## The Impact of Machine Learning and Big Data on Credit Markets

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*Disclaimer*: The views expressed in this presentation are my own and do not necessarily represent the views of the Bank of England



## How does entry by fintech affect competition and financial stability?

"Technological innovation holds great promise for the provision of financial services, with the potential to increase market access, the range of product offerings, and convenience while also lowering costs to clients. At the same time, new entrants into the financial services space, including FinTech firms and large, established technology companies ('BigTech'), could materially alter the universe of financial services providers. This could in turn affect the degree of concentration and contestability in financial services, with both potential benefits and risks for financial stability."

Source: FSB Report "FinTech and market structure in financial services", 2019

## Diverse activities fintech

### Figure 2: Provision of financial services by fintechs in the UK

Start-ups and innovations as a percentage of total institutions (product and customer segments)



Sources: McKinsey & Company, Pitchbook, Crunchbase, Fintech Global, McKinsey Panorama Fintech Database. Number of start-ups and innovations as a percentage of database total.

## Diverse activities fintech

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Lending and financing Account management Retail Retail SME SME Large corp Large corp 0% 5% 10% 0% 5% 10% 15% 15 Payments wealth management and capital markets Retail Retail SME SME Large corp Large corp 0% 5% 10% 15% 0% 5% 10% 15%

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## Competition in the paper

- Competition between Fintech (FT) and Traditional Banks (TB)
- FT: Machine Learning and Big Data
  - More accurate assessment of borrower risk
  - Especially opaque borrowers
    - Benefit SMEs
- ✓ TB: do not use new technologies
- ightarrow FT can better identify projects with lower default risk

## Competition in the paper

- ✓ How competition affects:
  - Rates offered
  - Borrower types
  - Financial stability
- Key: allow for different stages development fintech sector
  - Small, emerging sector
  - Mature sector



















Key assumption: lower R  $\rightarrow$  more that type

## Outcome when fintech sector small

- Subset of low-risk projects moves to fintech
  - No interest rate gain
- Increase save projects traditional banks
- Financial stability improves













Key assumption: lower R  $\rightarrow$  more that type



## Outcome when fintech sector substantial

- ✓ Increase number of RL projects
- Decrease save projects
- Financial instability increases
  - Share RH projects?



- Impact fintech on competition and financial stability really depends on its relative size
- Important and novel finding

## Comments

- Lending technologies
- Lender switching
- ✓ Dynamic effects
- Resilience bank lending

- ✓ FT use ML and Big data
- ✓ TB traditional lending technologies
- Banks use different lending technologies
  - Small vs large banks
- Question: Which type TB affected?

Function	Small/In-Market Banks	Large/Out-of-Market Banks	FinTech Lending Platforms
Screening	1	✓	✓
	Soft-info technologies	Hard-info technologies	Hard-info technologies
	Based on relationships, judgment	Based on credit scores, financial statements, collateral	Based on machine learning, algorithms, big data, alternative data
Monitoring	1	✓	×
	Active, based on site visits, changes in deposit account flows, Ioan repayments	Active, based on changes in scores, financial statements, deposit account flows, loan repayments	Passive, based on loan repayments
	Renegotiation possible	Renegotiation possible	Little to no renegotiation
Funding	1	1	×
	Bank funds from core deposits	Bank funds from core deposits and purchased funds	Funds from investors

Figure 1. Small business lending functions of different categories of lenders. This figure highlights major differences between FinTech lenders and (small/in-market and large/out-of-market) banks in terms of the three key functions from the borrowers' perspective, namely, loan screening, monitoring, and funding.

Source: Balyuk, Berger and Hackney (2020)

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- ✓ Hard information competition
  - Similar technologies and process
  - Borrowers less strong relationships with banks, so relatively low switching costs
- $\rightarrow$  If dominant force: large banks more affected

- Soft information competition
  - Additional information generated by ML might actually capture soft information
    - FT effectively harden soft information
  - Faster loan decisions.
- $\rightarrow$  If dominant force: small banks more affected

- ✓ Useful to make clear how FT compete
  - Has implications how market is affected
- ✓ Balyuk, Berger, Hackney (2020):
  - Study US FT SME lenders
  - FT replace loans large banks more than small banks
  - Consistent: FT advantage more efficient processing of hard information rather than hardening soft information

## Lender switching

- $\checkmark \quad \text{FT small: } R_{RL}^{FT} = R_R^{TB}$
- ✓ Why would low risk borrowers switch?
  - Advantage keeping LT banking relationship/ Ancillary business
- Not clear incentive from *borrower* side
  - Selection who switches
- ✓ Why "cream-skimming" and not "bottom-fishing"?
  - E.g. Tang (2019); De Roure, Pelizzon and Thakor (2019)



- ✓ TB react to growth FT sector via interest rates
- What about investment in new technologies?





Mobile cash-transfer app

Created by a consortium of Nordic financial institutions: SEB, Danske Bank, Handelsbanken, Länsförsäkringar Bank, Nordea, Swedbank and Sparbankerna



- ✓ TB react to growth FT sector via interest rates
- What about investment in new technologies?
- ✓ If FT sector becomes larger more incentives
  - Especially TB with big pockets
- Matters for competition

- Cyclicality credit key issue SMEs
- Banks' lending techniques contribute to cyclicality of credit
- Transaction based lending (hard information) more cyclical than relationship based lending (soft information)
  - Bolton, Freixas, Gambacorta and Mistrulli, 2016; Beck, Degryse, De Haas and Van Horen, 2018)
- Matters FT competes small or large banks

## Conclusion

- ✓ Very relevant study
- Interesting novel insights
- Further fine-tuning of underlying assumptions

### THANK YOU