When FinTech Competes for Payment Flows

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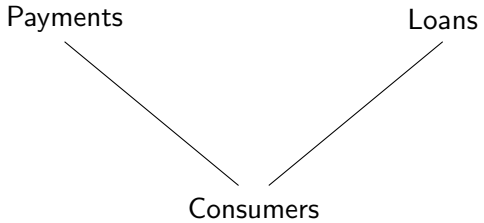
Main idea



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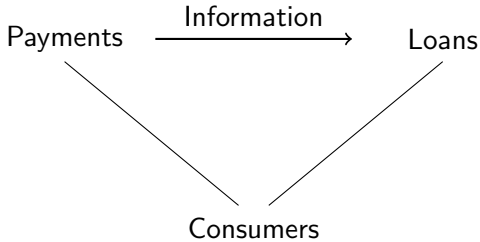

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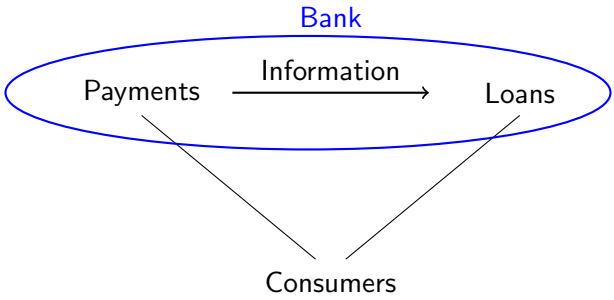

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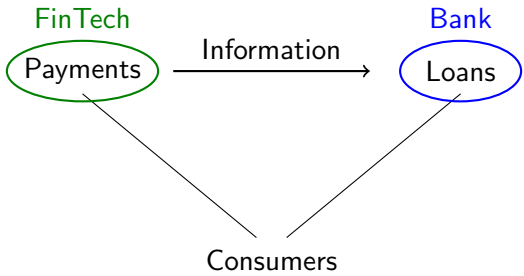

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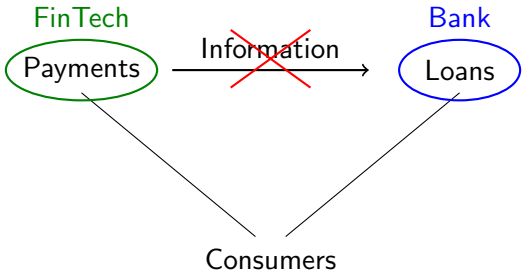

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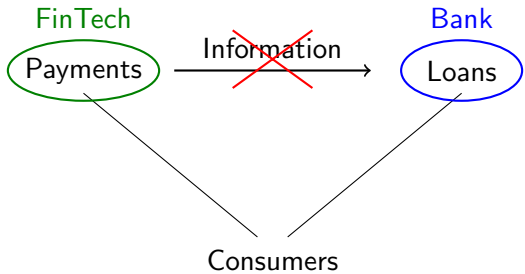

- How does FinTech competition in payments affect:
  (i) bank profit (ii) consumer welfare (iii) loan quality?

- What happens if information from payments can flow back into loan screening?
  - FinTech lending / FinTech data sales / Consumer portability of data.

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- New technology: Alipay, WeChat Pay, M-Pesa
  - In 2017, 1.7 billion people worldwide are "unbanked," according to the World Bank.
  - In Kenya, 3/4 of households have access to M-Pesa mobile money (Jack and Suri 2014).
  - Alipay and WeChat Pay use QR code for payments. Banks are needed only upon withdrawal or deposit.

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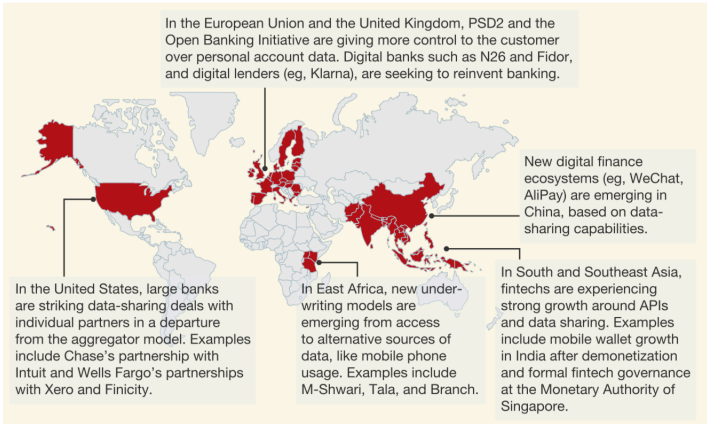
Regulatory attention on flow of consumer data



McKinsey&Company | Source: McKinsey Payments Practice

Main results

- When FinTech firms enter the payment services market:

✓ Effect on consumer welfare can be heterogeneous.
  - Bankophobes benefit from financial inclusion
  - Bankophiles may be hurt by higher prices.

✓ Quality of loans issued by bank decreases.

✓ Bank profit and hence charter value falls (of course).

- If information flows back into loan screening:
  - Loan quality improves, bank profit and consumer welfare may increase or decrease.

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Financial inclusion	versus	Disruption of existing markets
Consumer welfare	versus	Stability of banks

Model

- One bank.
  - "Bank" = Bank or credit card company.
  - Provides both payment services and loans to consumers.
- Two identical FinTech firms.
  - "FinTech"= Independent FinTech firms, Big Tech, online banks.
  - In the base model, provide only payment services to consumers.
  - Quality of payment services is the same across bank and FinTech firms.
- Continuum of consumers.

Consumers

- At $t = 1$, each consumer chooses either bank or FinTech firm to process payments.
  - Obtains utility $v > 0$ from electronic payment services.
  - Has a value for other bank services, called a bank affinity, $b \sim F(-\infty, +\infty)$.

- At $t = 2$, with probability $q > 0$, a consumer will need a loan of \$1. In the base model, only the bank makes loans.
  - If the consumer needs a loan, two other random variables are realized:
    (i) a repayment probability $\theta \sim G$, where $\theta \in [0, 1]$
    (ii) a reservation interest rate $r \sim H$, where $r \geq 0$.
  - Potentially, r represents other financing sources / banks.

- (θ, r, b) are independent across each other and across consumers.
  - Respective density functions are f, g, h.

Timeline

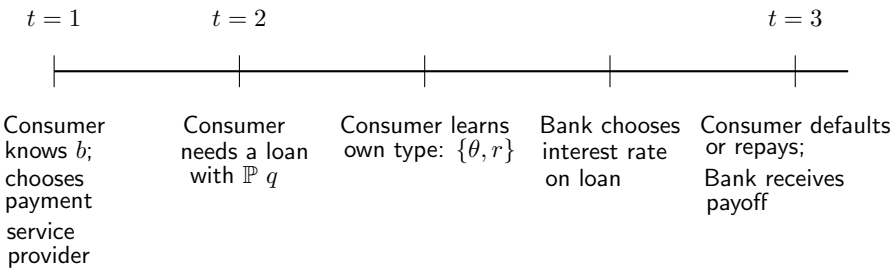


Figure: **Timing of Events**

Relationship between Loan market and Payments Market

- Bank value of the relationship includes the loan and the payments market.
  - Sells a bundle to consumers
  - Willing to price aggressively in payments market if loans are valuable
- Customer takes into account ex ante value of loan when they choose payment provider

Loan Market at Time 2

- Backward induction: Start analysis at $t = 2$.
- Suppose a consumer needs a loan. There are two possibilities:
  1. The consumer choses the bank to process payments.
     - Here, we assume the bank is *fully informed* about the consumer's repayment probability θ.
  2. The consumer choses a FinTech firm to process payments.
     - Here, the bank is *uninformed* about θ.
     - "Uninformed" = the bank has a prior G, based on whatever non-payment information it can acquire about the consumer.
- The bank makes a take-it-or-leave-it offer to the consumer at a rate r_b.
- The consumer accepts if the offer is less than their reservation rate, i.e., accepts if $r_b \leq r$, and rejects if $r_b > r$.

Loan Pricing by an Informed Bank

- We normalize the bank's cost of funds to zero. Then, its expected profit from the loan if it is informed is:

$$\pi_I(r_b, \theta) = \underbrace{[1 - H(r_b)]}_{\text{Probability loan is accepted}} \times \underbrace{\{(1 + r_b)\theta - 1\}}_{\text{Expected profit if accepted}}.$$

- The first-order condition for an informed bank implies:

$$r_I^*(\theta) = \underbrace{\frac{1}{\theta} - 1}_{\text{Break-even rate}} + \underbrace{\frac{1 - H(r_I^*(\theta))}{h(r_I^*(\theta)}}_{\text{Mark-up}}.$$

- Similarly, the uninformed bank sets

$$r_U^* = \frac{1}{E(\theta)} - 1 + \frac{1 - H(r_U^*)}{h(r_U^*)}.$$

Virtual Valuation

- As in auction theory, define the virtual reservation rate at a given rate r as $V(r) = r - \frac{1-H(r)}{h(r)}$.
- Then, the first-order conditions are concisely expressed as:

$$\begin{aligned} V(r_I^*(\theta)) &= \frac{1}{\theta} - 1 && \text{Informed Bank} \\ V(r_U^*) &= \frac{1}{E(\theta)} - 1 && \text{Uninformed Bank} \end{aligned}$$

Assumption

The distribution H is regular; that is, the virtual reservation rate $V(\cdot)$ is strictly increasing.

- Standard assumption from auction theory.
  - Assumption implies that higher repayment probability $\implies$ lower interest rate on loan.

Consumer Surplus

- We assume the consumer earns a surplus

$$\begin{cases} r - r_b & \text{if they repay the loan} \\ 0 & \text{if they default.} \end{cases}$$

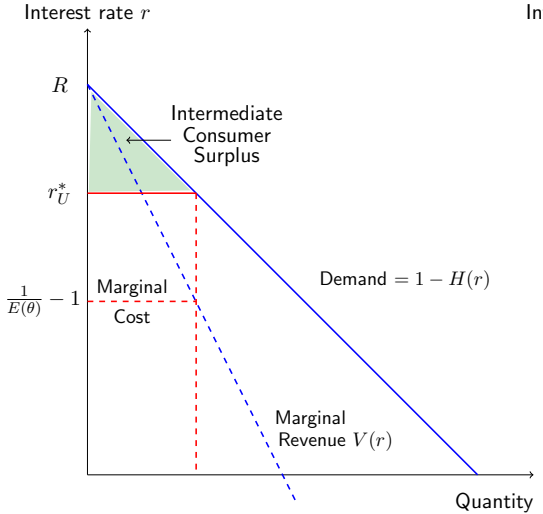
- Thus, the surplus at a given θ is:

$$S_\ell(r_b, \theta) \quad = \quad \theta \int_r^\infty (r - r_b) h(r) dr.$$

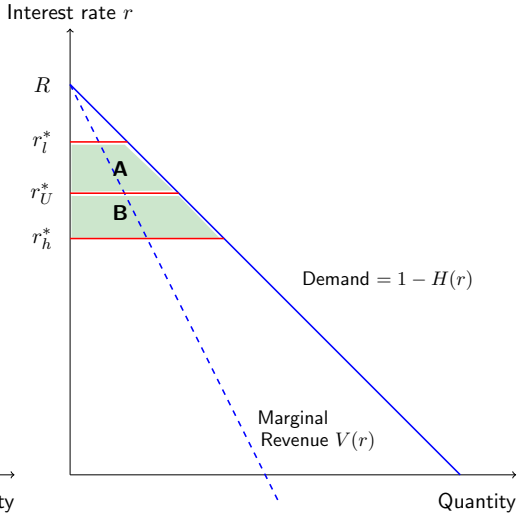
- We consider the ex ante consumer surplus *before* the consumer knows their own θ.

- Results depend on a *convexity condition* that says the virtual reservation rate V is not "too concave."

If the Virtual Reservation rate is sufficiently Convex, the expected consumer surplus is greater if the bank is informed



(a) Uninformed Bank



(b) Informed Bank

Payment Services Market
Bankophiles and Bankophobes

- Outcomes in payment services market depend on density of bank affinity, b.

- We expect b to vary both across and within countries.
- Within a country:
  - High b consumers: bankophiles.
    - Value unmodeled bank services / have high switching costs.
    - Old / wealthy / less tech-savvy.
  - Low b consumers: bankophobes.
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    - ABA survey on millenials:

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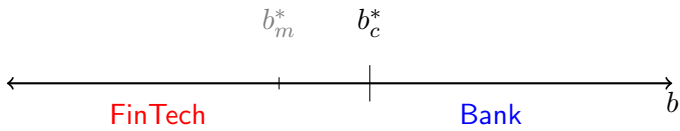
- Across countries:
  - b likely to be higher in developed economies (US, Europe).
  - b likely to be lower in developing economies (Africa, China, India).

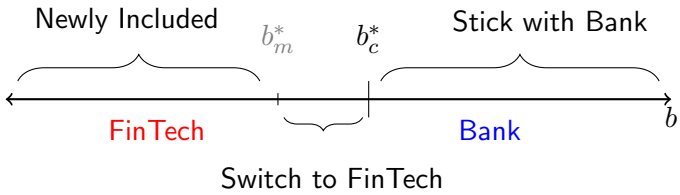
Result: Impact of FinTech competition on pricing

Proposition

The bank's market share decreases with FinTech entry; that is, $b_m^* < b_c^*$. *Further,*
$p_c^* < p_m^*$ *if the bank affinity distribution* F *has an increasing hazard rate everywhere;*
$p_c^* > p_m^*$ *if the bank affinity distribution* F *has an decreasing hazard rate everywhere.*



FinTech Competition: Effect on Consumer Welfare



- Bankophobes are better off due to financial inclusion.
- Bankophiles are better off (worse off) if bank's price for payment services decreases (increases).

Result : Impact of FinTech competition on consumer welfare

	$b < b_m^*$	$b \in [b_m^*, b_c^*]$	$b > b_c^*$
W_m (monopolist)	$qE[S_\ell(r_U^*, \theta)]$	$v + b - p_m^* + qE[S_\ell(r_I^*(\theta), \theta)]$	$v + b - p_m^* + qE[S_\ell(r_I^*(\theta), \theta)]$
W_c (competition)	$v + qE[S_\ell(r_U^*, \theta)]$	$v + qE[S_\ell(r_U^*, \theta)]$	$v + b - p_c^* + qE[S_\ell(r_I^*(\theta), \theta)]$
$W_c - W_m$	v	$p_m^* - b - q\Delta_{S_\ell}$	$p_m^* - p_c^*$

Proposition

- *If the bank affinity distribution $F(b)$ has an increasing hazard rate everywhere, then FinTech competition increases the welfare of each consumer.*
- *If the bank affinity distribution $F(b)$ has a decreasing hazard rate everywhere, then FinTech competition increases the welfare of consumers with bank affinity $b < p_m^* - q\Delta_{S_\ell}$, and decreases the welfare of consumers with bank affinity $b > p_m^* - q\Delta_{S_\ell}$.*

Implications so far

After FinTech entry into payment services (no data transfer):

- Bank's pricing of loans becomes less informative about credit risk.
- The quality of bank loans worsens.
- Consumers with low bank affinity benefit (from cheaper access to electronic payment services), whereas consumers with high bank affinity can benefit or be hurt (depending on the change in banks' pricing of services).

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A challenging tradeoff: **Consumer welfare vs stability of banks**

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Ideally, we want competition without losing payment data. What happens if the payment data are used in lending again?

FinTech lending / Data sales / Data portability

- Case 1: FinTech firms make loans.
  - FinTech firm earns $qE[\pi_I(r_I^*(\theta), \theta)]$ from a payment consumer.
  - Firm offers this profit back to consumer, through a negative price for payment services.
- Case 2: FinTech firms sell data to the bank.
  - Again, FinTech firms charge a price < 0, which depends on:
    (i) Δ_π, value of consumer information in loan market.
    (ii) Bargaining power of bank and FinTech firm in data sales market.
- Case 3: Consumers own their data, can costlessly port data to the bank.

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Common theme:

- Consumers do not have to use the bank for payment processing to get an informed interest rate. So bank market share should go down.
- Loan quality will improve, in the sense that all consumers face informed interest rates.

FinTech lending / Data sales / Data portability

Compared to the base case in which FinTech firms offer payment services, but do not make loans:

	FinTech Lending	Data Sales	Data Portability
Bank Profit	↓	↓ or ↑	↓ or ↑
Consumer Welfare	↑ or ↓	↑ or ↓	↑ or ↓
Loan Quality	↑	↑	↑

- Consumer welfare effects depend critically on bank's price for payment services.
- General theme remains: consumers with low bank affinity are better off, and consumers with high bank affinity may be better or worse off.

Unintended consequence of data portability

- Case 3: Consumers own their payment data, can transmit costlessly whenever they want. Mirrors recent regulations such as PSD2 and GDPR in Europe.
- Unraveling occurs—the option to share data forces data sharing.
- All consumers are worse off if $\Delta_{S_\ell} < 0$ (i.e., they prefer the bank is uninformed ex ante).

What's the best way to get payment data back to lending?

- FinTech lending: poses the biggest challenge to banks' profitability (because lending is done by nonbanks), but the unbanked may benefit most from this regime because FinTech firms pass the lending profit back to consumers in the payment stage.
- Data portability: creates the challenge of unraveling, or forced data porting.
- FinTech data sales: seems a convenient middle ground.

Conclusion: Two faces of FinTech competition

- Starting point: Payment data contain valuable information about credit.
- We study how FinTech competition in payment services affects banks and consumers.
- We also study various regimes in which payment data find their way back to lending.

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