

Intro to Financial Technologies

4 key questions



Why Do We Need Banks?

In []:

What Is Information Governance?

In []:

What Is FinTech?

In []:

How Does FinTech Impact Banking?

In []:

Map

1. Information Governance in Banking
2. Adoption of Financial Technologies



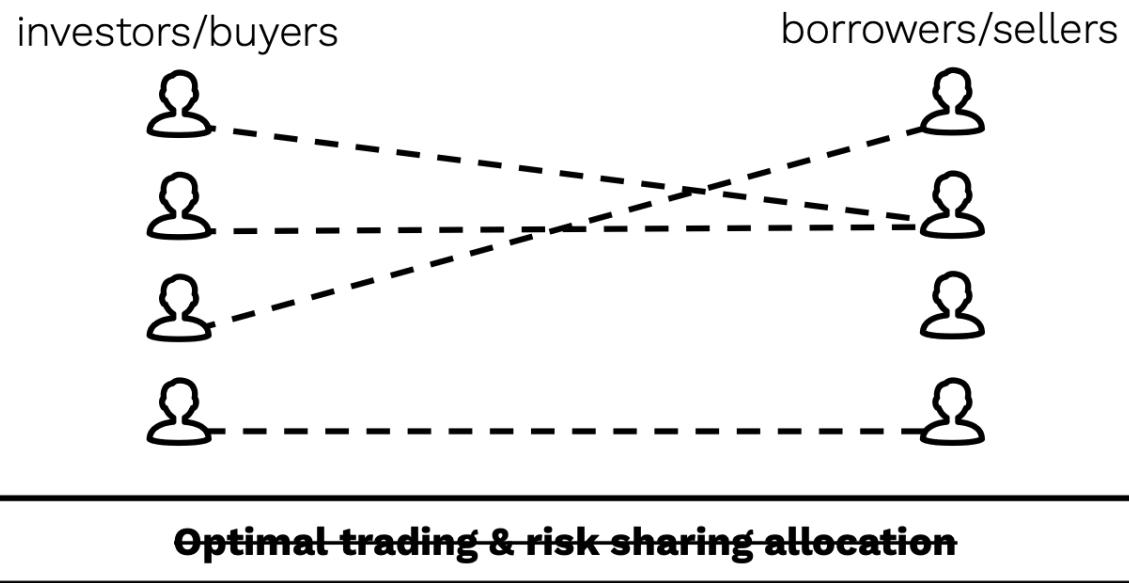
1. Information Governance in Banking

Origin Story



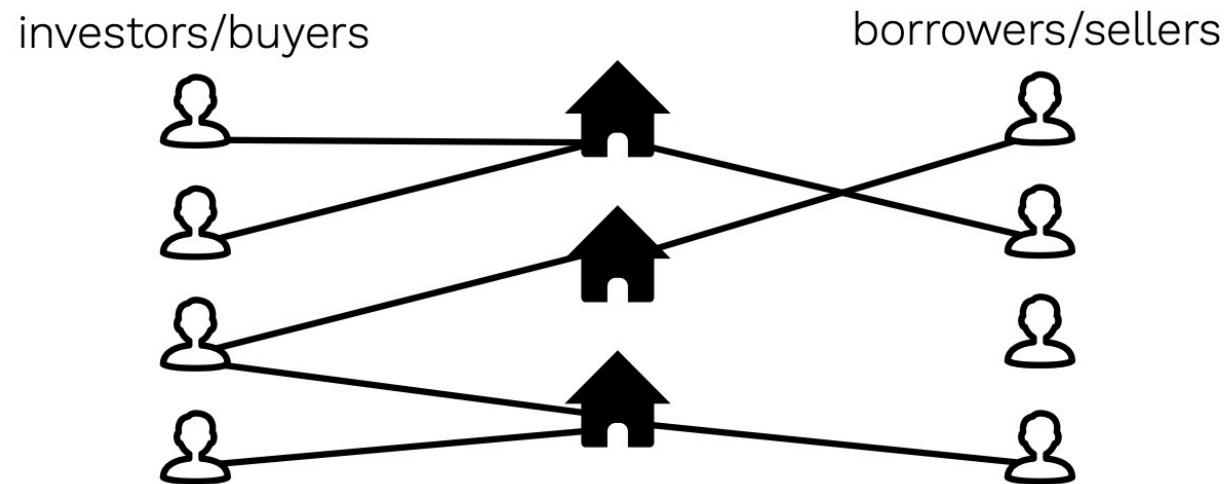
Economics goal: efficiently allocate risk and capital

Main barrier: information frictions



The Intermediation Solution

Banks' fundamental value proposition: solver of information frictions



Information frictions

Asymmetric information in credit

screening/monitoring problem to prevent **adverse selection** and **moral hazard**

- Better information **lowers transaction costs**, but creates **information rents** (Boot, 2000)
 - Banks **produce information** to improve their services (e.g., monitoring technology)
 - Banks **hoard information** to capture surplus and limit competition

Implications

- **Rate of information production** (De Marco and Petricone, 2024)
- **Consumer welfare** (prices, lockins, etc.) (Schenone, 2010)
- **Rationing** and de-risking (Holmstrom & Tirole, 1997)
- **Barriers to entry** (Bofondi and Gobbi, 2006)

Incomplete information in deposit

forecasting problem to determine **future states** of the world

- Banks create liquidity through **maturity transformation**
- Efficiency and stability relies on **information** about the future: withdrawals are highly sensitive to **perceptions of solvency**.

Implications

- **Bank runs and deposit insurance** (Diamond and Dybvig, 1983)
- **Lender-of-last-resort** (Diamond and Rajan, 2005)
- **Contagion and systemic risk** (Allen and Gale, 2000)
- **Bankruptcy cost**: Bank failures destroy accumulated information capital (Bernanke, 1983)

Confidential information in payments

privacy problem to match on sensitive information

- Information technologies exhibit strong **economies of scale and scope**.
- In presence of **sensitive information**, verification and matching services are prone to large **network effects**.

Implications

- Market power (Rochet and Tirole, 2003)
- Trust and digital adoption (Lee, McAndrews and Wang, 2020)
- Concentrated markets (Tirole, 2015)

Special Case: Illicit Activity (AML/CFT)

Superior information capacity bestows special public duties on banks

- **Monitoring delegation:** governments rely on bank data and reporting of **suspicious activities.**
 - **Screening:** Know-Your-Customer
 - **Monitoring:** Detect illicit transactions in real time.
 - **Safeguarding:** Balance confidentiality with mandatory disclosure obligations to authorities.

Implications

- **Compliance cost** with limited private benefits
- Potential exclusion effects (**de-risking**)



Summary table

Type	Problem	Economic Issue	Example	Market Implications
Asymmetric	Screening Monitoring	Adverse selection Moral hazard	Credit	↓ rationing ↑ information rents
Incomplete	Forecasting	Uncertainty	Deposit	↓ liquidity mismatch ↑ instability (bank runs)
Confidential	Privacy	Matching on sensitive data	Payments	↓ search & verification frictions ↑ market power (trust, network effects)

Special Case: Financial crime (AML/CFT)

- Bank's **superior information capacity** bestows special **public duties**: identifying, reporting, monitoring of **suspicious activities**
- **Compliance cost** with limited private benefits with potential exclusion effects (**de-risking**)

Information Governance Approach

Banking services are contracts whose scope and values are structurally bounded by specific information sets

Who can produce, access and control information defines how services can be offered - and ultimately shapes how well markets can function



Information Governance

Digitalization



The systematic **conversion of financial information** into **data**:

- **codified**
- **verifiable**
- **machine-readable data**

From **soft, relational knowledge** → **hard and transferable inputs** for economic exchange and supervision.



Digitalisation reshapes Information Governance

Digital Technologies & FinTech



Fundamentally: technologies are about **reducing cost**.

Digital technologies reduce information costs.

- **Artificial Intelligence**
- **Platforms**
- **Distributed Ledger Technology (DLT)**
- **Cloud / APIs / etc.**

When applied to financial functions such as lending, trading, or payments, these digital technologies give rise to **financial technologies (FinTech)** — innovations that reshape how financial services are produced and delivered.

FinTech = Digital Technology + Financial Function/Application



Artificial Intelligence

Modern AI (Machine Learning) is about **reducing the cost of prediction**. (Agrawal, Gans & Goldfarb, 2022)

prediction in Banking: **credit, liquidity management**, etc. (**forecasting, monitoring, screening**)

Key features

- **Data dependency**

Quantity & quality determine predictive power.

- **Application limits**

Not all problems are prediction problems (reasoning, causality, logic).

Not all prediction problems are ML problems (data scarcity → COVID-19).

Platforms

Platforms are digital infrastructures that **reduce the cost of search and matching** leveraging **private (often sensitive) data**. (Bergemann and Bonatti, 2024)

search and matching in Banking: **Payments, Investments**

Key features

- **Network effects and data**

More users → more data → better services → attracts more users. (Hagiu and Wright, 2023)

- **Multi-sidedness**

Different users, different prices: cross-subsidize and free services. (Rochet and Tirole, 2006)



Distributed Ledger Technology (DLT)

Note: Cryptography is about **verifiability without observability**: Ownership, actions or states can be publically proven without revealing underlying information.

DLT allow to **reduce the cost of verification** in public ledgers leveraging **crypto solution** and **mechanism design**. (Catalini and Gans, 2018)

Verification in Banking: Payments, Contingent Contracting

Key features

- **Elimination of confidential information**

Shifts the structure of information — what is public, private, and verifiable. (Roukny, 2022)

Removes the need for third party safeguarding

Prevents further auditing (identification, monitoring, etc.)

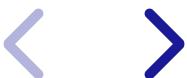
- **Decentralised Finance**

Increase in public ledgers expands self-executing contracting spaces (**smart contracts**)



Summary Table

Technology	Information Cost	How	Banking	Key Features
Modern AI	Prediction (Agrawal, Gans & Goldfarb, 2022)	Statistical learning	Credit Liquidity management	Data Computation
Digital Platforms	Searching & matching (Bergemann & Bonatti, 2024)	Private/sensitive data	Payments Investments	Network effects Multi-sidedness
DLT	Public verification (Catalini & Gans, 2018)	Cryptography Mechanism design	Payments Contingent contracting	Decentralisation Smart contracting



A New Digital Information Governance



AI & Platforms

1. Value of **alternative data** (e.g., digital footprint, device metadata, geolocalisation, webscraping etc.)

- ↑ the relevant information space
- ↑ **entry** of new actors with new data access (**fintech, bigtech**)

2. More power in **signal extraction** from **traditional financial data**

- ↑ efficiency of banking services
- ↑ intensity of incumbent competition/innovation
- ~ **entry limited** by in-house information production

DLT

1. **Verification** without **confidential information**

- ↓ **intermediation rent**
- ↓ **auditing power** on private information

2. Expansion of **public information space**

- ↑ **contestability, interoperability & innovation**



2. Adoption of Financial Technologies

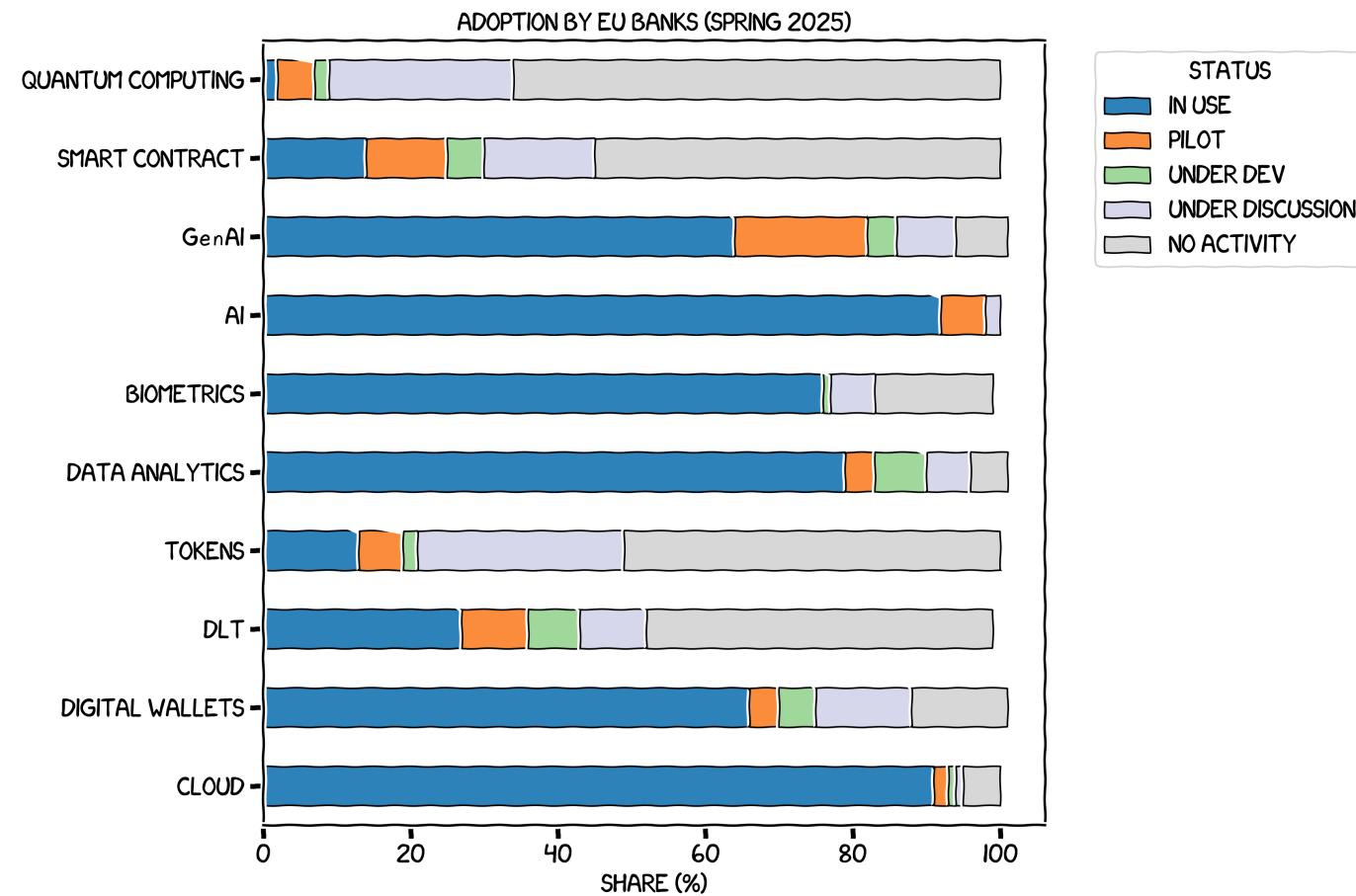
Banking



1. **Intensive margin:** AI adoption and computing power for inhouse data
2. **Extensive margin:** *Platformisation* by expanding data collection to alternative data
3. **Crypto resistance** so far (regulation, compliance, disintermediation threat)

Adoption of AI and data-related activities

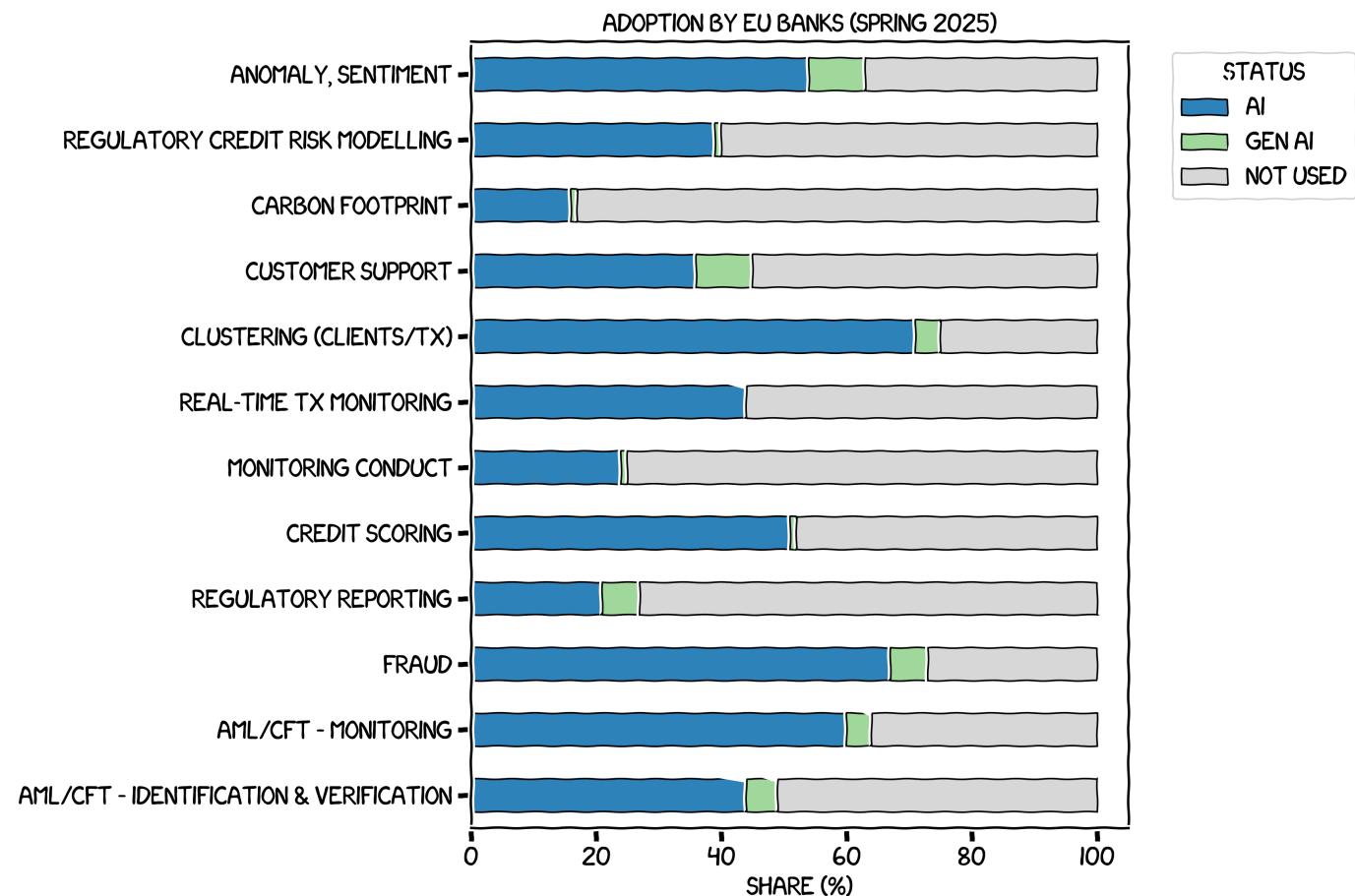
Limited adoption of DLT and applications



EBA - Risk Assessment Questionnaire - Spring 2025

Main use of AI

Monitoring, Screening and AML/Fraud

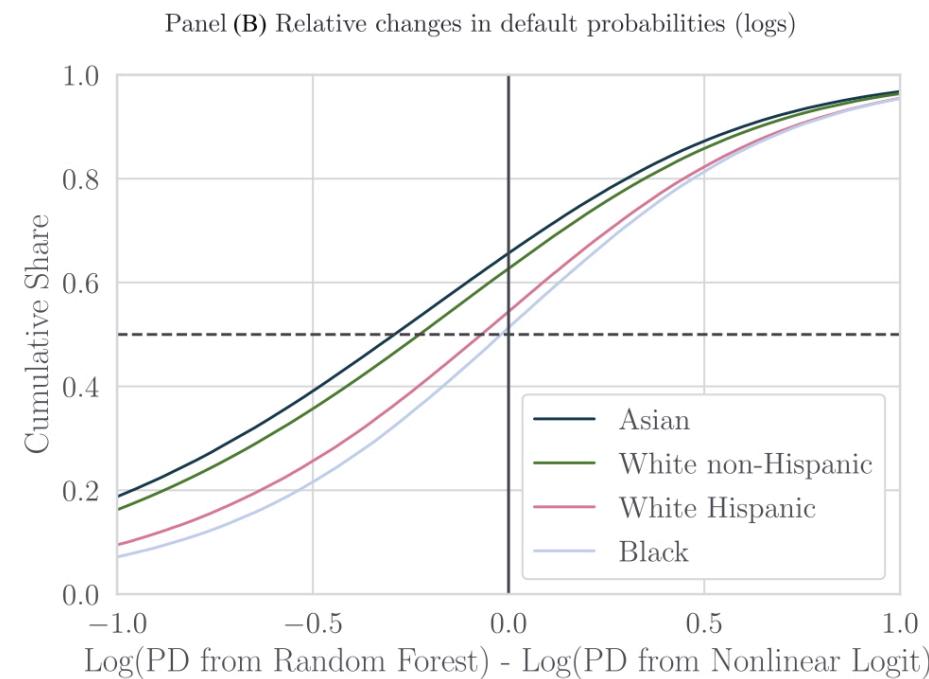


EBA - Risk Assessment Questionnaire - Spring 2025



Adoption at Intensive Margin

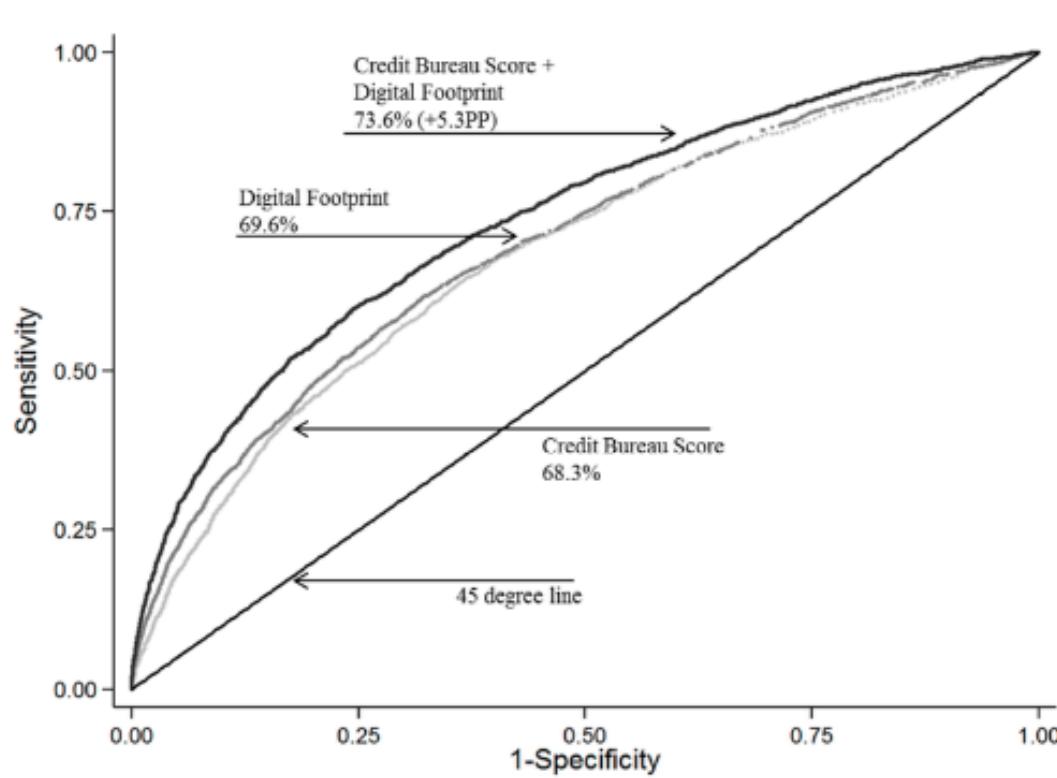
Transition to superior prediction technologies: unequal effects across the population



Fuster, A., Goldsmith-Pinkham, P., Ramadorai, T., & Walther, A. (2022). Predictably unequal? The effects of machine learning on credit markets. *The Journal of Finance*, 77(1),

Extensive Margin

Including alternative data: 1st order improvement in prediction power



Berg, T., Burg, V., Gombović, A., & Puri, M. (2020). On the rise of fintechs: Credit scoring using digital footprints. *The Review of Financial Studies*, 33(7), 2845-2897.

Platformisation

The rise of Super-Apps: transition to **multi-sided platform**



2024 Award of the Best Banking App in the World (SIA Partners)

The New Digital Landscape

Enter Fintech and Bigtech companies

FinTech = technology + financial services

BigTech = established tech platform firms expanding into finance (Amazon, Alphabet, Meta, etc.)



Fintech x Bigtech in credit

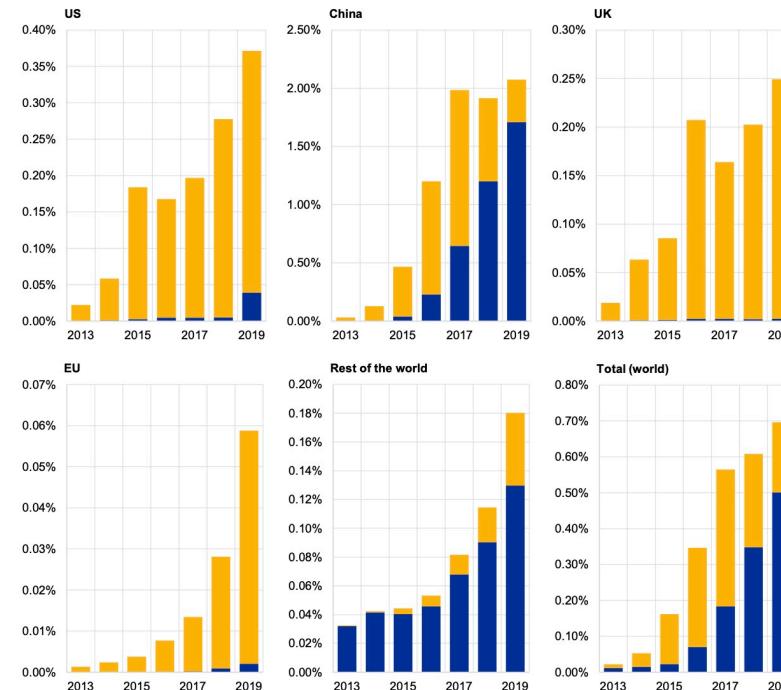
Continuous growth from low base

Main penetration from China

Share of fintech and big tech credit of total domestic lending by the financial sector

(percentages)

Big tech
Fintech



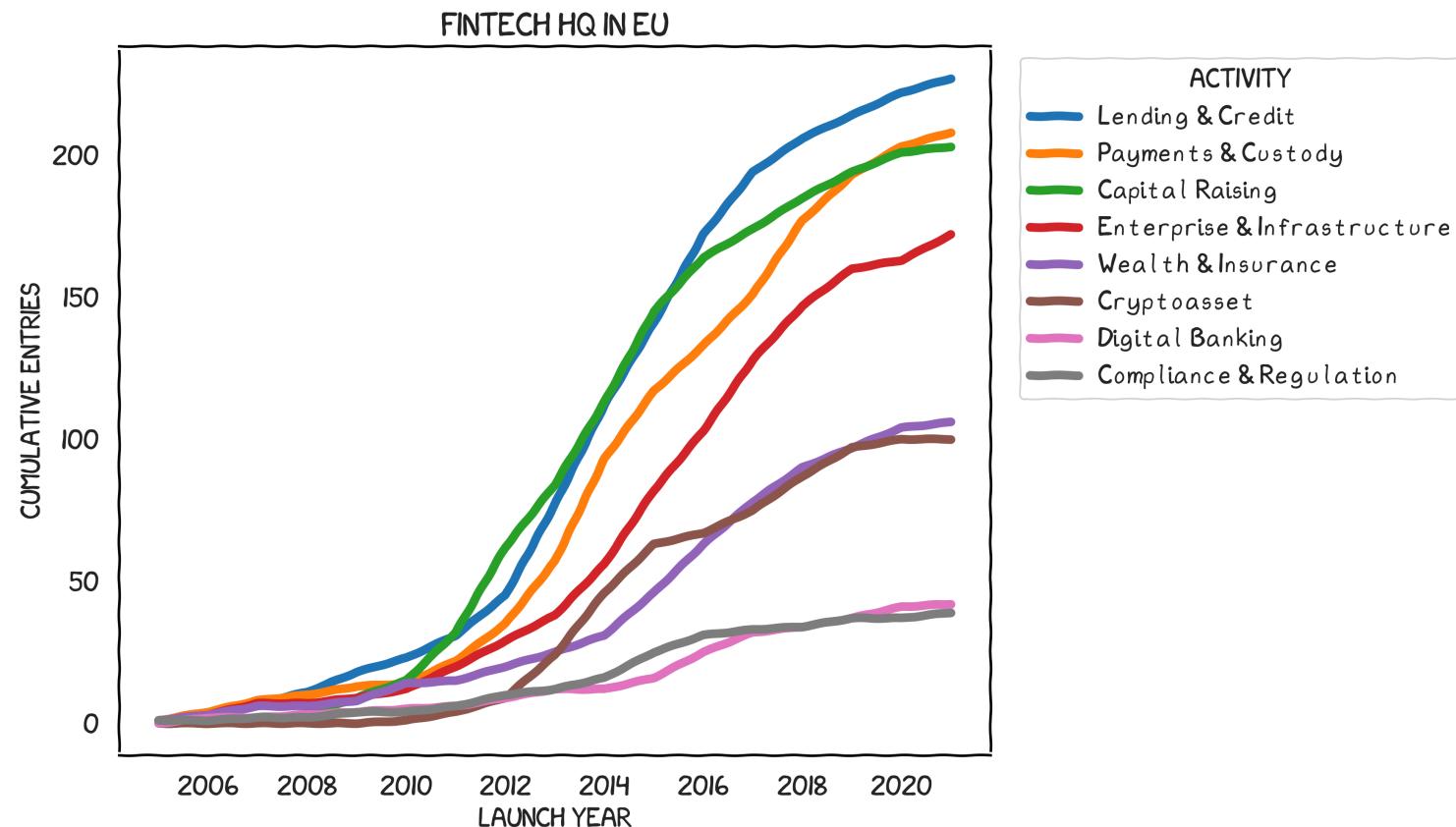
Cecchetti, S., Beck, T., Grothe, M., Kemp, M., Pelizzon, L., & Serrano, A. S. (2022). Will video kill the radio star?—Digitalisation and the future of banking. Reports of the Advisory



Fintech in EU

Exponential growth over the past decade

Mainly credit, payment, crowdfunding and back-end processes



Bigtech in EU

Main penetration point: Payments

2.1 Authorisation or registration of BigTech group companies and 'home' and 'host' presence

	Group	Subsidiary	Home MS	Host MS
E-Money Institutions	Alphabet (Google)	Google Payment Lithuania UAB	LT	12
	Meta Platforms (Facebook)	Facebook Payments International Limited	IE	14
	Amazon	Amazon Payment Europe SCA	LU	16
	Alibaba (Ant Group)	Alipay (Europe) Limited S.A.	LU	4
	Uber	Uber Payments B.V.	NL	10
	NTT Docomo	DOCOMO Digital Payment Services AG	LI*	3
Payment I	Alphabet (Google)	Google Payment Ireland Limited	IE	13
	Tencent	Wechat	NL	2
	Orange	Orange Bank	FR	3
Credit I	Rakuten	Rakuten Europe Bank S.A.	LU	13
	Tesla	Tesla Insurance Ltd (undertaking)	MT	1
	Vodafone	Vodafone Insurance Limited (undertaking)	MT	9
	Amazon	Amazon EU Sarl (intermediary)	LU	2
	Apple	Apple Distribution International (intermediary)	IE	2
	Orange	Orange Slovensko (Intermediary)	SK	/
Insurance				

Digital Impact on Business Models

Change in information governance implies a **modularisation of banking**.

Each service becomes a module that can be provided independently (Boot at el., 2021).

1. Unbundling of banking services

Banks face competition at each segment against heterogeneous agents

- **Payments:** PayPal, Wise
- **Lending:** Funding Circle, LendingClub
- **Deposits:** USDT, USDC (stablecoins)

2. Re-bundling of banking services (w/ or w/o other services)

Fintech/Bigtech build their offerings up

- **Payments → credit:** Cash App
- **E-commerce platforms → finance:** Amazon Lending, Shopify Capital
- **All-in-one app:** Alipay, WeChat Pay, Revolut
- **Telecom/BigTech cross-bundles:** Orange Bank (bundling mobile subscription with banking)



Digital Impact on Customer Segments: Niche vs Core

Digitalisation doesn't erode banks uniformly

1. **Niches**: Entry where banks underserve (high costs or weak offerings)

- **Remittances**: Wise, Remitly
- **SME services**: Tide, Holvi, Qonto
- **Gig-economy**: Chime, Monese
- **Buy-Now-Pay-Later**: Klarna, Affirm, Apple Pay Later, CashApp
- **Outliers**: Suitsme
 - "When banks say no, we say yes"
 - "Struggling to open an account after leaving prison? It's time to try an account that suits you!"

2. **Core**: Target banks' primary revenue pools.

- **Payments**: PayPal, Adyen, Apple Pay, Alipay
- **Deposits**: USDT, USDC
- **Bank accounts**: Revolut, N26
- **Credit**: Amazon Lending, Shopify Capital
- **Mortgages**: Rocket Mortgage
- **Asset management**: Robinhood, Trade Republic



Digitalisation Shows Promises and Pitfalls

Increased information value

- ↓ **information barriers**
 - extensive margin: ↑ **new entry**
 - intensive margin: ↑ **efficiency gains**
- ↑ **innovation and adoption**

But... breaking down banks' integrated services may

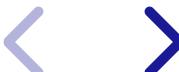
- Eliminate prior **synergies**
- Create **new costs** (e.g. double margins)
- Introduce **new sources of market power** (see later)

Open question

Banks and Fintech/Bigtech

Complementarity vs. Substitution?

Type	References
Complement	<ul style="list-style-type: none">- Erel, I., & Liebersohn, J. (2022). <i>Can FinTech reduce disparities in access to finance? Evidence from the Paycheck Protection Program.</i> Journal of Financial Economics, 146(1), 90-118.- Di Maggio, M., Ratnadiwakara, D., & Carmichael, D. (2022). <i>Invisible primes: Fintech lending with alternative data</i> (No. w29840). National Bureau of Economic Research.- Gambacorta, L., Cornelli, G., Frost, J., Rau, R., Wardrop, R., & Ziegler, T. (2020). <i>Fintech and big tech credit: a new database</i> (No. 15357). CEPR Discussion Papers.
Substitute	<ul style="list-style-type: none">- Naceur, S. B., Candelon, B., Elekdag, S., & Emrullah, D. (2023). <i>Is FinTech Eating the Bank's Lunch?</i> Journal of International Financial Management & Accounting.- Eça, A., Ferreira, M. A., Prado, M. P., & Rizzo, A. E. (2022). <i>The real effects of fintech lending on SMEs: Evidence from loan applications.</i> ECB Working Paper Series No 2639.- Tang, H. (2019). <i>Peer-to-peer lenders versus banks: substitutes or complements?</i> The Review of Financial Studies, 32(5), 1900-1938.- Buchak, G., Matvos, G., Piskorski, T., & Seru, A. (2018). <i>Fintech, Regulatory Arbitrage, and the Rise of Shadow Banks.</i> Journal of Financial Economics, 130, 453-483.



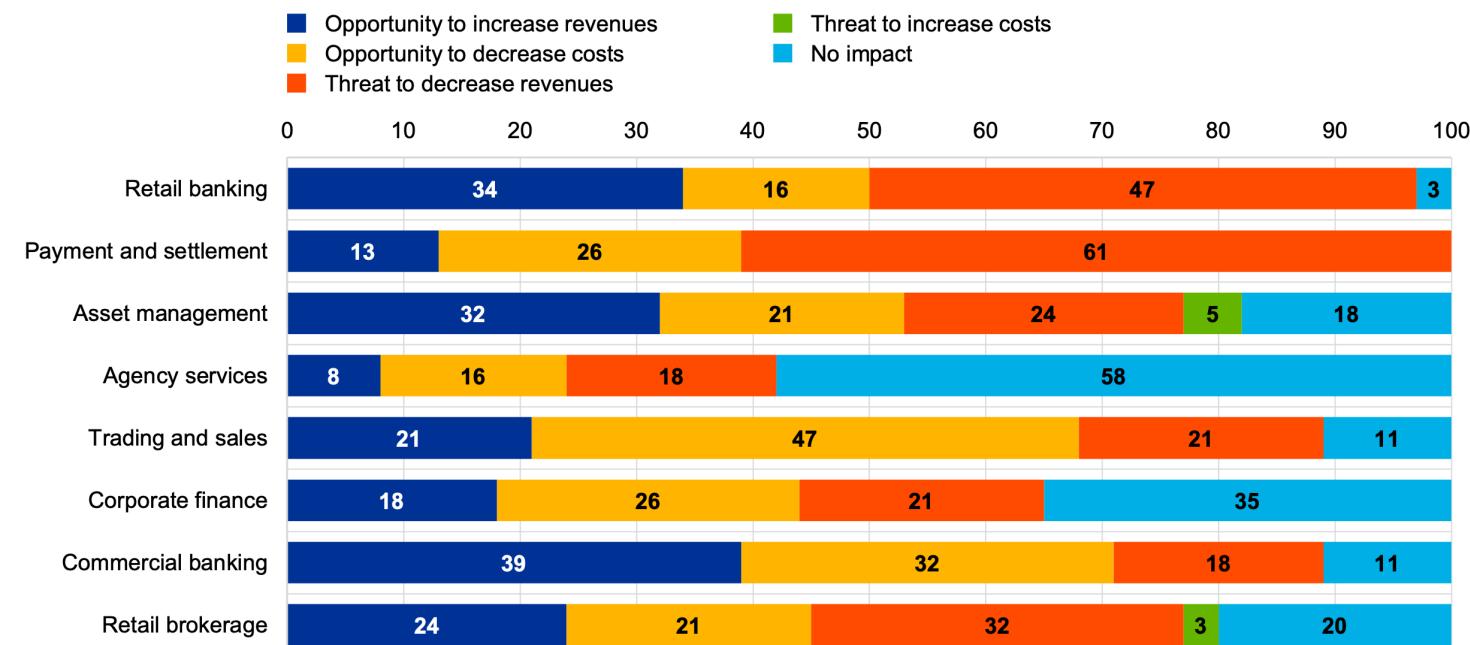
Vertical and horizontal relations

Threat: retail banking and payments

Opportunity: commercial banking and trading services

Summary of responses by European banks to the question “How do you see fintech affecting the current business model of your bank?”

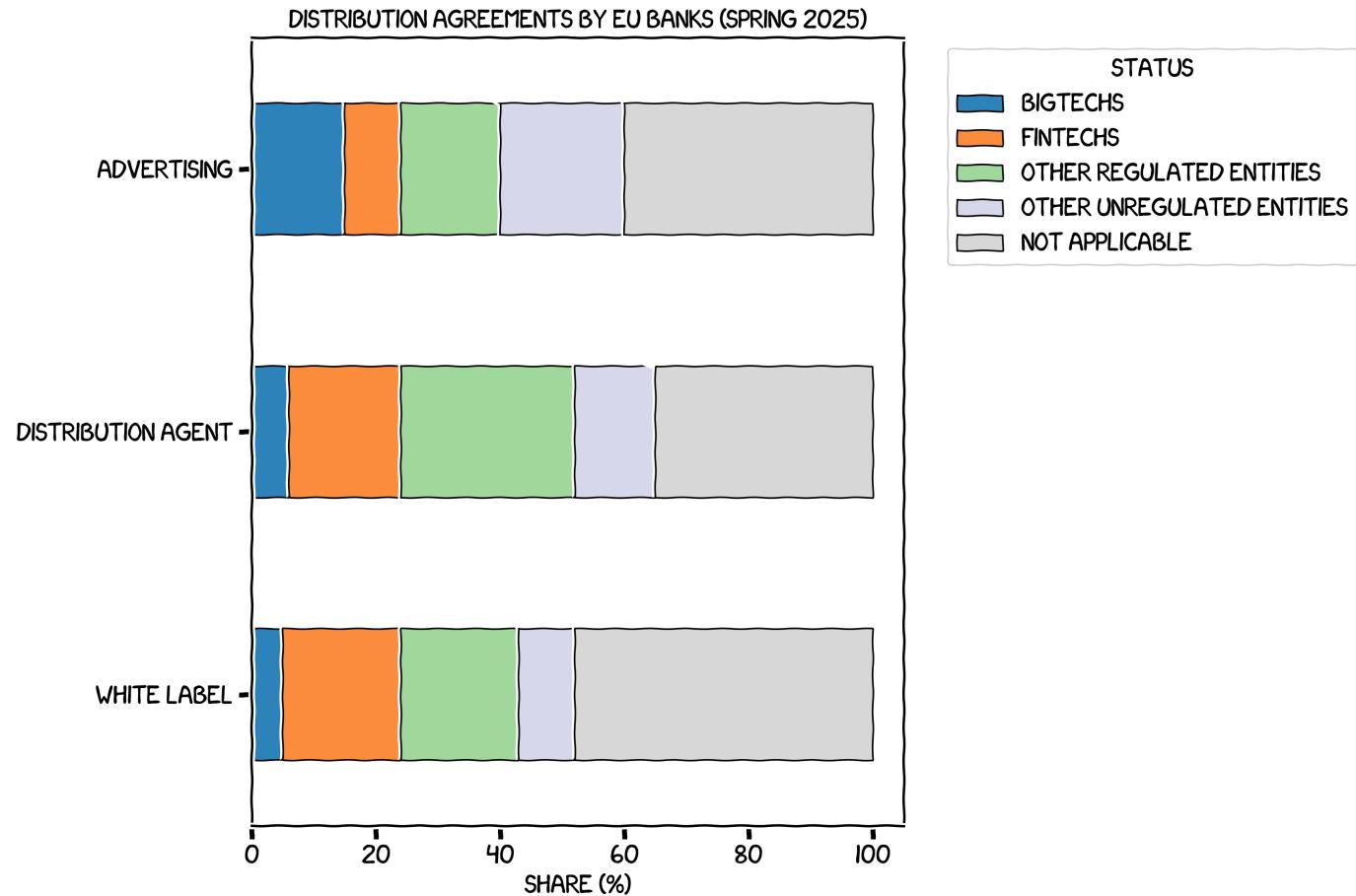
(percentages)



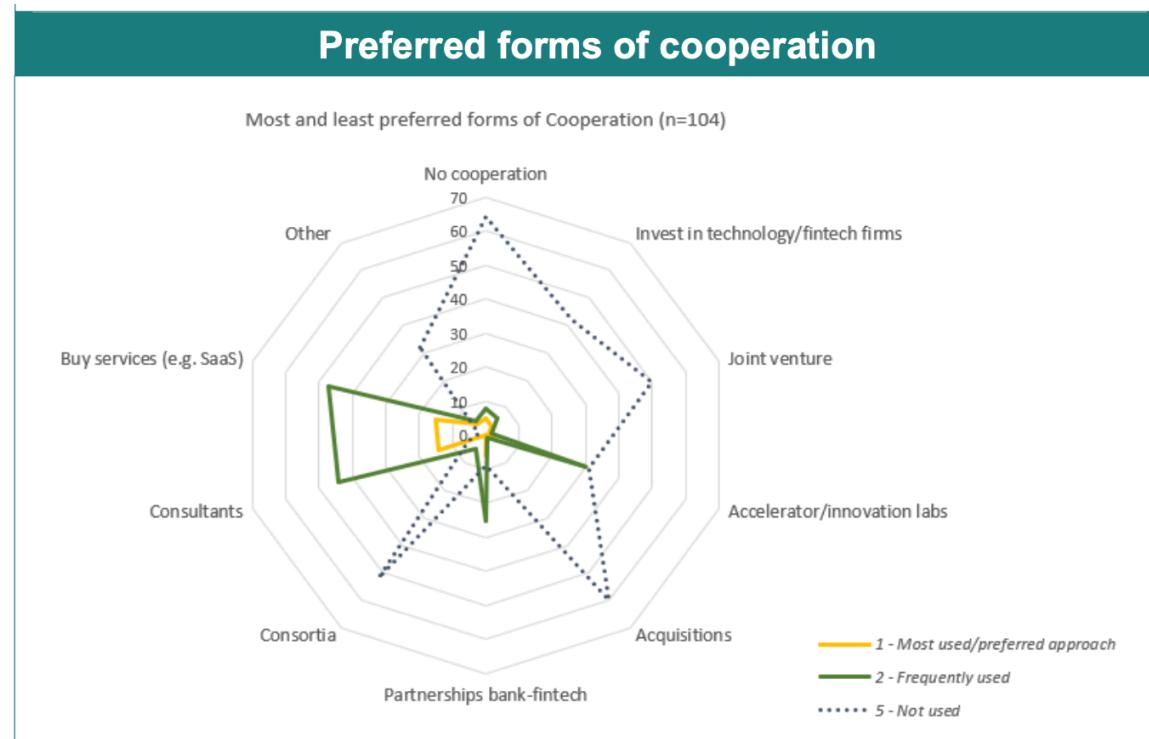
Sources: Baba et al. (2020), based on the 2019 EBA Risk Assessment Report.

Vertical relations

Bank x Bigtech for advertisement & Bank x Fintech for white labelling Limited distribution agreements



Banks and Fintech
Cooperation through services, consulting, (low) partnerships
Limited acquisition, joint venture plans

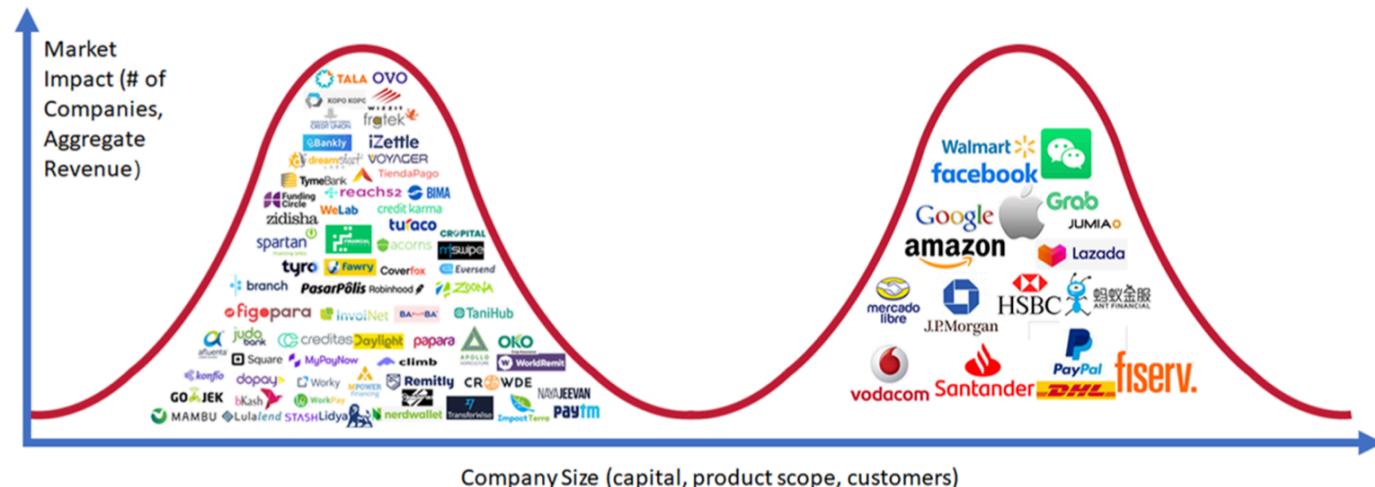


ECB - Take-aways from the horizontal assessment of the survey on digital transformation
and the use of fintech - February 2023

Possible equilibrium

Potential barbell financial services market (illustrative)¹³

Graph 9



Source: authors' elaborations.

Feyen, E., Frost, J., Gambacorta, L., Natarajan, H., & Saal, M. (2021). Fintech and the digital transformation of financial services: implications for market structure and public policy. BIS papers.

