What is Fueling the FinTech Lending Revolution? Local Banking Market Structure and FinTech Market Penetration

Tetyana Balyuk

Allen N. Berger

John Hackney

Emory University

University of South Carolina

University of South Carolina

Wharton Financial Institutions Center

European Banking Center

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The FinTech Revolution Is Upon Us!

 FinTech → Derived from "financial" and "technology:" products and intermediaries that use both financial and information technologies



Source: Accenture Research analysis based on CB Insights data



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• This paper: What is fueling FinTech lending to small businesses?



Necessity is the mother of invention!

We would not have FinTech if there were no need for it.

- Focus: Small business credit, for which banks are the leading lenders
- FinTech marketplace firms would not have succeeded if banks were
 - **(**) Completely successful in alleviating small business financial constraints
 - Offered the most favorable possible contract terms (incl. interest rate)
 - Provided their services in the most timely fashion possible
- Obvious place to look for clues is weaknesses in bank credit supply



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 - **()** Completely successful in alleviating small business financial constraints
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 - Provided their services in the most timely fashion possible
- Obvious place to look for clues is weaknesses in bank credit supply
- Reductions in bank small business credit \Rightarrow opportunities for FinTech
 - Small community banks disappear (8,000 in 2000 to <5,000 in 2019)
 - Large banks cut small business lending (13% lower than the 2007 peak)
 - Small businesses turn to FinTech lenders: 20% in 2015

FinTech Lenders vs. Banks

"FinTech marketplace platforms" are online firms that create credit scores derived from machine learning and provide information to investors (institutions or retail "peers") who finance the loans

Function	FinTech lenders	Community banks	Large banks	
Screening	✓	1	1	
	Transaction-based	Relationship-based	Transaction-based	
	"Hard" data	"Soft" info	"Hard" data	
	Limited past history	Rich repaymen	t/deposit data	
	Machine-learning	Loan officer role	Credit-scoring	
Monitoring	×	✓	✓	
	Limited hands-on	Site visits, deposit account info,		
	monitoring	customer-supplier info etc.		
	Rigid and inflexible	Renegotiation possible		
	In-house or outsourced	In-house or outsourced		
	collection efforts	collectio	n efforts	
Funding	×	✓	✓	
	Investor funds	Own	funds	

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Small Banks and FinTech Penetration

Introduction	Data	Heterogeneous Effects	Real Outcomes	
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Example from Prosper Marketplace

PROPER



PROSPER





- **Research question:** What is the relative importance of problems in credit supply by *small* vs. *large* banks for FinTech penetration?
 - **1** How does local banking market structure affect FinTech penetration?
 - What are the real economic effects for small businesses?
 - 3 Are additional FinTech small business loans riskier or safer?



- **Research question:** What is the relative importance of problems in credit supply by *small* vs. *large* banks for FinTech penetration?
 - I How does local banking market structure affect FinTech penetration?
 - What are the real economic effects for small businesses?
 - In Are additional FinTech small business loans riskier or safer?
- Why important?
 - Small businesses are important for US economy
 - Comprise 99% of firms
 - Create 60% of private sector employment
 - Produce 50% of non-farm GDP
 - Implications for small business financial constraints and real effects

Introduction	Data	Heterogeneous Effects	Real Outcomes	
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Hypotheses

Why should bank size matter? Focus: Different lending technologies

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Hypothe	ses			

Why should bank size matter? Focus: Different lending technologies

Small banks: Lend much more to small businesses per dollar of assets due to comparative advantages in relationship lending to small businesses (e.g., soft info processing, fewer layers of management)
 H₁: ↓ Small bank share ⇒ ↑ FinTech loan vol

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Why should bank size matter? Focus: Different lending technologies

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VS.

 Large banks: Similar screening technology to FinTech lenders (i.e., credit scoring with focus on hard data)
 H₂: ↓ Large bank share ⇔ ↑ Small bank share ⇒ ↑ FinTech loan vol

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 Large banks: Similar screening technology to FinTech lenders (i.e., credit scoring with focus on hard data)
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Key variables:

- FinTech Loan Vol. = consumer loans to self-employed
 - + small business purpose loans (\$ per capita)
- Small Bank Share = proportion of branches owned by small banks, community banks with < \$2 billion in assets in 2006 dollars

Introduction	Data	Heterogeneous Effects	Real Outcomes	
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Brief Overview of Findings

Heat Map of Small Bank Share in 2016



Introduction 0000000	Data O		Real Outcomes 0000	
Main Fin	dings			

Three sets of results

- Lower small bank share \Rightarrow higher FinTech penetration
- Iffects come from counties with above-median Internet access
- FinTech small business lending has real economic effects
 - FinTech lending associated with higher employment in smallest businesses (<20 employees), small banks matter for small & mid-size businesses (<50 employees), neither matter for large businesses
 - Riskiness of additional FinTech loans after small bank withdrawal is lower than that of other FinTech small business loans

Where small banks disappear, FinTech lenders fill part of the void, and reduce investor risk in the process

Summary Statistics by County-Year

- FinTech loan data from a large FinTech marketplace lender (Prosper)
- Small bank presence data from Call reports and Summary of Deposits

	Mean	Median	St. dev.	No. obs.
	(1)	(2)	(3)	(4)
# FinTech Loans (per '000 people)	0.011	0	0.028	34,660
FinTech Loan Vol. (\$ per capita)	0.116	0	0.315	34,660
Small Bank Share	0.583	0.595	0.307	34,660
Small Bank Branches (# per '000 people)	0.289	0.202	0.289	34,660

- Each observation is a county-year (\sim 3000 counties times 11 years)
- Most county years have 0 FinTech loans; we keep these because 0 is valuable information, although results are robust to dropping these

Data	Main Results	Heterogeneous Effects	Real Outcomes	
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Univariate Results

	No	Small Bank Sharo or	# FinToch Loons	FinTach Loon Vol		
	NO.	Siliali Balik Silare Ul	# FITTECTI LUATIS	FITTECTI LOATI VOI.		
	obs.	⊿ Small Bank Share	(per '000 people)	(\$ per capita)		
-	(1)	(2)	(3)	(4)		
	P	Panel A: Small Bank Share qu	iartiles - full sample			
Quartile 1 (smallest)	8,583	0.185	0.016	0.167		
Quartile 2	8,129	0.478	0.011	0.119		
Quartile 3	8,136	0.734	0.011	0.112		
Quartile 4 (largest)	8,283	0.981	0.009	0.087		
	Р	anel B: Initial Small Bank Sh	are quartiles (2006)			
Quartile 1 (smallest)	938	0.209	0.014	0.147		
Quartile 2	906	0.474	0.012	0.13		
Quartile 3	970	0.723	0.011	0.118		
Quartile 4 (largest)	949	0.978	0.01	0.097		
Panel C: 🛽 Small Bank Share (2006-2016)						
Decrease	1,980	-0.188	0.013	0.137		
Increase	1,585	0.059	0.01	0.104		
			0			

Note: Lighter color corresponds to larger value for each variable within a panel

- FinTech penetration is higher in counties with lower Small Bank Share
- Regression analyses mainly focus on *FinTech Loan Vol.* as a function of lagged *Small Bank Share*

	Data	Main Results	Heterogeneous Effects	Real Outcomes	
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Multivariate Results: OLS

	Log (1 + FinTech Loan Vol.)					
	(1)	(2)	(3)			
Small Bank Share $_{t-1}$	-0.032**	-0.026*	-0.029**			
Log (Population) $_{t-1}$	(-2.42)	(-1.91) 0.49***	(-2.13) 0.50***			
$Income_{t-1}$		(10.63) -0.00082	(10.90) -0.0010			
Unemployment $_{t-1}$		(-1.23) 0.0032***	(-1.55) 0.0040***			
House Price Change $_{t-1}$		(3.29) 0.0021***	(4.02) 0.0020***			
Bank Branch Density		(8.74)	(7.89) 0.058			
HHL of Deposits. 4			(1.37)			
			(-0.12)			
			(0.99)			
Liquidity Creation $_{t-1}$			-0.11*** (-3.14)			
ROA_{t-1}			-0.12 (-0.48)			
Nonperforming Loans $_{t-1}$			-0.51***			
County & Year FE Clustered SE No. observations R ²	√ County 32,361 0.448	√ County 25,667 0.518	County 25,667 0.519			

• Main specification:

```
\begin{array}{l} \mbox{Log}(1+\mbox{FinTech Loan Vol.})_{i,t} \\ = \alpha_0 + \alpha_1 \mbox{Small Bank Share}_{i,t-1} \\ + \alpha_2 \mbox{Local Market Chars}_{i,t-1} \\ + \alpha_3 \mbox{Local Bank Chars}_{i,t-1} \\ + \mbox{Year FE} + \mbox{County FE} + \mbox{$\epsilon_{i,t}$}_{i,t} \end{array}
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Small Banks and FinTech Penetration

Data	Main Results	Heterogeneous Effects	Real Outcomes	
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$Income_{t-1}$		-0.00082	-0.0010
$Unemployment_{t-1}$		0.0032***	0.0040***
House Price $Change_{t-1}$		(3.29) 0.0021*** (8.74)	(4.02) 0.0020*** (7.80)
Bank Branch Density $_{t-1}$		(0.74)	0.058
HHI of $Deposits_{t-1}$			-0.0042
Capital Ratio $_{t-1}$			0.14
Liquidity $Creation_{t-1}$			-0.11***
ROA_{t-1}			-0.12
Nonperforming $Loans_{t-1}$			-0.51***
County & Year FE Clustered SE No. observations R ²	✓ County 32,361 0.448	√ County 25,667 0.518	(-4.13) ✓ County 25,667 0.519

- Multivariate analysis confirms negative relation between Small Bank Share and FinTech Loan Vol.
- 1σ ↓ Small Bank Share is associated with
 - 6.9% to 8.4% \uparrow

Log(1+FinTech Loan Vol.)

Endogeneity and Identification

• Concerns about estimation bias

- Omitted variable bias: Concern that omitted local economic variables are affecting both *Small Bank Share* and *FinTech Loan Vol.*
- Reverse causality: Concern that FinTech affects small bank presence

Identification

- IV analysis using Rice and Strahan (2010) index (RSI) updated to 2016
- RSI = interstate bank entry restrictions for state (0 to 4)
- Expect positive relation between RSI and Small Bank Share



RSI between 2006 and 2016



Lots of deregulation since 2006

reductions in RSI: 39

states with reduced *RSI*: 30

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Small Banks and FinTech Penetration

Data	Main Results	Heterogeneous Effects	Real Outcomes	
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Multivariate Results: IV Analysis

 $\begin{array}{l} \textit{Small bank share}_{i,t-1} = \phi_0 + \phi_1 \textit{RSI}_{i,t-1} + \phi_2 \textit{Local Market Chars}_{i,t-1} \\ + \phi_3 \textit{Local Bank Chars}_{i,t-1} + \textit{Time FE} + \textit{County FE} + \eta_{i,t-1} \end{array}$

 $\begin{array}{l} \text{Log } (1 + \textit{FinTech Loan Vol.})_{i,t} = \gamma_0 + \gamma_1 \textit{Small Bank Share}_{i,t-1} + \gamma_2 \textit{Local Market Chars}_{i,t-1} \\ + \gamma_3 \textit{Local Bank Chars}_{i,t-1} + \textit{Time FE} + \textit{County FE} + \xi_{i,t} \end{array}$

	Small Bank Share $_{t-1}$			Log (1	Log (1 + FinTech Loan Vol.)		
	(1)	(2)	(3)	(4)	(5)	(6)	
Small \widehat{Bank} Share _{t-1}				-1.61*** (-2.72)	-1.83** (-2.48)	-1.58*** (-2.62)	
RSI_{t-1}	0.0084*** (3.11)	0.0073*** (2.84)	0.0080*** (3.12)		()		
Local Market Chars _{t—1} Local Banking Chars _{t—1}	. ,	\checkmark	Î Î		\checkmark	\checkmark	
County & Year FE	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
Clustered SE	County	County	County	County	County	County	
No. observations	32,361	25,667	25,667	32,361	25,667	25,667	
R ²	0.911	0.921	0.922	-0.024	-0.051	0.102	

- Local Market Chars: Log (Pop), Income, Employment, Δ House Price

- Local Bnk Chars: Bnk Branch Density, HHI Deposits, Capital Ratio, Liquidity, ROA, Nonperf. Loans

• 1st stage: RSI is relevant for Small Bank Share

• 2nd stage: Confirms baseline results; mitigates endogeneity concerns

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Effects by Internet Access: OLS

	Log (1 + FinTech Loan Vol.)				
	(1)	(2)	(3)		
Small Bank Share $_{t-1}$ × Internet	-0.14***	-0.089***	-0.098***		
Small Bank Share $_{t-1}$	(-5.26) 0.022 (1.37)	(-3.54) 0.017 (0.97)	(-3.93) 0.019 (1.05)		
Local Market Chars $_{t-1}$	()	`ë	`ë		
Local Banking Chars $t-1$			\checkmark		
County & year FE	\checkmark	\checkmark	\checkmark		
Clustered SE	County	County	County		
No. observations	32,361	25,667	25,667		
R ²	0.448	0.518	0.519		

- Local Market Chars: Log (Pop), Income, Employment, Δ House Price

 Local Banking Chars: Bank Branch Density, HHI Deposits, Capital Ratio, Liquidity, ROA, Nonperf. Loans

- *Internet* = above-median *Internet Access* defined as proportion of population with wireline Internet access from at least one provider
- Cross-sectional indicator measured at county level in June 2011
- 18.9% to 30.7% \uparrow Log(1+FinTech Loan Vol.) for $1\sigma \downarrow$ Small Bank Share if Internet = 1

Employment "Horseraces"

	Employment (per '000 people) by firm size (# employees)						
	(0–19)	(20–49)	(50-249)	(250–499)	(≥500)		
	(1)	(2)	(3)	(4)	(5)		
FinTech Loan Vol.	0.56**	0.048	-0.21	-0.089	1.38		
Small Bank Loan Vol.	(2.08) 0.017***	(0.16) 0.0059***	(-0.52) -0.00094	(-0.17) 0.0039*	(1.25) 0.0068		
Local Market Chars $_{t-1}$	(6.87) ✓	(3.45) ✓	(-0.31) ✓	(1.80) ✓	(1.14) ✓		
Local Banking $Chars_{t-1}$	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		
County & year FE	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		
Clustered SE	County	County	County	County	County		
No. observations	23,792	23,716	23,713	22,200	23,781		
R ²	0.975	0.923	0.922	0.760	0.944		

- Local Market Chars: Log (Pop), Income, Employment, Δ House Price

- Local Bnk Chars: Bnk Br Density, HHI Deposits, Capital Ratio, Liquidity, ROA, Nonperf. Loans

- Small Bank Loan Vol. adapted from CRA data on small business loan originations
- FinTech lenders matter for smallest businesses (<20 employees), small banks matter for small & mid-size businesses (<50 employees), and neither matter for large businesses

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Risks of Additional FinTech Loans: OLS

	FinTe	FinTech Default Rate			FinTech Loss Rate		
	(1)	(2)	(3)	(4) (5)	(6)	
Small Bank Share $_{t-1}$	6.29 (0.67)	12.8 (1.20)	6.50 (0.63)	12.1 (1.8	1* 16.4** 5) (2.34)	13.1* (1.88)	
Local Market Chars _{t—1} Local Banking Chars _{t—1}	. ,	✓	\checkmark		\checkmark	<i>\</i>	
County & year FE Clustered SE No. observations R ²	√ County 5,581 0.300	√ County 4,551 0.328	√ County 4,551 0.333	√ Cour 5,52 0.28	√ hty County 22 4,498 36 0.315	√ County 4,498 0.319	

- Local Market Chars: Log (Pop), Income, Employment, Δ House Price

- Local Bnk Chars: Bnk Br Density, HHI Deposits, Capital Ratio, Liquidity, ROA, Nonperf. Loans

- *FinTech Default Rate* = realized default rate on FinTech small business loans
- *FinTech Loss Rate* = realized loss rate of principal on FinTech small business loans (both non-defaulting and defaulting)
 - Use matching procedure in Balyuk and Davydenko (2019)

Data	Heterogeneous Effects	Real Outcomes	
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Risks of Additional FinTech Loans: $IV - 2^{nd}$ Stage

	FinTech Default Rate				FinTech Loss Rate		
	(1)	(2)	(3)	(4)	(5)	(6)
Small \widehat{Bank} Share _{t-1}	113* (1.65)	165* (1.67)	142 (1.45)	73 (1.5	.7 54)	119* (1.71)	109 (1.55)
Local Market Chars $_{t-1}$	()	\checkmark	~	(·	,	\checkmark	1
County & year FE	\checkmark	\checkmark	∨	\checkmark		\checkmark	∨
Clustered SE	County	County	County	Cou	nty	County	County
No. observations	5,581	4,551	4,551	5,5	22	4,498	4,498
R ²	0.271	0.273	0.291	0.2	67	0.263	0.276

- Local Market Chars: Log (Pop), Income, Employment, Δ House Price

- Local Bnk Chars: Bnk Br Density, HHI Deposits, Capital Ratio, Liquidity, ROA, Nonperf. Loans

- 1st stage (not shown): RSI is relevant for Small Bank Share in subsample of counties with at least one FinTech small business loan
- 2nd stage: Suggests that additional FinTech loans are safer

Data 0		Real Outcomes 000●	

Robustness Checks

- Results robust to
 - Alternative measure of small bank market share, *Small Bank Loan Share*, based on CRA data
 - Measuring small bank presence in terms of # of small bank branches scaled by population, Log (1 + Small Bank Branches)
 - Separation of FinTech small business loan volume into FinTech loans to self-employed borrowers and FinTech loans for small business purposes
 - More granular city-level analysis
 - Removing observations with 0 FinTech loan volume (intensive margin)

	Data 0		Real Outcomes 0000	Summary ●0
Summary				

- Lower small bank share \Rightarrow higher FinTech penetration
 - More FinTech loan volume when small bank share decreases
 - Results confirmed by IV analysis
 - Decline of community banks helps explain the FinTech revolution
- Effects come from counties with above-median Internet access
- Positive real effects on employment
 - FinTech lenders matter for smallest businesses (<20 employees)
 - Small banks also matter for larger small businesses (<50 employees)
 - Neither matters for large businesses
- Additional FinTech loans when small banks disappear are safer
 - Suggests that the smallest business loans of the small banks may generally be safer than FinTech loans

Introduction	Data	Main Results	Heterogeneous Effects	Real Outcomes	Summary
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Policy In	plicati	ions			

- Where small banks disappear, FinTech lenders fill part of the void, with positive real economic outcomes for the smallest small businesses
- Community banks are still needed for medium-sized small businesses