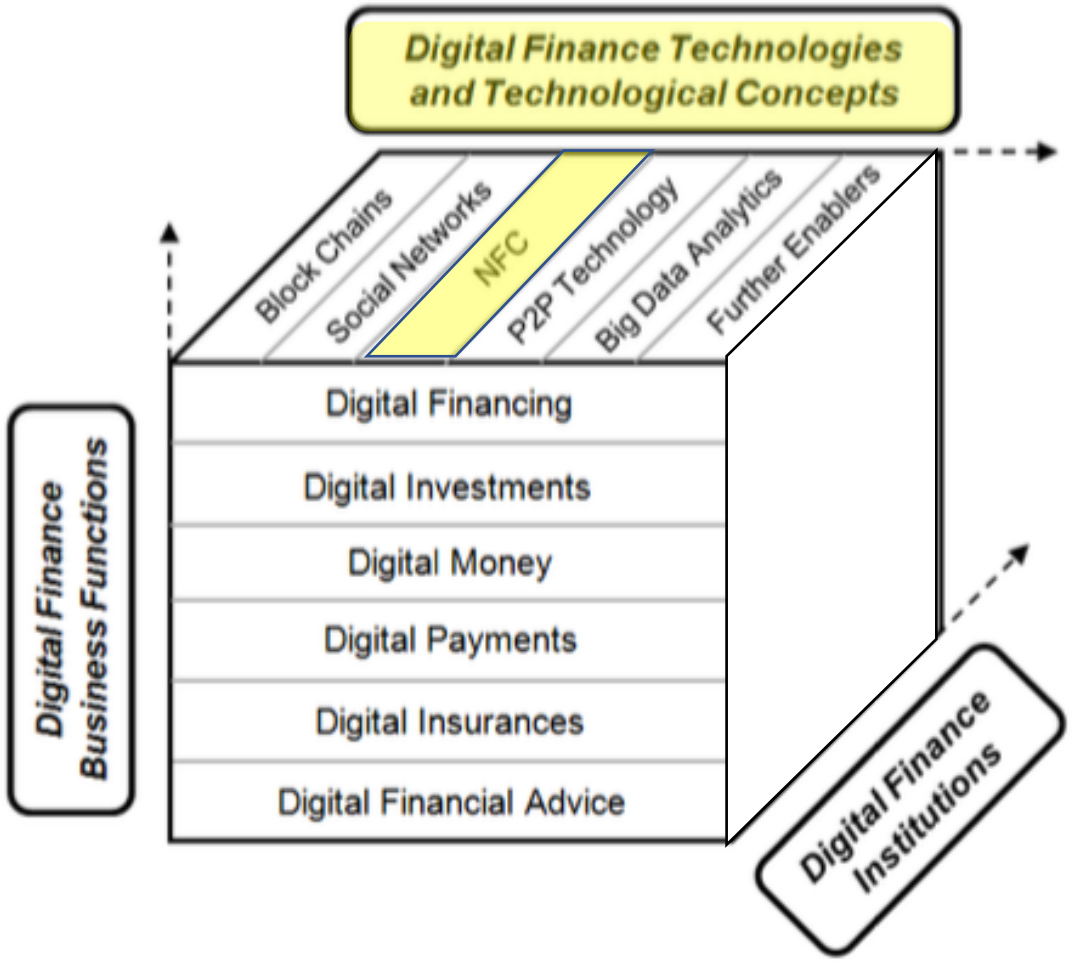

Near Field Communication: Short-range wireless point-to-point interconnection technology enabling two devices to communicate without further configuration steps, when brought close together. Max distance a few inches

E.g., Contactless smartphone payments (Samsung, Apple)

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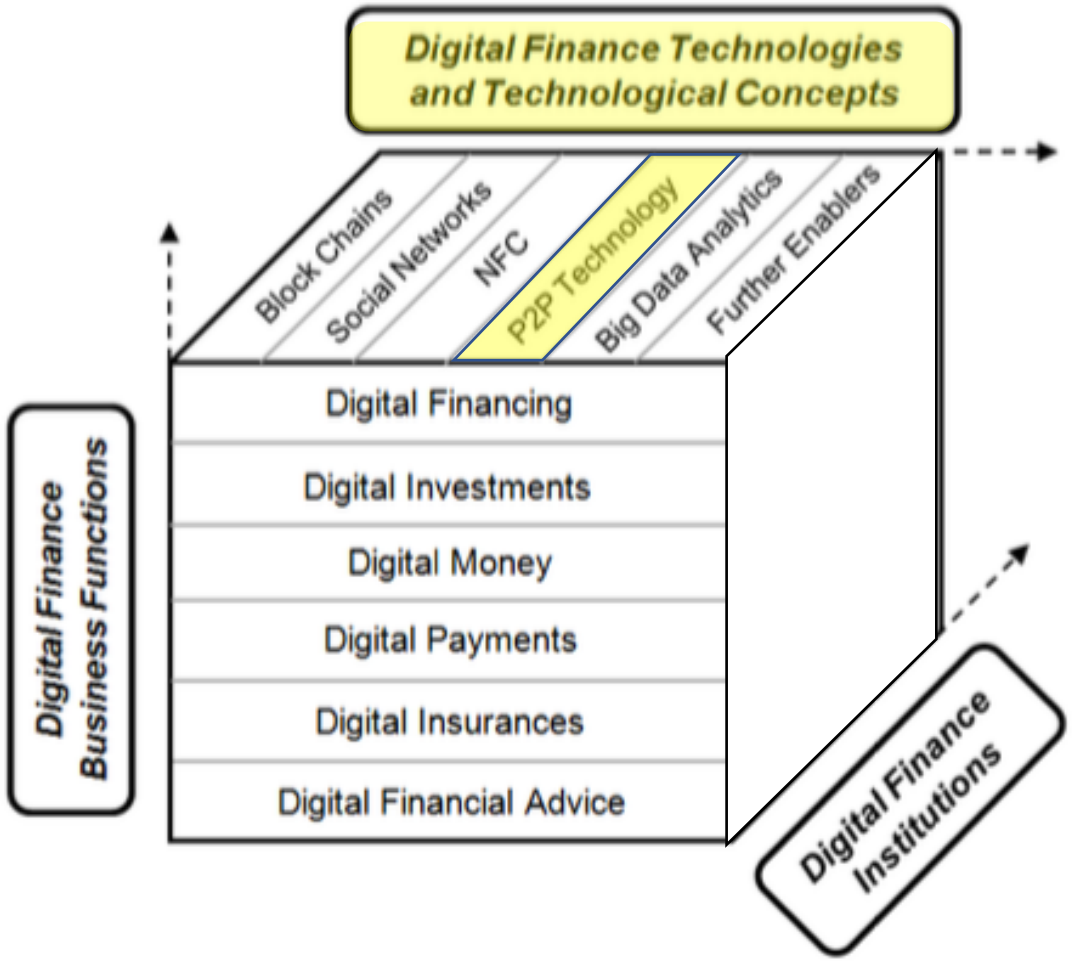

Peer-to-peer: self-organising system of equal, autonomous entities (peers, or nodes) which aims for the shared usage of distributed resources in a networked environment avoiding central services

E.g., Lending platforms (Zopa)

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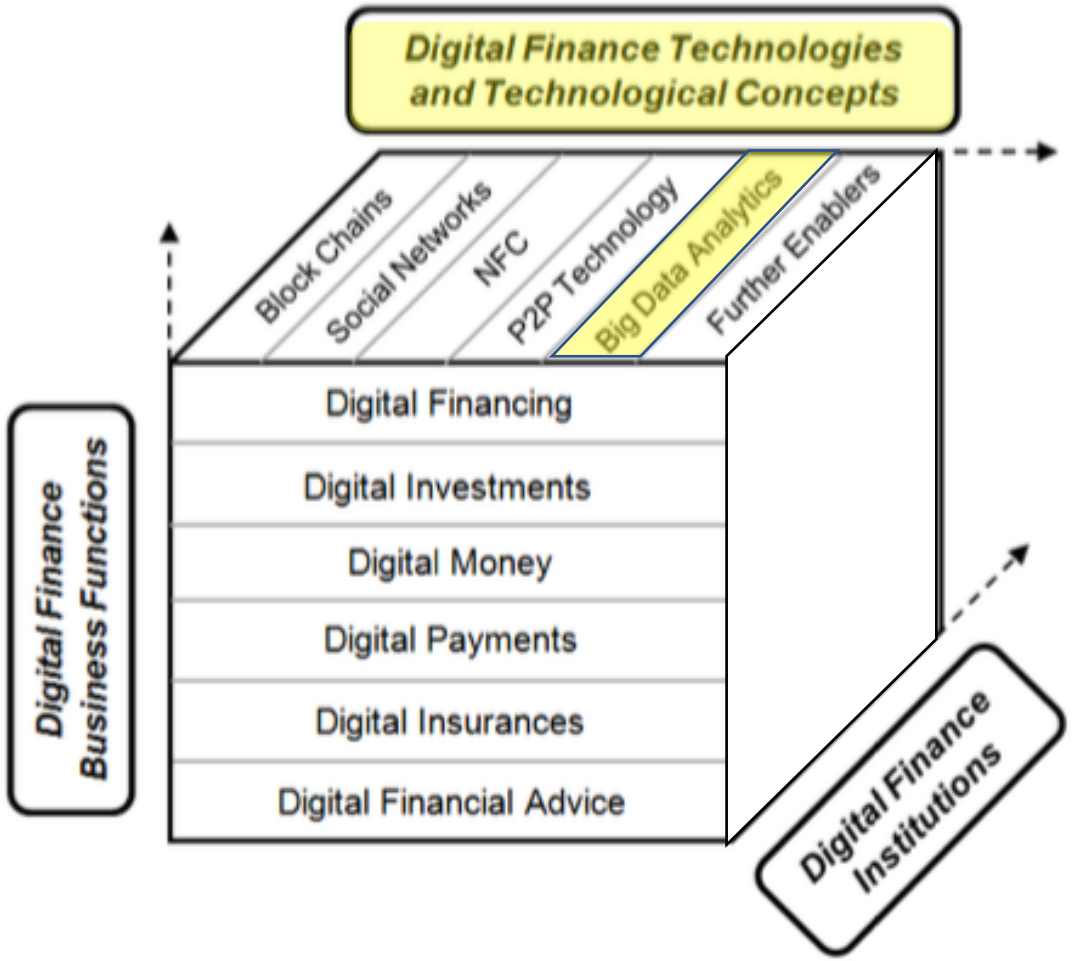

Big Data Analytics: characterised by enormous volume of data to be analysed, high processing velocity, and a variety of data sources to be taken in to account.

E.g., Real-time analytics for insurance (Aviva Drive app)

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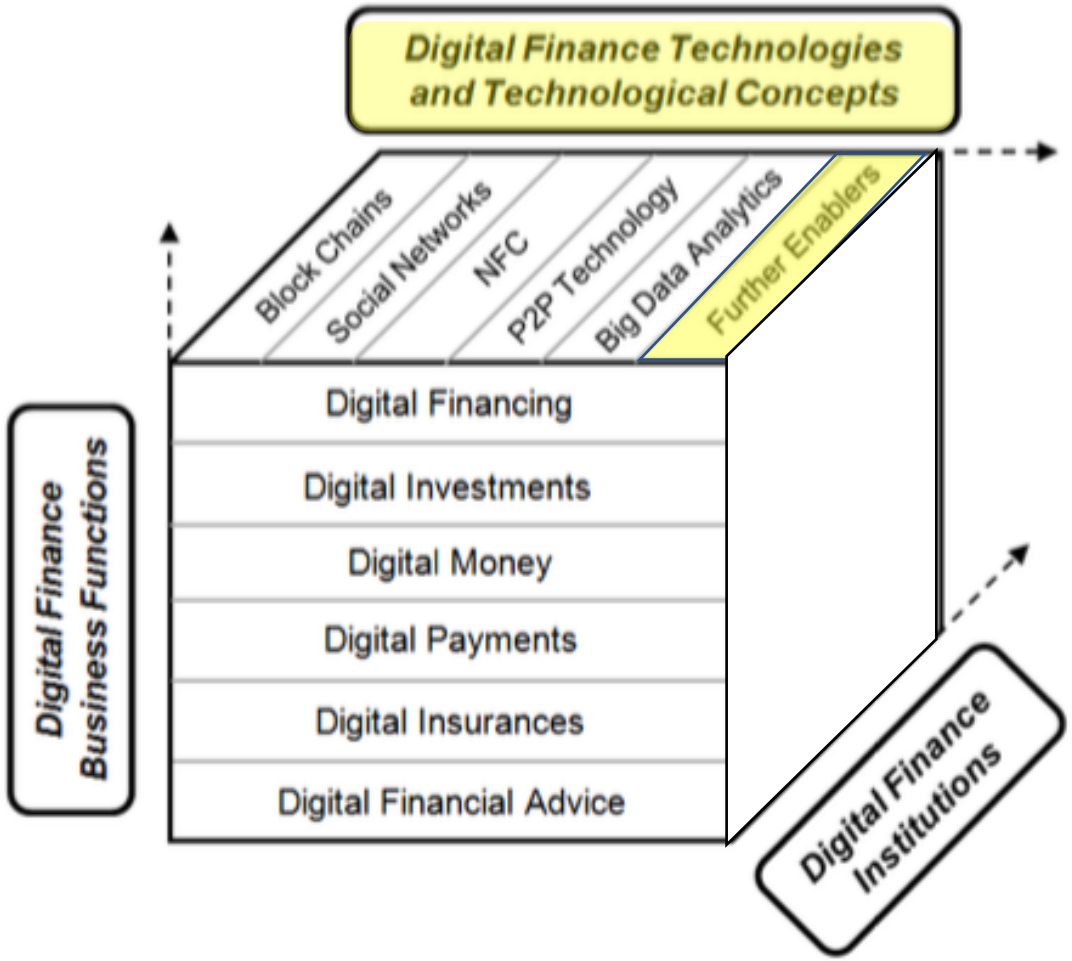

Further enablers: render possible or facilitate financial processes, e.g., mobile Internet, AI, worldwide connectivity, mobile devices, intuitive user interfaces, and security technologies

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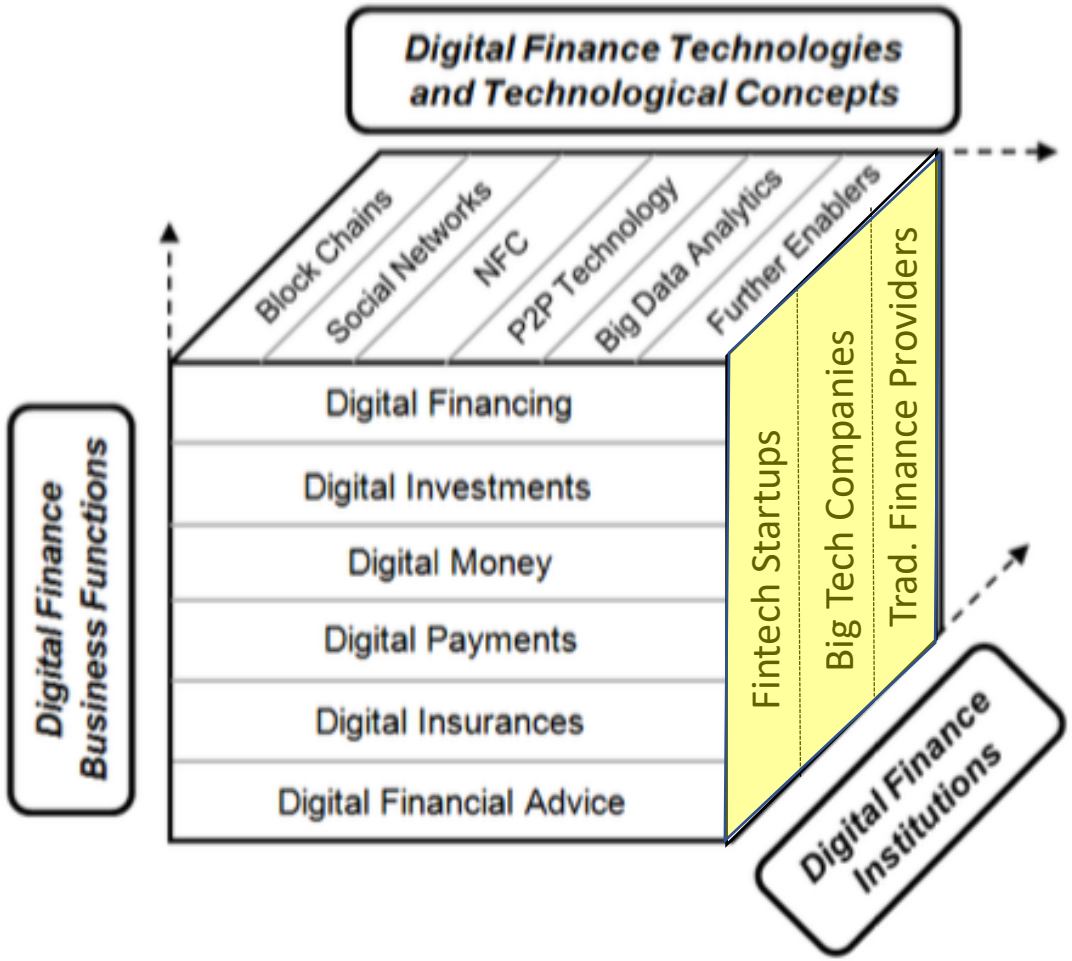

Institutions

- Fintech startups
- Big Tech (e.g., Google, Apple)
- Trad finance (e.g., Banks, Insurance)

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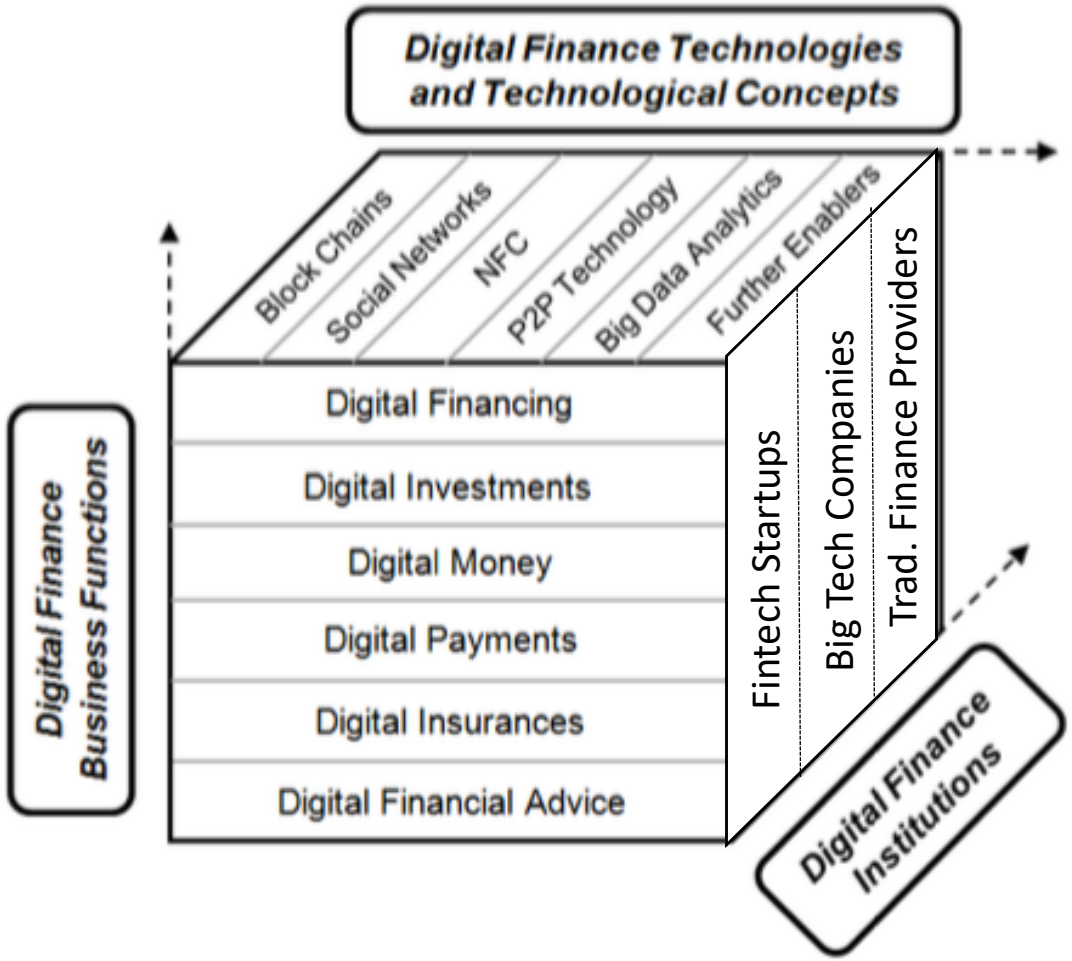


The financial technology space: financial functions, technologies, and institutions

Financial Regulation

- **Financial regulation** – Authority (government/regulatory body) rules or directives to control and manage services
  - To protect actors (e.g., FSCS savings and deposit protection),
  - To improve efficiency (e.g., monopoly regulation/antitrust laws),
  - To reduce risk (e.g., ring-fencing retail banking from other banking activities)
- Help to build **trust**
- FinTech/TechFin is disruptive, and so therefore may not initially be regulated

Who is using FinTech / TechFin?

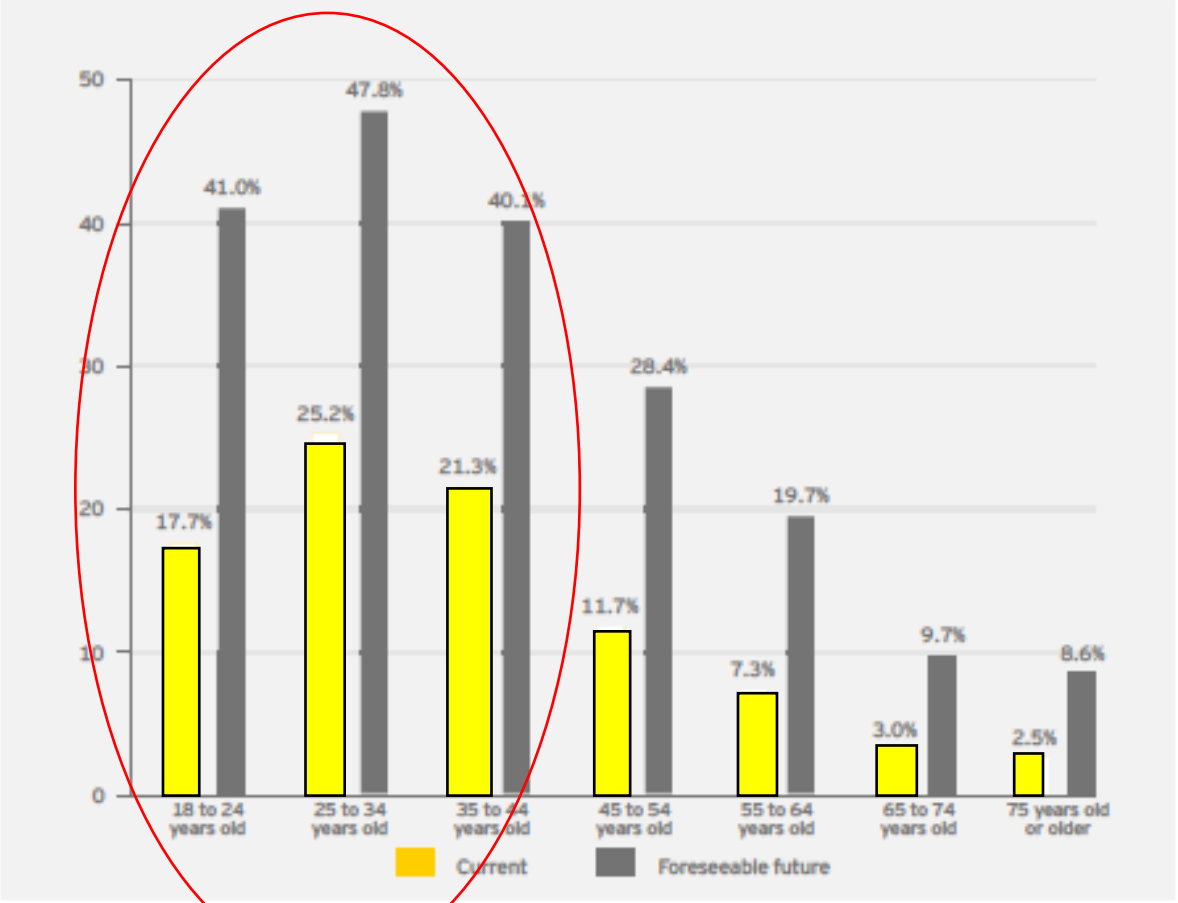
Finding a customer base

FinTech/TechFin Users

Australia, Canada, Hong Kong, Singapore, UK, US

- **Tend to be young**
- More than 25% of 25-34 year olds used 2 or more FinTech products in last 6 months

Figure 4: Use of FinTech users by age group



Base: 1,485 respondents who indicated using two or more FinTech products
EY FinTech Adoption Index 2015

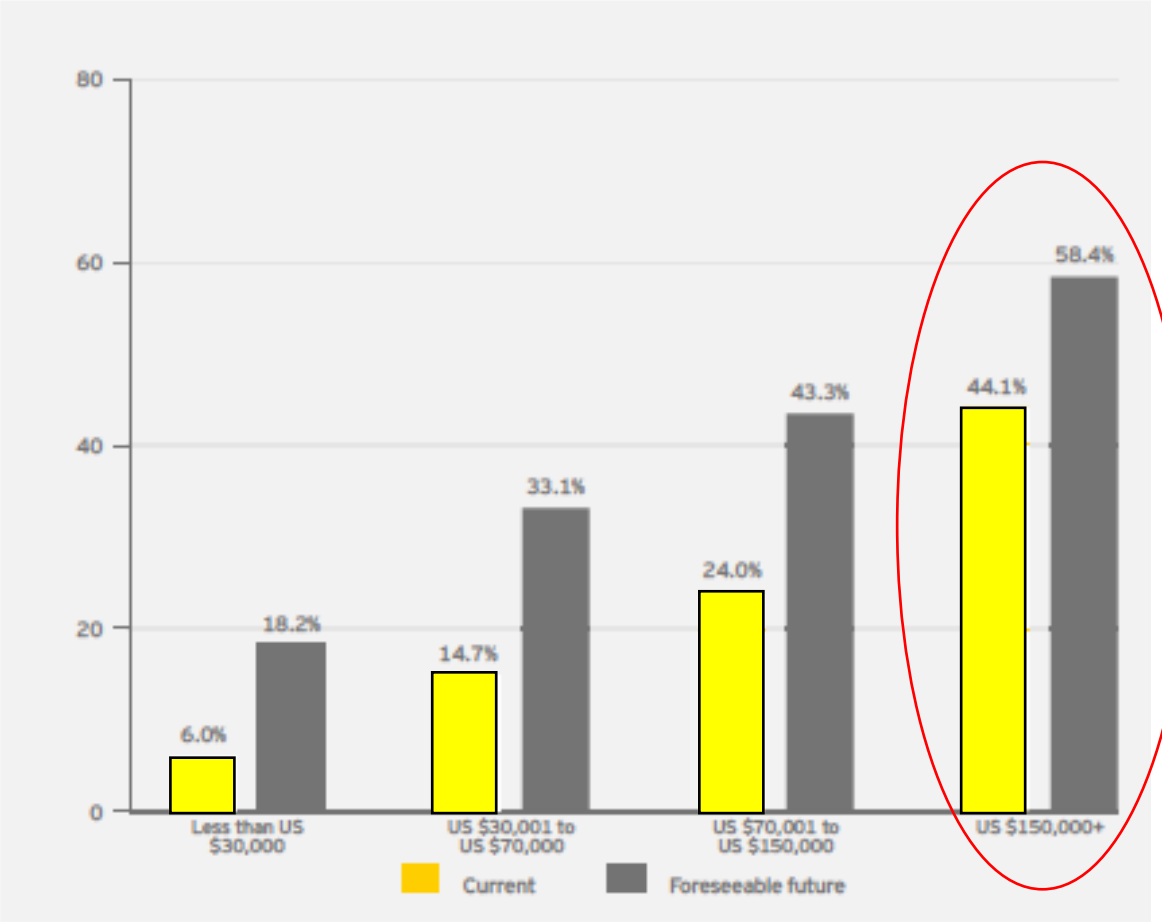
I. Gulamhuseinwala, T. Bull, S. Lewis, FinTech is gaining traction and young, high-income users are the early adopters. Journal of Financial Perspectives, Winter 2015: FinTech, pp. 16-23.

FinTech/TechFin Users

Australia, Canada, Hong Kong, Singapore, UK, US

- **Tend to be wealthy**
- More than 44% uptake in users earning more than $150,000 USD/year

Figure 5: Profile of FinTech users by income group



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~~FinTech/TechFin~~ Users

Australia, Canada, Hong Kong, Singapore, UK, US

Is there a bias in these results?

Figure 4: Use of FinTech users by age group

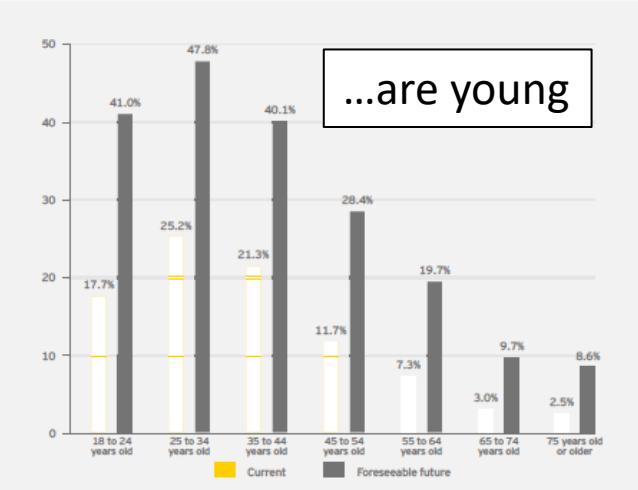

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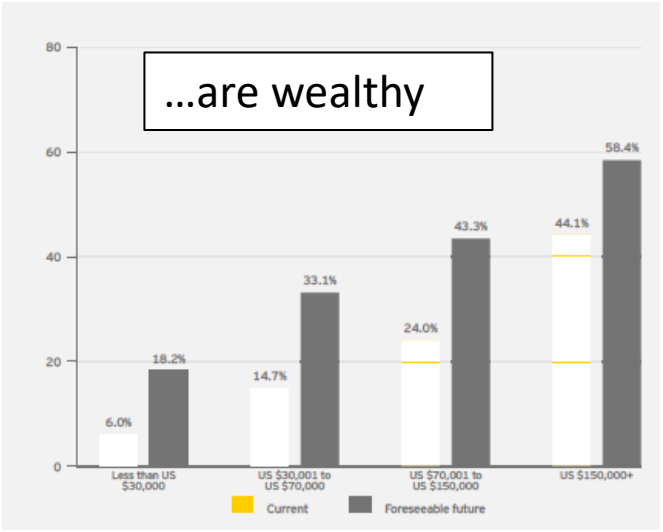
Figure 5: Profile of FinTech users by income group



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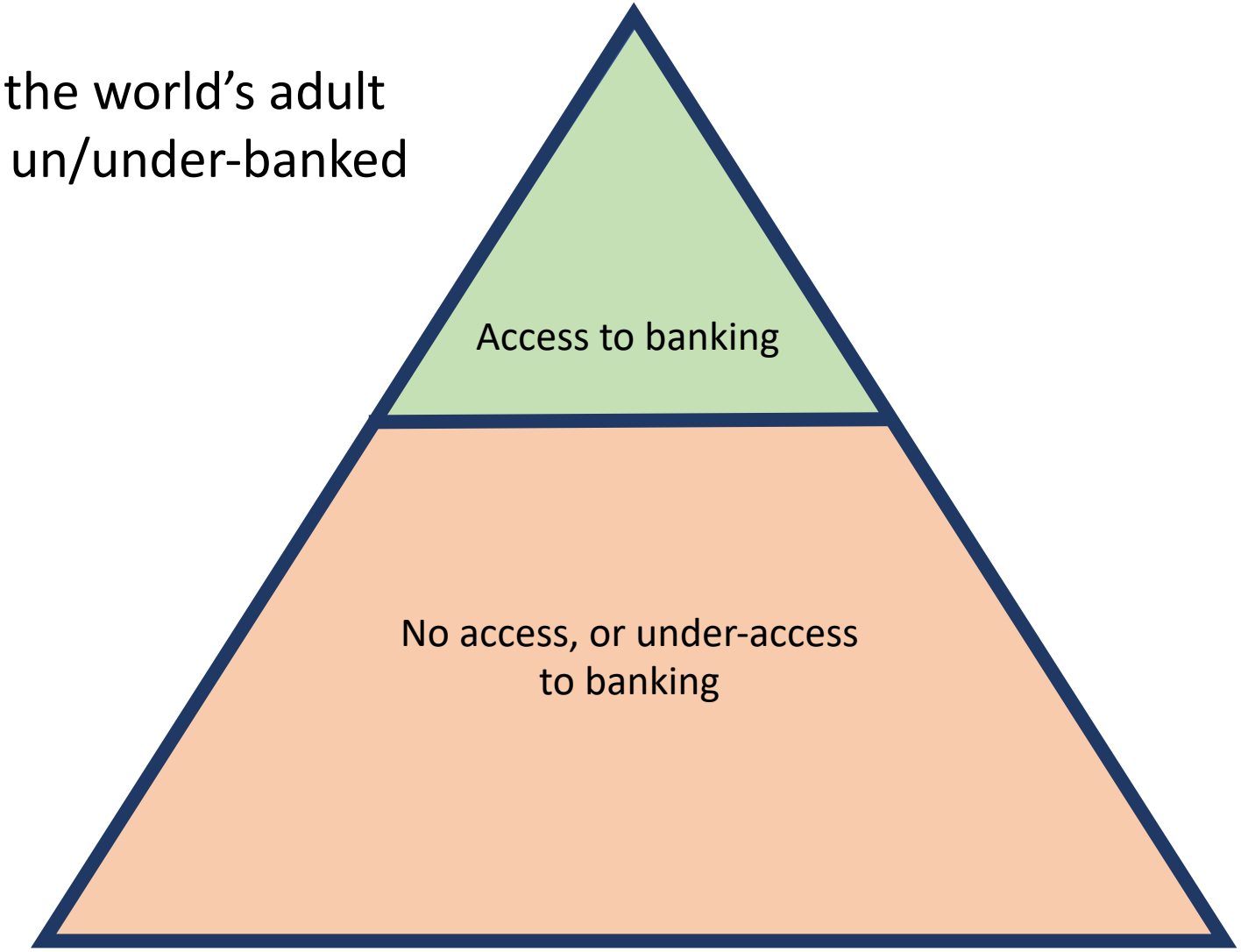
Almost 70% of the world's adult population are un/under-banked



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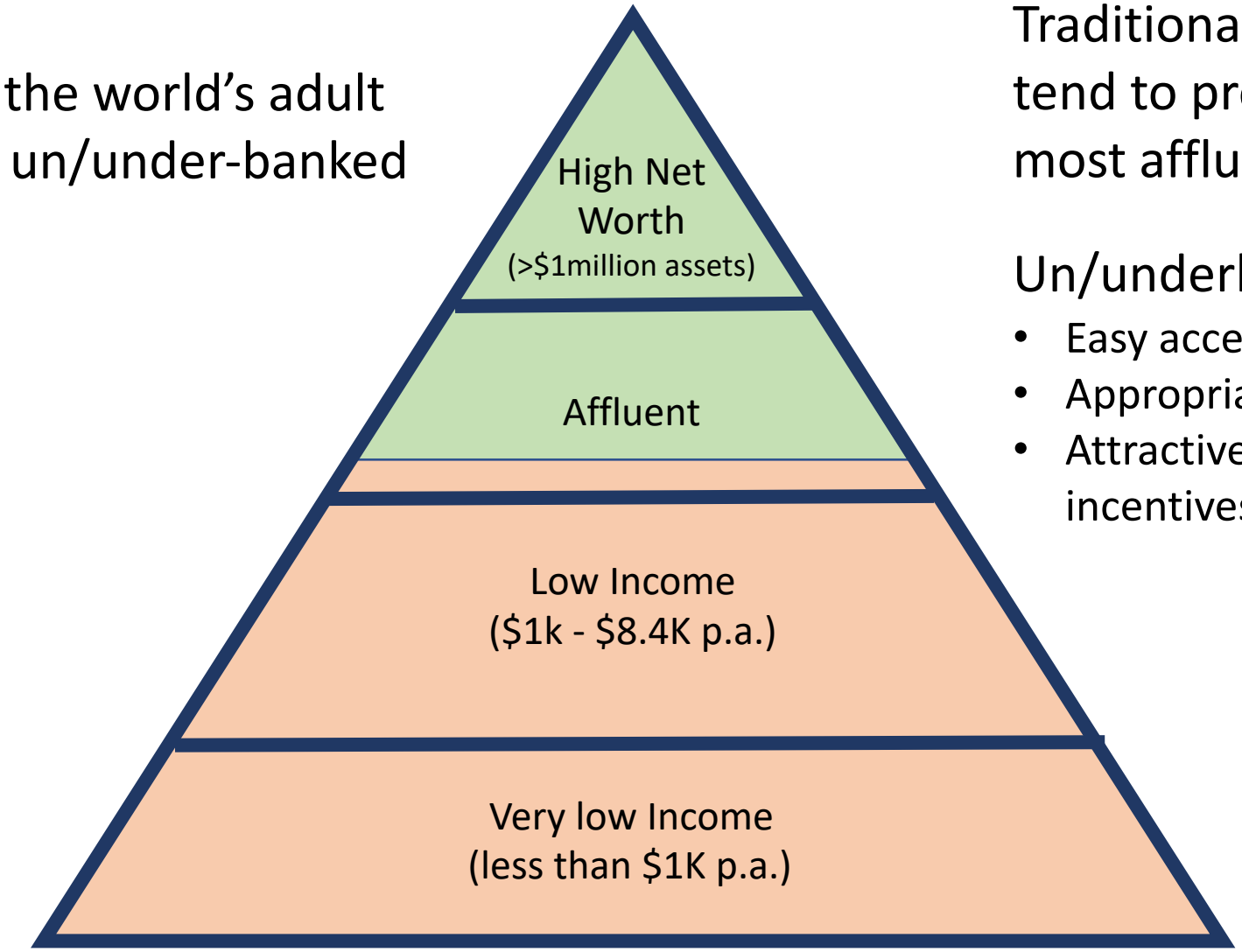
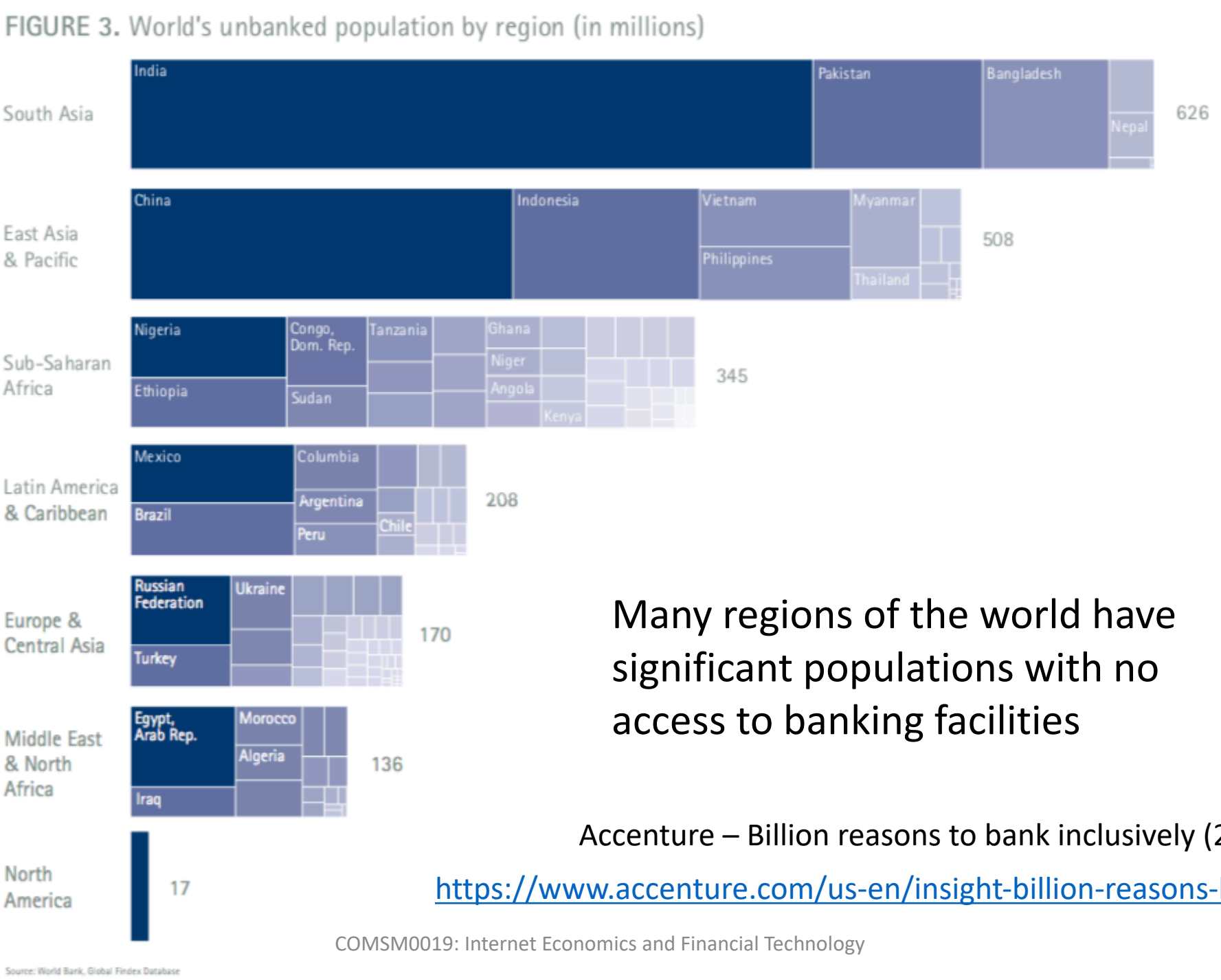


3.5 billion potential customers currently un/under banked

Traditional banking services tend to provide for the world's most affluent

Un/underbanked need:

- Easy access
- Appropriate products
- Attractive to use (low costs and incentives)



Many regions of the world have significant populations with no access to banking facilities

Accenture – Billion reasons to bank inclusively (2015)

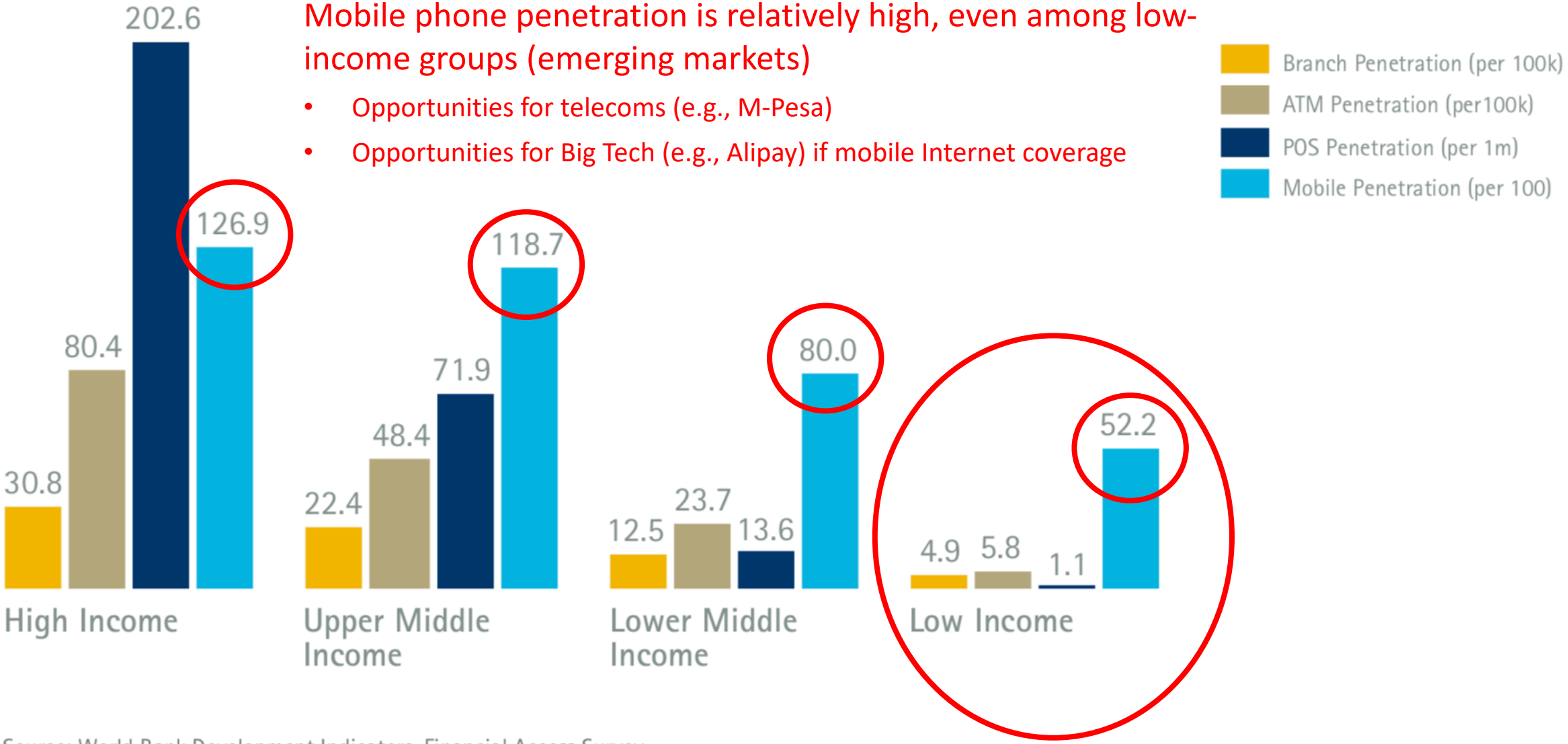
https://www.accenture.com/us-en/insight-billion-reasons-bank-inclusively

Accenture – Billion reasons to bank inclusively (2015)
https://www.accenture.com/us-en/insight-billion-reasons-bank-inclusively

FIGURE 7. Banking distribution infrastructure by income group

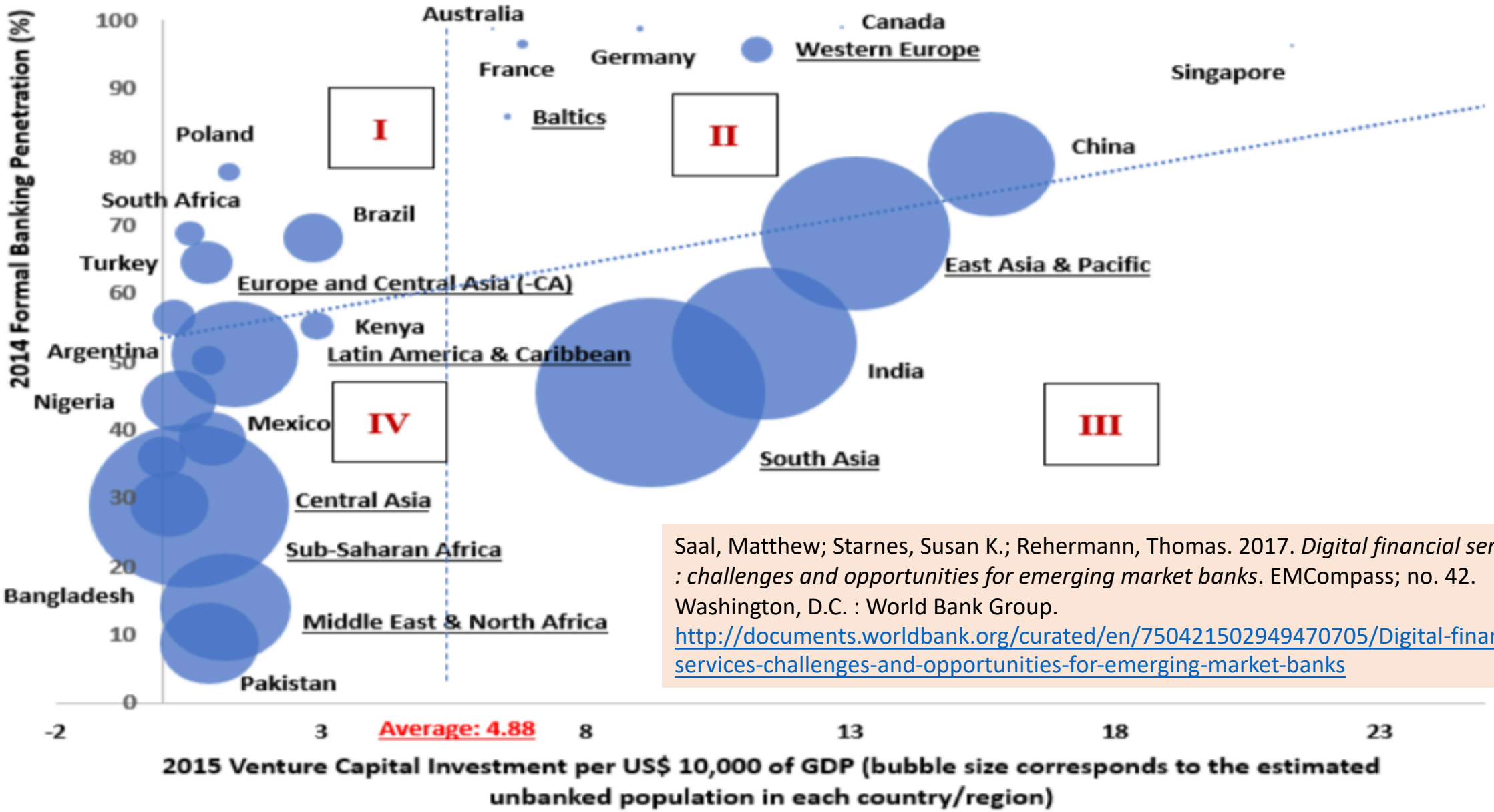
Mobile phone penetration is relatively high, even among low-income groups (emerging markets)

- Opportunities for telecoms (e.g., M-Pesa)
- Opportunities for Big Tech (e.g., Alipay) if mobile Internet coverage



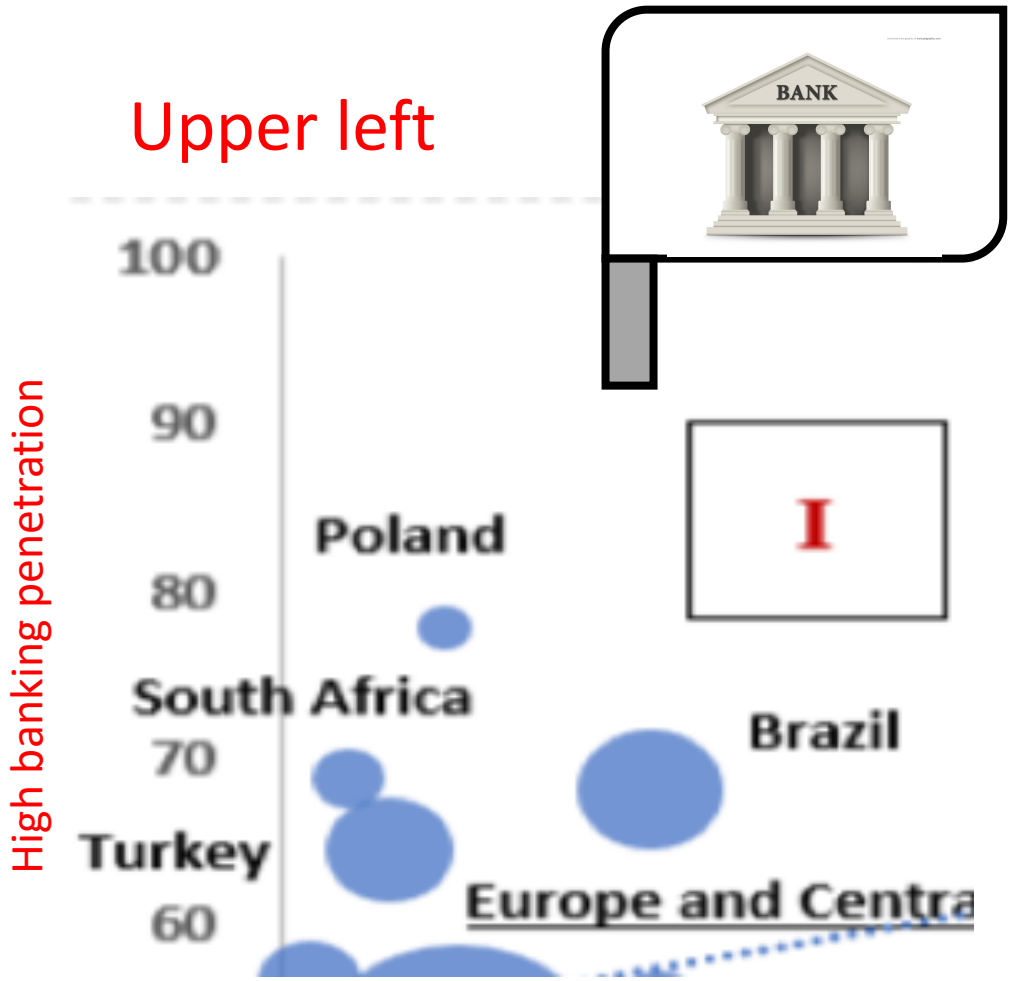
Source: World Bank Development Indicators. Financial Access Survey

Figure 1. The banking-fintech development space



Saal, Matthew; Starnes, Susan K.; Rehermann, Thomas. 2017. *Digital financial services : challenges and opportunities for emerging market banks*. EMCompass; no. 42. Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/750421502949470705/Digital-financial-services-challenges-and-opportunities-for-emerging-market-banks

Source: IFC staff calculations; World Development Indicators, The World Bank, 2016; Global Findex, The World Bank; PitchBook Data, Inc. 2016.



Upper-left: "Bank dominance"

- Traditional banking sector is already well established and likely to continue to dominate. In-sector competition may create positive dynamic of service innovation.
- Nascent local tech ecosystem means innovation may come from foreign FinTech.
- E.g., mBank in Poland – licensing of its mobile and online banking systems

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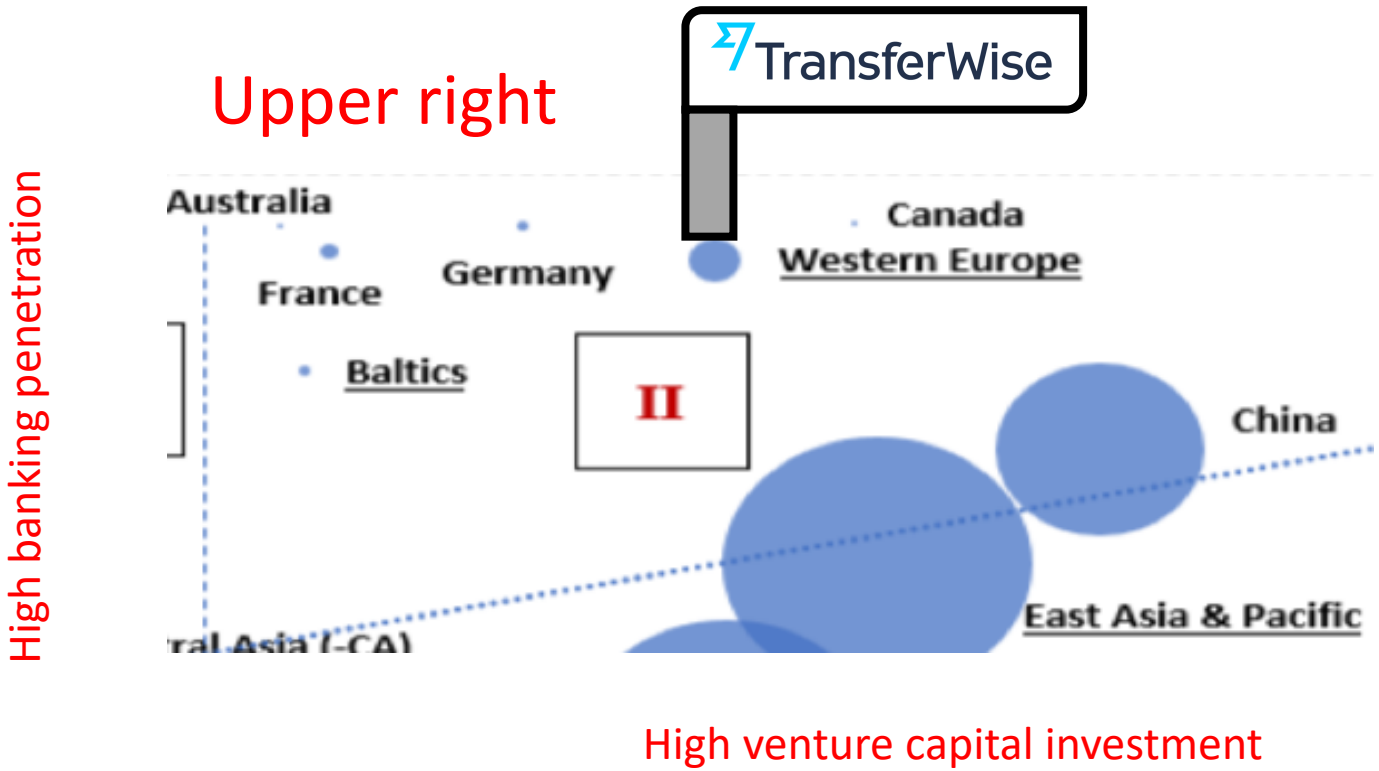

Upper Right: "Partnering"

- Banks well entrenched and serve most of population. Strong tech ecosystem supports innovations (to disrupt incumbents). Banks can leverage tech to compete.
- Some FinTechs will scale, others will partner with banks.
- June 2018 – TransferWise partner with France's 2nd largest bank
- 2019 – TransferWise announce partnership with Monzo

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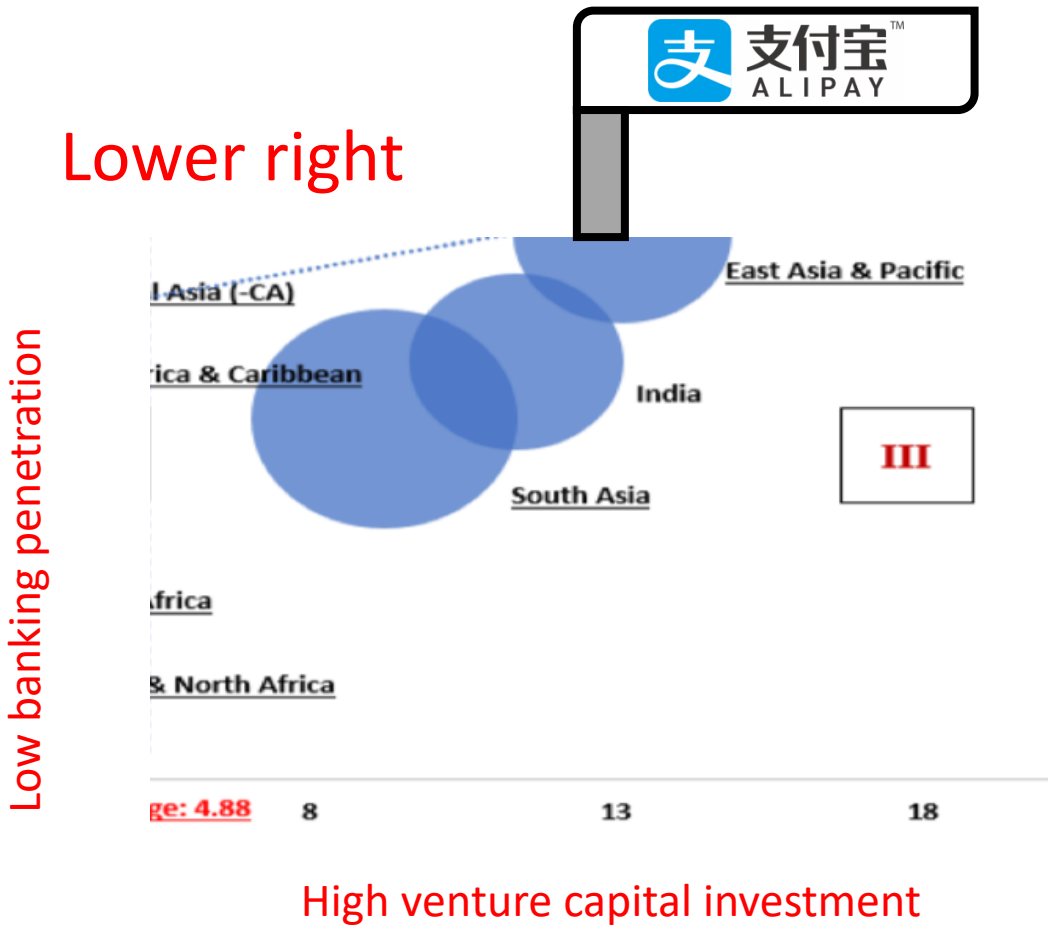

Lower Right: "Tech dominance"

Well-developed tech eco-system, while banks underserve. Opportunities for non-bank innovators.

Regulatory environment is key determinant:

- **China** has been relatively open to TechFin, Ant Financial has more than 340 million clients, 10 times more than served by any one of the world's largest banks. (Equivalent to 60% of bank accounts in China.)
- **India** on the other hand demands financial services conducted by licensed and regulated institutions.

Cross-sector convergence: tech companies obtain financial services licenses or partner with banks, while banks seek new functionality via partnership with FinTechs

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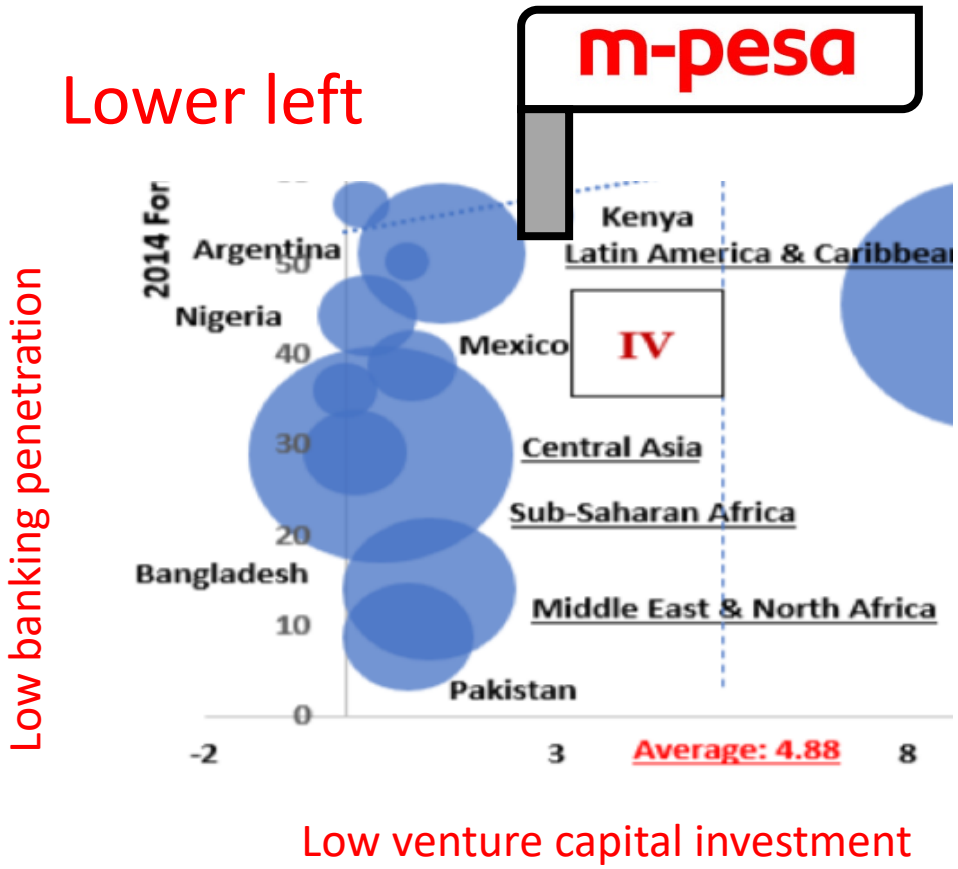

Lower-Left: "Race to the finish"

- Low levels of bank penetration and underdeveloped tech ecosystems.
- Telecom companies are the most significant local tech players – in some countries have led digitization of finance through mobile money products.
- Banks can catch up if they innovate before telecoms corner the market.

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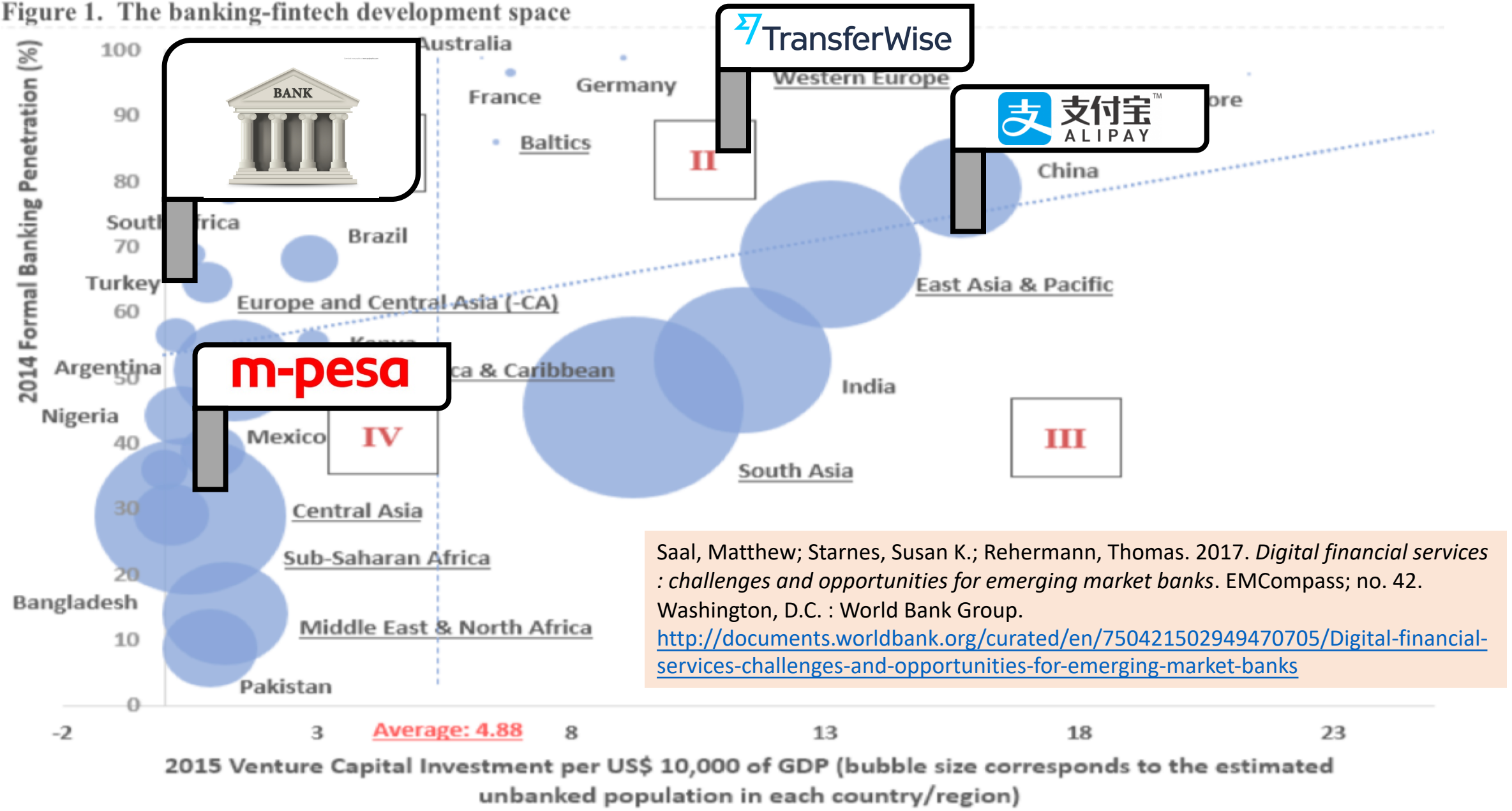
Figure 1. The banking-fintech development space



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