

# Small bank lending in the era of fintech and shadow banking: a sideshow?

Taylor Begley<sup>1</sup>    Kandarp Srinivasan<sup>2</sup>

<sup>1</sup>Washington University in St. Louis

<sup>2</sup>Northeastern University

November 2019

Financial System of the Future Conference

# Major changes in the mortgage industry in the last 10 years

*MarketWatch*

**Big banks are fleeing the mortgage market**

# Major changes in the mortgage industry in the last 10 years

*MarketWatch*

**Big banks are fleeing the mortgage market**

**DealB%k**

INVESTMENT BANKING | LEGAL/REGULATORY

**In Deal, Bank of America Extends Retreat From  
Mortgages**

# Major changes in the mortgage industry in the last 10 years

*MarketWatch*

**Big banks are fleeing the mortgage market**

**DealB%k**

INVESTMENT BANKING | LEGAL/REGULATORY

**In Deal, Bank of America Extends Retreat From  
Mortgages**

**Big banks cede market share to  
nonbanks**

Nonbanks grab market share as banks retreat | **inman**

# Major changes in the mortgage industry in the last 10 years

*MarketWatch*

**Big banks are fleeing the mortgage market**

**DealB%k**

INVESTMENT BANKING | LEGAL/REGULATORY

**In Deal, Bank of America Extends Retreat From  
Mortgages**

**Big banks cede market share to  
nonbanks**

Nonbanks grab market share as banks retreat | **inman**

THE CRISIS: A DECADE LATER

THE WALL STREET JOURNAL

**The New Mortgage Kings: They're Not  
Banks**

# Major changes in the mortgage industry in the last 10 years

*MarketWatch*

**Big banks are fleeing the mortgage market**

**DealB%k**

INVESTMENT BANKING | LEGAL/REGULATORY

**In Deal, Bank of America Extends Retreat From  
Mortgages**

**Big banks cede market share to  
nonbanks**

Nonbanks grab market share as banks retreat | **inman**

THE CRISIS: A DECADE LATER

THE WALL STREET JOURNAL

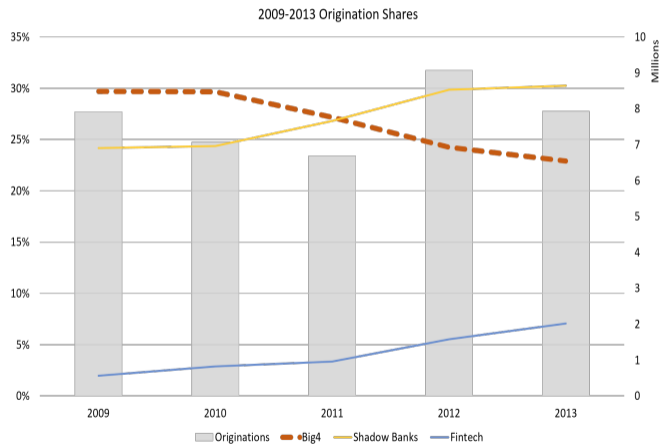
**The New Mortgage Kings: They're Not  
Banks**

Business

**International Business Times**

**Shadow Banking Now Dominates The  
Mortgage Market, Edging Out Wall Street  
Giants**

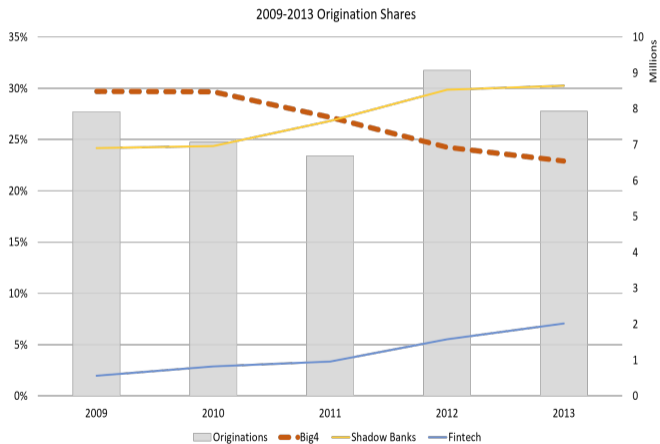
# Post-Crisis Changes in Aggregate Mortgage Origination Shares



The largest four banks' (Big4) share dropped 7pps from 2009 to 2013.

- ▶ BoA, Citi, JPM, WF

# Post-Crisis Changes in Aggregate Mortgage Origination Shares



The largest four banks' (Big4) share dropped 7pps from 2009 to 2013.

► BoA, Citi, JPM, WF

---

### Crisis-related Fines (\$Bn)

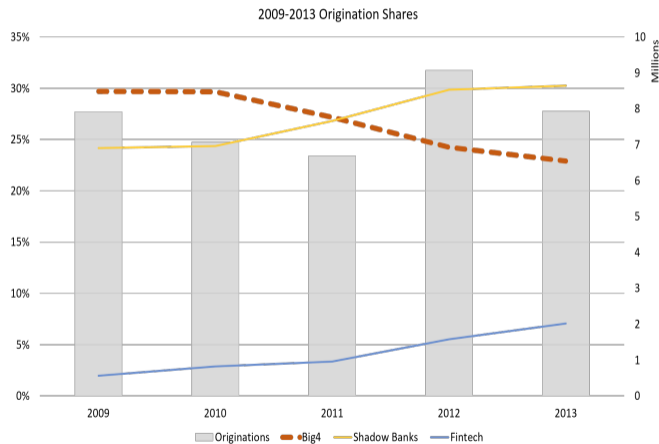
---

Bank of America	\$76.1
JPMorgan	\$43.7
Citigroup	\$19.0
Wells Fargo	\$11.8

---



# Post-Crisis Changes in Aggregate Mortgage Origination Shares

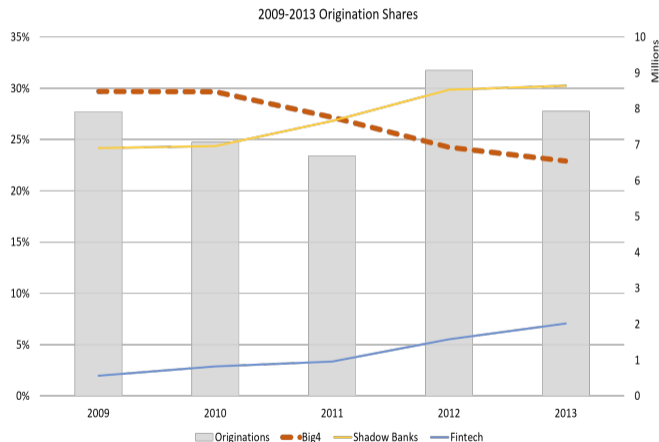


The largest four banks' (Big4) share dropped 7pps from 2009 to 2013.

► BoA, Citi, JPM, WF

	Crisis-related Fines (\$Bn)	2006 NI
Bank of America	\$76.1	\$21.1
JPMorgan	\$43.7	\$14.4
Citigroup	\$19.0	\$21.5
Wells Fargo	\$11.8	\$8.4

# Post-Crisis Changes in Aggregate Mortgage Origination Shares



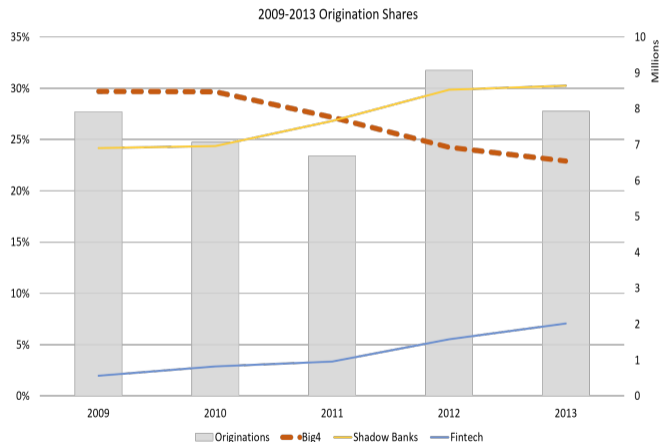
The largest four banks' (Big4) share dropped 7pps from 2009 to 2013.

► BoA, Citi, JPM, WF

	Crisis-related Fines (\$Bn)	2006 NI
Bank of America	\$76.1	\$21.1
JPMorgan	\$43.7	\$14.4
Citigroup	\$19.0	\$21.5
Wells Fargo	\$11.8	\$8.4

Meanwhile, nonbanks surged.

# Post-Crisis Changes in Aggregate Mortgage Origination Shares



The largest four banks' (Big4) share dropped 7pps from 2009 to 2013.

- ▶ BoA, Citi, JPM, WF

	Crisis-related Fines (\$Bn)	2006 NI
Bank of America	\$76.1	\$21.1
JPMorgan	\$43.7	\$14.4
Citigroup	\$19.0	\$21.5
Wells Fargo	\$11.8	\$8.4

Meanwhile, nonbanks surged.

- ▶ Big4 → nonbanks.
- ▶ Is this the whole story?

# This paper: a more nuanced picture

## 1. Document key new facts.

- ▶ Aggregate trends in mortgage lending:
  - ▶ Traditional banks to nonbanks driven mostly by largest lenders.
  - ▶ Small banks' aggregate market share was virtually unchanged.
- ▶ Changes at local level: Small banks are most sensitive to Big4 withdrawal.

## 2. Particular supply and demand forces play important, independent roles.

- ▶ Credit supply: Institutional features – Securitizability/hard-soft info.
- ▶ Credit demand: Choosing banks (over nonbanks) for mortgage loans.

# This paper: a more nuanced picture

## 1. Document key new facts.

- ▶ Aggregate trends in mortgage lending:
  - ▶ Traditional banks to nonbanks driven mostly by largest lenders.
  - ▶ Small banks' aggregate market share was virtually unchanged.
- ▶ Changes at local level: Small banks are most sensitive to Big4 withdrawal.

## 2. Particular supply and demand forces play important, independent roles.

- ▶ Credit supply: Institutional features – Securitizability/hard-soft info.
- ▶ Credit demand: Choosing banks (over nonbanks) for mortgage loans.

# This paper: a more nuanced picture

## 1. Document key new facts.

- ▶ Aggregate trends in mortgage lending:
  - ▶ Traditional banks to nonbanks driven mostly by largest lenders.
  - ▶ Small banks' aggregate market share was virtually unchanged.
- ▶ Changes at local level: Small banks are most sensitive to Big4 withdrawal.

## 2. Particular supply and demand forces play important, independent roles.

- ▶ Credit supply: Institutional features – Securitizability/hard-soft info.
- ▶ Credit demand: Choosing banks (over nonbanks) for mortgage loans.

# This paper: a more nuanced picture

## 1. Document key new facts.

- ▶ Aggregate trends in mortgage lending:
  - ▶ Traditional banks to nonbanks driven mostly by largest lenders.
  - ▶ Small banks' aggregate market share was virtually unchanged.
- ▶ Changes at local level: Small banks are most sensitive to Big4 withdrawal.

## 2. Particular supply and demand forces play important, independent roles.

- ▶ Credit supply: Institutional features – Securitizability/hard-soft info.
- ▶ Credit demand: Choosing banks (over nonbanks) for mortgage loans.

# This paper: a more nuanced picture

## 1. Document key new facts.

- ▶ Aggregate trends in mortgage lending:
  - ▶ Traditional banks to nonbanks driven mostly by largest lenders.
  - ▶ Small banks' aggregate market share was virtually unchanged.
- ▶ Changes at local level: Small banks are most sensitive to Big4 withdrawal.

## 2. Particular supply and demand forces play important, independent roles.

- ▶ Credit supply: Institutional features – Securitized/hard-soft info.
- ▶ Credit demand: Choosing banks (over nonbanks) for mortgage loans.



# This paper: a more nuanced picture

## 1. Document key new facts.

- ▶ Aggregate trends in mortgage lending:
  - ▶ Traditional banks to nonbanks driven mostly by largest lenders.
  - ▶ Small banks' aggregate market share was virtually unchanged.
- ▶ Changes at local level: Small banks are most sensitive to Big4 withdrawal.

## 2. Particular supply and demand forces play important, independent roles.

- ▶ Credit supply: Institutional features – Securitizability/hard-soft info.
- ▶ Credit demand: Choosing banks (over nonbanks) for mortgage loans.

# Does the composition of mortgage credit matter?

- ▶ Access and cost of credit
  - ▶ Costs of renting and mortgage denial rates (Gete & Reher 2018)
  - ▶ the distribution of mortgage credit (D'Acunto & Rossi 2017)
- ▶ Loan Quality and Stability of Suppliers of Credit
  - ▶ Loan quality (Demyanyk & Loutskina 2016)
  - ▶ Systemic risk (Kim, Laufer, Stanton, Wallace, & Pence 2018)
- ▶ Effects of capital regulation and monetary policy transmission
  - ▶ Buchak, Matvos, Piskorski, & Seru (2018)
  - ▶ Elliott, Meisenzahl, Peydro, & Turner (2019)

# Does the composition of mortgage credit matter?

- ▶ Access and cost of credit
  - ▶ Costs of renting and mortgage denial rates (Gete & Reher 2018)
  - ▶ the distribution of mortgage credit (D'Acunto & Rossi 2017)
- ▶ Loan Quality and Stability of Suppliers of Credit
  - ▶ Loan quality (Demyanyk & Loutskina 2016)
  - ▶ Systemic risk (Kim, Laufer, Stanton, Wallace, & Pence 2018)
- ▶ Effects of capital regulation and monetary policy transmission
  - ▶ Buchak, Matvos, Piskorski, & Seru (2018)
  - ▶ Elliott, Meisenzahl, Peydro, & Turner (2019)

# Does the composition of mortgage credit matter?

- ▶ Access and cost of credit
  - ▶ Costs of renting and mortgage denial rates (Gete & Reher 2018)
  - ▶ the distribution of mortgage credit (D'Acunto & Rossi 2017)
- ▶ Loan Quality and Stability of Suppliers of Credit
  - ▶ Loan quality (Demyanyk & Loutskina 2016)
  - ▶ Systemic risk (Kim, Laufer, Stanton, Wallace, & Pence 2018)
- ▶ Effects of capital regulation and monetary policy transmission
  - ▶ Buchak, Matvos, Piskorski, & Seru (2018)
  - ▶ Elliott, Meisenzahl, Peydro, & Turner (2019)

# Setting & Data

## Setting: US Mortgage Market 2009-2013

The Big4 banks dominated the origination market in 2009.

- ▶ BoA and WF each individually originated  $>10\%$  of all new mortgages.
- ▶ Only two nonbanks in top 15:
  - ▶ Provident (7) and Quicken (10) [five by 2013, ten by 2016]

Events post crisis, after 2009:

- ▶ Massive fines on the Big4 (e.g.,  $>\$150$  billion)
- ▶ Technological change
- ▶ Dodd-Frank Act/regulatory changes
  - ▶ SIFI designation, stress tests, capital and liquidity rules, MSR changes, GSE put-backs
  - ▶ “If you guys want to stick with this programme of ‘putting back’ any time, any way, whatever, that’s fine, we’re just not going to make those loans” -Wells Fargo CEO

## Setting: US Mortgage Market 2009-2013

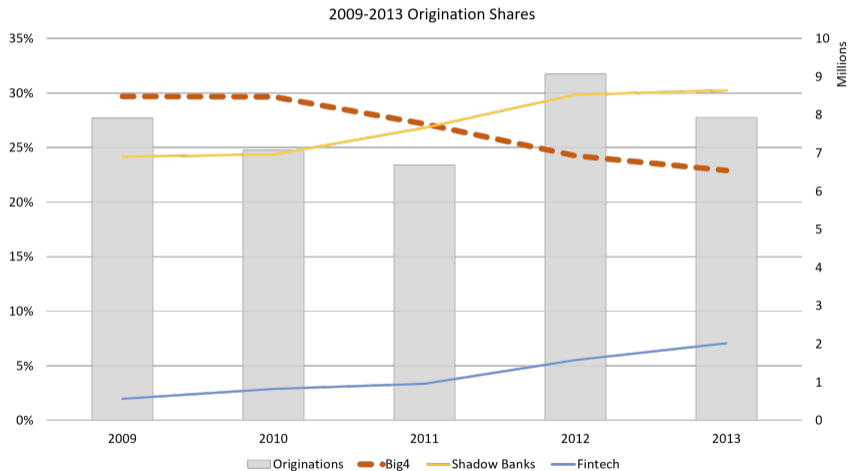
The Big4 banks dominated the origination market in 2009.

- ▶ BoA and WF each individually originated  $>10\%$  of all new mortgages.
- ▶ Only two nonbanks in top 15:
  - ▶ Provident (7) and Quicken (10) [five by 2013, ten by 2016]

Events post crisis, after 2009:

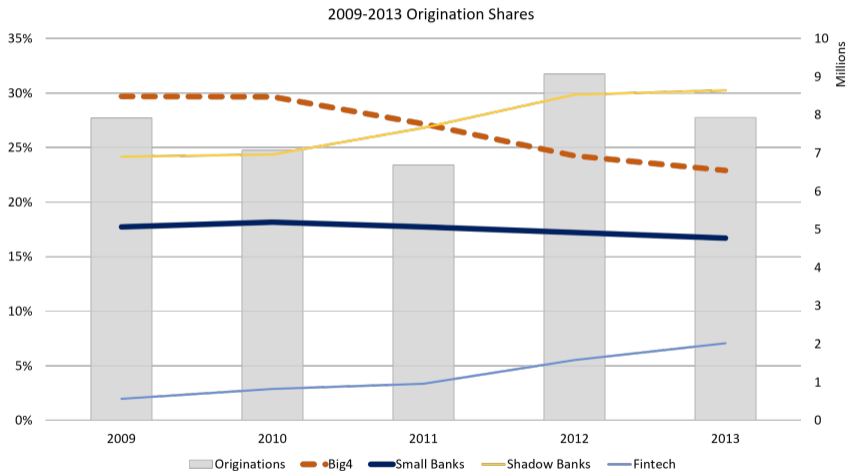
- ▶ Massive fines on the Big4 (e.g.,  $>\$150$  billion)
- ▶ Technological change
- ▶ Dodd-Frank Act/regulatory changes
  - ▶ SIFI designation, stress tests, capital and liquidity rules, MSR changes, GSE put-backs
  - ▶ “If you guys want to stick with this programme of ‘putting back’ any time, any way, whatever, that’s fine, we’re just not going to make those loans” -Wells Fargo CEO

# Facts: Post-Crisis Changes in Aggregate Shares

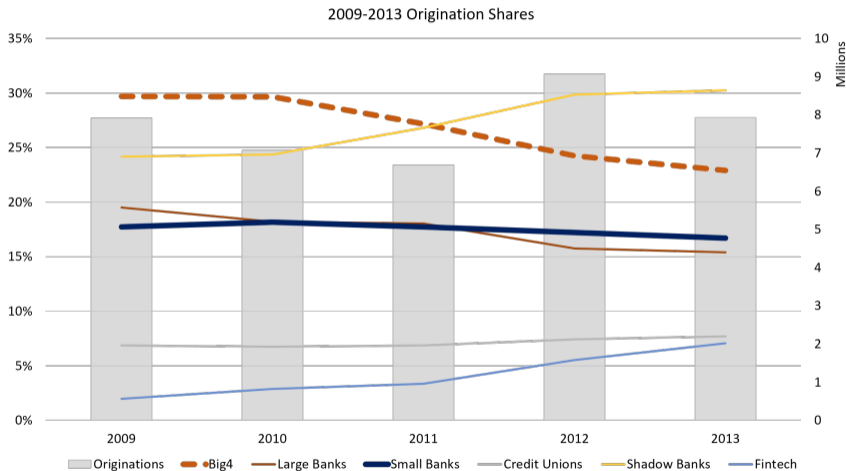




# Facts: Post-Crisis Changes in Aggregate Shares



# Facts: Post-Crisis Changes in Aggregate Shares



## Who is filling the *local* gap?

$H_{agg}$ : Aggregate trends suggest shadow banks and fintech will take this share.  
i.e., Big4 and nonbanks are substitutes throughout the country.

## Who is filling the *local* gap?

- $H_{agg}$ : Aggregate trends suggest shadow banks and fintech will take this share.  
i.e., Big4 and nonbanks are substitutes throughout the country.
- $H_{fintech}$ : With low margin cost of entry and superior technology, fintech will respond most strongly to the opportunities.

## Who is filling the *local* gap?

- $H_{agg}$ : Aggregate trends suggest shadow banks and fintech will take this share. i.e., Big4 and nonbanks are substitutes throughout the country.
- $H_{fintech}$ : With low margin cost of entry and superior technology, fintech will respond most strongly to the opportunities.
- $H_{BkReg}$ : Facing relatively less regulation than banks (regardless of size), nonbanks will respond most strongly, while other banks move alongside Big4.

## Who is filling the *local* gap?

$H_{agg}$ : Aggregate trends suggest shadow banks and fintech will take this share.  
i.e., Big4 and nonbanks are substitutes throughout the country.

$H_{fintech}$ : With low margin cost of entry and superior technology, fintech will respond most strongly to the opportunities.

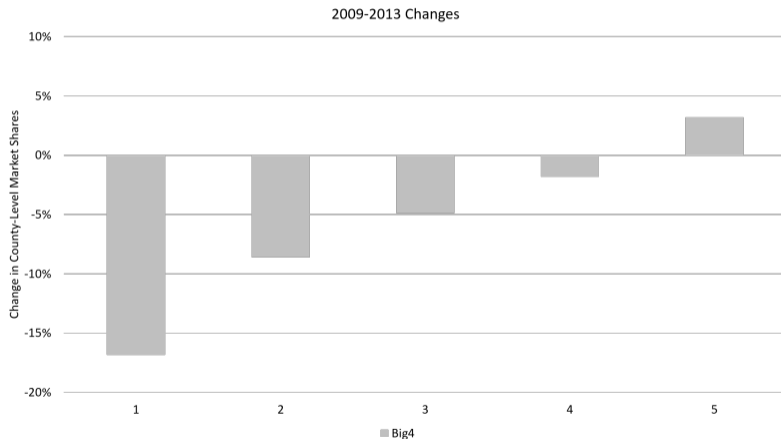
$H_{BkReg}$ : Facing relatively less regulation than banks (regardless of size), nonbanks will respond most strongly, while other banks move alongside Big4.

$H_{SmallBk}$ : Small banks are best equipped to serve those that otherwise have borrowed from big banks.

- ▶ Some consumer prefer banks, and some prefer products only banks can offer (more on these later).

# Filling the Gap

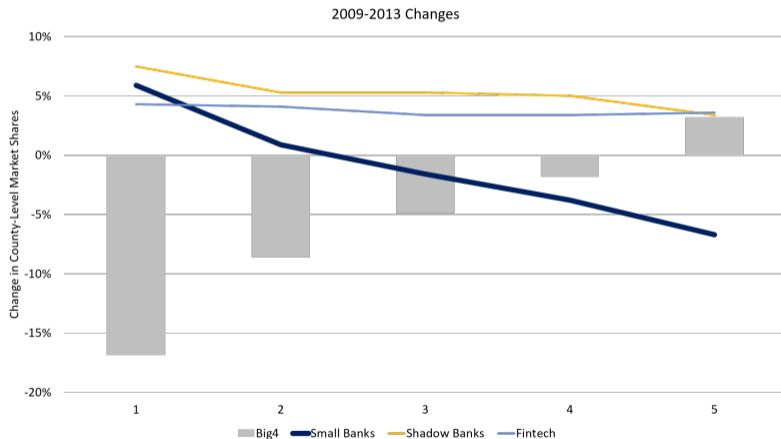
# Variation in Big4 Withdrawal and Lender Composition



	Share change (pps)	
	Overall	(1-5)
Big4	-5.8	-20.0
ShadowBk		
Fintech		
Small Bank		



# Variation in Big4 Withdrawal and Lender Composition



	Share change (pps)	
	Overall	(1-5)
Big4	-5.8	-20.0
ShadowBk	5.3	4.1
Fintech	3.8	0.7
Small Bank	-1.0	12.6

# Baseline Regression

$$\Delta Share_{county}^{LenderClass} = \phi \left( \Delta Share_{county}^{Big4} \right) + \zeta_{stateFE} + \Gamma X_{county} + \epsilon_{county} \quad (1)$$

- ▶ Unit of observation: County
- ▶ Changes in share measured as the difference from 2009 to 2013
- ▶ Controls:
  - ▶ Total population
  - ▶ Minority share of population
  - ▶ Income
  - ▶ Subprime borrower share
  - ▶ Banking competition
  - ▶ Number of lending banks, Number of lending nonbanks, Depository presence
  - ▶ State Fixed Effects

# Variation in Big4 Withdrawal and Lender Composition

	(1) Small Banks	(2) Shadow Banks	(3) Fintech	(4) Large Banks	(5) Credit Unions
$z\Delta Share_{county}^{Big4}$	-0.047*** ( $<0.01$ )	-0.017*** ( $<0.01$ )	-0.002*** ( $<0.01$ )	-0.000 (0.77)	-0.004*** ( $<0.01$ )
$z\ln(\text{Population})$	-0.015* (0.06)	0.016** (0.02)	-0.001 (0.75)	0.002 (0.64)	-0.003 (0.36)
$z\text{Minority}$	0.002 (0.70)	-0.005 (0.27)	0.002* (0.06)	-0.004 (0.14)	0.003 (0.17)
$z\text{Income}$	0.001 (0.75)	0.001 (0.79)	-0.002 (0.16)	0.003 (0.29)	-0.002 (0.28)
$z\text{Subprime}$	-0.015** (0.02)	0.010** (0.03)	-0.002 (0.35)	0.008*** (0.01)	-0.000 (0.87)
$z\text{HHI}$	0.005 (0.22)	-0.009** (0.01)	0.003* (0.08)	0.003 (0.18)	-0.001 (0.59)
Bank/Nonbank Counts/controls	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
Observations	2986	2986	2986	2986	2986
$R^2$	0.211	0.079	0.014	0.010	0.012
$\overline{\Delta Share}_{county}^{LenderClass}$	-0.010	0.053	0.037	-0.037	0.015

$H_{agg}$ :  $\hat{\phi}_{Small} = 0$ ;  $\hat{\phi}_{ShadBk} < 0$ ; and  $\hat{\phi}_{Fintech} < 0$

# Variation in Big4 Withdrawal and Lender Composition

	(1) Small Banks	(2) Shadow Banks	(3) Fintech	(4) Large Banks	(5) Credit Unions
$z\Delta Share_{county}^{Big4}$	-0.047*** ( $<0.01$ )	-0.017*** ( $<0.01$ )	-0.002*** ( $<0.01$ )	-0.000 (0.77)	-0.004*** ( $<0.01$ )
$z\ln(\text{Population})$	-0.015* (0.06)	0.016** (0.02)	-0.001 (0.75)	0.002 (0.64)	-0.003 (0.36)
$z\text{Minority}$	0.002 (0.70)	-0.005 (0.27)	0.002* (0.06)	-0.004 (0.14)	0.003 (0.17)
$z\text{Income}$	0.001 (0.75)	0.001 (0.79)	-0.002 (0.16)	0.003 (0.29)	-0.002 (0.28)
$z\text{Subprime}$	-0.015** (0.02)	0.010** (0.03)	-0.002 (0.35)	0.008*** (0.01)	-0.000 (0.87)
$z\text{HHI}$	0.005 (0.22)	-0.009** (0.01)	0.003* (0.08)	0.003 (0.18)	-0.001 (0.59)
Bank/Nonbank Counts/controls	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
Observations	2986	2986	2986	2986	2986
$R^2$	0.211	0.079	0.014	0.010	0.012
$\overline{\Delta Share}_{county}^{LenderClass}$	-0.010	0.053	0.037	-0.037	0.015

$H_{agg}$ :  $\hat{\phi}_{Small} = 0$ ;  $\hat{\phi}_{ShadBk} < 0$ ; and  $\hat{\phi}_{Fintech} < 0$

# Share Changes

## Alternative Specification

- ▶ Combine into a single regression
- ▶ Obs: county  $\times$  lender class

(1) average share changes

(2) differential sensitivity

(3) scale by SD

	(1)	(2)	(3)
	$\Delta Share_{county}^{LenderClass}$	$\Delta Share_{county}^{LenderClass}$	$z\Delta Share_{county}^{LenderClass}$
1(Small Banks)	-0.010*** (<0.01)	-0.009*** (<0.01)	
1(Shadow Banks)	0.053*** (<0.01)	0.053*** (<0.01)	
1(Fintech)	0.038*** (<0.01)	0.038*** (<0.01)	
1(Large Banks)	-0.037*** (<0.01)	-0.035*** (<0.01)	
1(Credit Unions)	0.015*** (<0.01)	0.017*** (<0.01)	
1(Small Banks) $\times$ $z\Delta Share_{county}^{Big4}$		-0.046*** (<0.01)	-0.420*** (<0.01)
1(Shadow Banks) $\times$ $z\Delta Share_{county}^{Big4}$		-0.016*** (<0.01)	-0.185*** (<0.01)
1(Fintech) $\times$ $z\Delta Share_{county}^{Big4}$		-0.003** (0.01)	-0.105*** (<0.01)
1(Large Banks) $\times$ $z\Delta Share_{county}^{Big4}$		-0.003* (0.09)	-0.048 (0.12)
1(Credit Unions) $\times$ $z\Delta Share_{county}^{Big4}$		-0.003*** (0.02)	-0.072*** (0.02)
Controls	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Observations	14930	14930	14930
$R^2$	0.190	0.262	0.048

# Share Changes

## Alternative Specification

- ▶ Combine into a single regression
- ▶ Obs: county  $\times$  lender class

(1) average share changes

(2) differential sensitivity

(3) scale by SD

	(1) $\Delta Share_{county}^{LenderClass}$	(2) $\Delta Share_{county}^{LenderClass}$	(3) $z\Delta Share_{county}^{LenderClass}$
1(Small Banks)	-0.010*** ( $<0.01$ )	-0.009*** ( $<0.01$ )	
1(Shadow Banks)	0.053*** ( $<0.01$ )	0.053*** ( $<0.01$ )	
1(Fintech)	0.038*** ( $<0.01$ )	0.038*** ( $<0.01$ )	
1(Large Banks)	-0.037*** ( $<0.01$ )	-0.035*** ( $<0.01$ )	
1(Credit Unions)	0.015*** ( $<0.01$ )	0.017*** ( $<0.01$ )	
1(Small Banks) $\times z\Delta Share_{county}^{Big4}$		-0.046*** ( $<0.01$ )	-0.420*** ( $<0.01$ )
1(Shadow Banks) $\times z\Delta Share_{county}^{Big4}$		-0.016*** ( $<0.01$ )	-0.185*** ( $<0.01$ )
1(Fintech) $\times z\Delta Share_{county}^{Big4}$		-0.003** (0.01)	-0.105*** ( $<0.01$ )
1(Large Banks) $\times z\Delta Share_{county}^{Big4}$		-0.003* (0.09)	-0.048 (0.12)
1(Credit Unions) $\times z\Delta Share_{county}^{Big4}$		-0.003*** (0.02)	-0.072*** (0.02)
Controls	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Observations	14930	14930	14930
$R^2$	0.190	0.262	0.048

# Share Changes

## Alternative Specification

- ▶ Combine into a single regression
- ▶ Obs: county  $\times$  lender class

(1) average share changes

(2) differential sensitivity

(3) scale by SD

	(1) $\Delta Share_{county}^{LenderClass}$	(2) $\Delta Share_{county}^{LenderClass}$	(3) $z\Delta Share_{county}^{LenderClass}$
1(Small Banks)	-0.010*** (<0.01)	-0.009*** (<0.01)	
1(Shadow Banks)	0.053*** (<0.01)	0.053*** (<0.01)	
1(Fintech)	0.038*** (<0.01)	0.038*** (<0.01)	
1(Large Banks)	-0.037*** (<0.01)	-0.035*** (<0.01)	
1(Credit Unions)	0.015*** (<0.01)	0.017*** (<0.01)	
1(Small Banks) $\times$ $z\Delta Share_{county}^{Big4}$		-0.046*** (<0.01)	-0.420*** (<0.01)
1(Shadow Banks) $\times$ $z\Delta Share_{county}^{Big4}$		-0.016*** (<0.01)	-0.185*** (<0.01)
1(Fintech) $\times$ $z\Delta Share_{county}^{Big4}$		-0.003** (0.01)	-0.105*** (<0.01)
1(Large Banks) $\times$ $z\Delta Share_{county}^{Big4}$		-0.003* (0.09)	-0.048 (0.12)
1(Credit Unions) $\times$ $z\Delta Share_{county}^{Big4}$		-0.003*** (0.02)	-0.072*** (0.02)
Controls	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Observations	14930	14930	14930
$R^2$	0.190	0.262	0.048

# Share Changes

## Alternative Specification

- Combine into a single regression
- Obs: county  $\times$  lender class

(1) average share changes

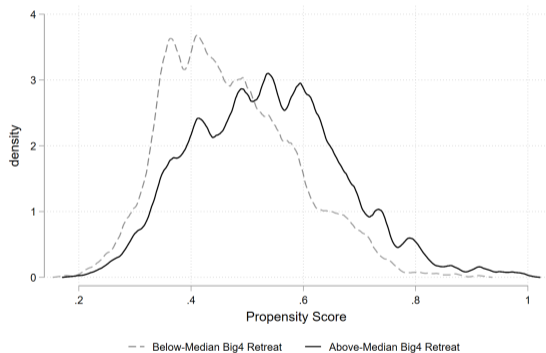
(2) differential sensitivity

(3) scale by SD

	(1) $\Delta Share_{county}^{LenderClass}$	(2) $\Delta Share_{county}^{LenderClass}$	(3) $z\Delta Share_{county}^{LenderClass}$
1(Small Banks)	-0.010*** ( $<0.01$ )	-0.009*** ( $<0.01$ )	
1(Shadow Banks)	0.053*** ( $<0.01$ )	0.053*** ( $<0.01$ )	
1(Fintech)	0.038*** ( $<0.01$ )	0.038*** ( $<0.01$ )	
1(Large Banks)	-0.037*** ( $<0.01$ )	-0.035*** ( $<0.01$ )	
1(Credit Unions)	0.015*** ( $<0.01$ )	0.017*** ( $<0.01$ )	
1(Small Banks) $\times z\Delta Share_{county}^{Big4}$		-0.046*** ( $<0.01$ )	-0.420*** ( $<0.01$ )
1(Shadow Banks) $\times z\Delta Share_{county}^{Big4}$		-0.016*** ( $<0.01$ )	-0.185*** ( $<0.01$ )
1(Fintech) $\times z\Delta Share_{county}^{Big4}$		-0.003** (0.01)	-0.105*** ( $<0.01$ )
1(Large Banks) $\times z\Delta Share_{county}^{Big4}$		-0.003* (0.09)	-0.048 (0.12)
1(Credit Unions) $\times z\Delta Share_{county}^{Big4}$		-0.003*** (0.02)	-0.072*** (0.02)
Controls	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Observations	14930	14930	14930
$R^2$	0.190	0.262	0.048

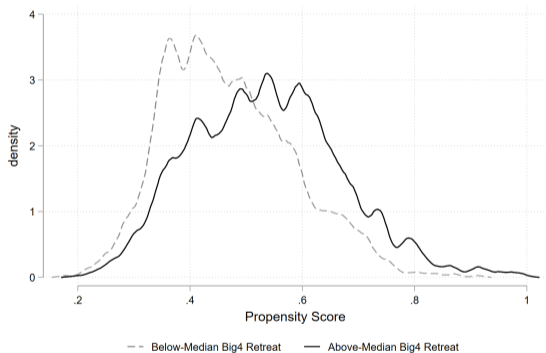


# Matching: ensuring comparability on observables

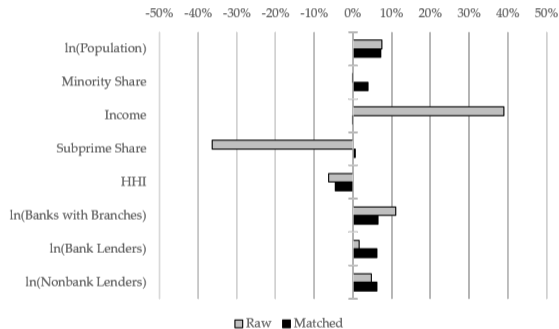


Overlap

# Matching: ensuring comparability on observables



Overlap



Match Quality

# Matching Results

	Propensity Score		Mahalanobis	
	$\hat{\beta}_{ATET}^{PS}$	<i>p</i> -val	$\hat{\beta}_{ATET}^{Mahalanobis}$	<i>p</i> -val
Small Banks	0.063***	(0.00)	0.066***	(0.00)
Shadow Banks	0.025***	(0.00)	0.025***	(0.00)
Fintech	0.005***	(0.00)	0.005***	(0.00)
Large Banks	0.009***	(0.00)	0.002	(0.64)
Credit Unions	0.004**	(0.04)	0.002	(0.27)
Within-State	No		Yes	
Treated	1500		1455	
Control	1487		1467	
Total	2987		2922	

*p*-values in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Matching Results

	Propensity Score		Mahalanobis	
	$\hat{\beta}_{ATET}^{PS}$	<i>p</i> -val	$\hat{\beta}_{ATET}^{Mahalanobis}$	<i>p</i> -val
Small Banks	0.063***	(0.00)	0.066***	(0.00)
Shadow Banks	0.025***	(0.00)	0.025***	(0.00)
Fintech	0.005***	(0.00)	0.005***	(0.00)
Large Banks	0.009***	(0.00)	0.002	(0.64)
Credit Unions	0.004**	(0.04)	0.002	(0.27)
Within-State	No		Yes	
Treated	1500		1455	
Control	1487		1467	
Total	2987		2922	

*p*-values in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Potential concerns: Big4 chose where and to what extent to withdraw

Unobservable county characteristics (e.g., growth prospects, regulatory environment) may be systematically related to the retreat of Big4 banks as well as the changes in (e.g.,) small bank shares.

## Potential concerns: Big4 chose where and to what extent to withdraw

Unobservable county characteristics (e.g., growth prospects, regulatory environment) may be systematically related to the retreat of Big4 banks as well as the changes in (e.g.,) small bank shares.

We use the initial (2009) Big4 county share as an instrument for the 2009-2013 changes.

## Potential concerns: Big4 chose where and to what extent to withdraw

Unobservable county characteristics (e.g., growth prospects, regulatory environment) may be systematically related to the retreat of Big4 banks as well as the changes in (e.g.,) small bank shares.

We use the initial (2009) Big4 county share as an instrument for the 2009-2013 changes.

- ▶ Increasing fines and regulatory burden/uncertainty were major forces for Big4s' broad withdrawal.
  - ▶ e.g., legal liabilities, change in MSR treatment, stricter oversight, stress tests, SIFI designation, higher capital & liquidity requirements, higher put-back risk

[Buchak et al 2018; D'Acunतो & Rossi 2017; Chen et al 2017; Cortes et al 2018; Gete & Reher 2018]

$Share_{county}^{09Big4}$  as an instrument for  $\Delta Share_{county}^{Big4}$

$$\Delta Share_{county}^{Big4} = \theta Share_{county}^{09Big4} + \zeta_{stateFE} + \Gamma X_{county} + \eta_{county} \quad (2)$$

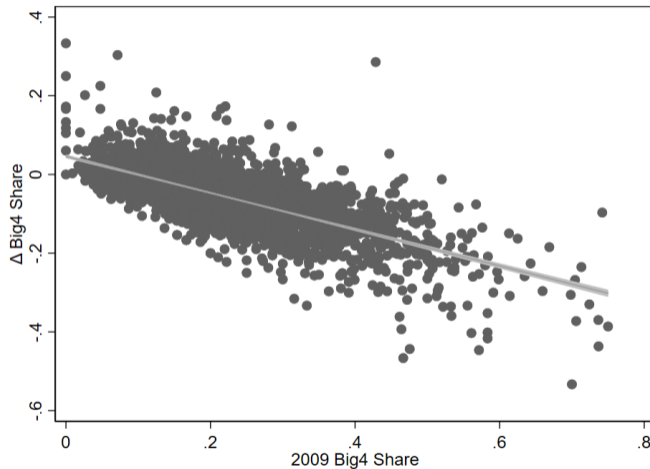
$$\Delta Share_{county}^{LenderClass} = \psi \left( \widehat{\Delta Share_{county}^{Big4}} \right) + \tilde{\zeta}_{stateFE} + \Lambda X_{county} + \epsilon_{county} \quad (3)$$

The instrument does not condition on *actual* withdrawal, but rather identifies counties that have the *greatest scope* for withdrawal.

- ▶ The decline in Big4 share from 2009-2013 is likely greater in those counties which had the highest initial share.



## Big4: Mapping the Shares (instrument) and Changes



# Cross-Sectional Heterogeneity in Response to the Big4 Retreat: IV

	(1) Small Banks	(2) Shadow Banks	(3) Fintech	(4) Large Banks	(5) Credit Unions
$z\widehat{\Delta Share}_{county}^{Big4}$	-0.050*** ( $<0.01$ )	-0.013*** ( $<0.01$ )	-0.007*** ( $<0.01$ )	0.001 (0.59)	-0.002 (0.45)
All Controls	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
Observations	2986	2986	2986	2986	2986
$\overline{\Delta Share}_{county}^{LenderClass}$	-0.010	0.053	0.037	-0.037	0.015
Fstat	537	537	537	537	537

$p$ -values in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Cross-Sectional Heterogeneity in Response to the Big4 Retreat: IV

	(1) Small Banks	(2) Shadow Banks	(3) Fintech	(4) Large Banks	(5) Credit Unions
$z\widehat{\Delta Share}_{county}^{Big4}$	-0.050*** ( $<0.01$ )	-0.013*** ( $<0.01$ )	-0.007*** ( $<0.01$ )	0.001 (0.59)	-0.002 (0.45)
All Controls	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
Observations	2986	2986	2986	2986	2986
$\overline{\Delta Share}_{county}^{LenderClass}$	-0.010	0.053	0.037	-0.037	0.015
Fstat	537	537	537	537	537

$p$ -values in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Cross-Sectional Heterogeneity in Response to the Big4 Retreat: IV

	(1) Small Banks	(2) Shadow Banks	(3) Fintech	(4) Large Banks	(5) Credit Unions
$z\Delta\widehat{Share}_{county}^{Big4}$	-0.050*** ( $<0.01$ )	-0.013*** ( $<0.01$ )	-0.007*** ( $<0.01$ )	0.001 (0.59)	-0.002 (0.45)
All Controls	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
Observations	2986	2986	2986	2986	2986
$\overline{\Delta Share}_{county}^{LenderClass}$	-0.010	0.053	0.037	-0.037	0.015
Fstat	537	537	537	537	537

$p$ -values in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

[Alternative Instrument: 2009 Share interacted with aggregate Big4 change]

## Response to the Big4 Retreat: IV Growth

What about changes in the *level* of lending rather than changes in their *shares*?

## Response to the Big4 Retreat: IV Growth

What about changes in the *level* of lending rather than changes in their *shares*?

- ▶ Are small banks expanding their lending volume in areas vacated by the Big4?

## Response to the Big4 Retreat: IV Growth

What about changes in the *level* of lending rather than changes in their *shares*?

- ▶ Are small banks expanding their lending volume in areas vacated by the Big4?
- ▶ ...or simply mechanically changing in share as a results of changes in market size?

## Response to the Big4 Retreat: IV Growth

What about changes in the *level* of lending rather than changes in their *shares*?

- ▶ Are small banks expanding their lending volume in areas vacated by the Big4?
- ▶ ...or simply mechanically changing in share as a results of changes in market size?

	(1) Small Banks	(2) Shadow Banks	(3) Fintech	(4) Large Banks	(5) Credit Unions
$\widehat{zGrowth}_{county}^{Big4}$	-0.093*** ( $<0.01$ )	-0.029*** ( $<0.01$ )	-0.012*** ( $<0.01$ )	-0.007** (0.04)	-0.007*** (0.01)
All Controls	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
Observations	2986	2986	2986	2986	2986
$\widehat{Growth}_{county}^{LenderClass}$	-0.016	0.056	0.038	-0.041	0.012
Fstat	500	500	500	500	500

*p*-values in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



## Response to the Big4 Retreat: IV Growth

What about changes in the *level* of lending rather than changes in their *shares*?

- ▶ Are small banks expanding their lending volume in areas vacated by the Big4?
- ▶ ...or simply mechanically changing in share as a results of changes in market size?

	(1) Small Banks	(2) Shadow Banks	(3) Fintech	(4) Large Banks	(5) Credit Unions
$\widehat{zGrowth}_{county}^{Big4}$	-0.093*** ( $<0.01$ )	-0.029*** ( $<0.01$ )	-0.012*** ( $<0.01$ )	-0.007** (0.04)	-0.007*** (0.01)
All Controls	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
Observations	2986	2986	2986	2986	2986
$\widehat{Growth}_{county}^{LenderClass}$	-0.016	0.056	0.038	-0.041	0.012
Fstat	500	500	500	500	500

*p*-values in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Within-Lender Reallocation

## Within-Lender Reallocation: Loan Growth

$$\Delta \log(\text{loans})_{c,l,g}^{2009-2013} = \Theta \left[ (\Delta \text{Big4 Share})_c^{2009-2013} \times \mathbb{I}_g \right] + \delta_c + \lambda_l + \epsilon_{c,l,g} \quad (4)$$

- ▶ Unit of observation: individual lender  $\times$  county
- ▶  $\hat{\theta}_g$  measures the average sensitivity of lending by those in lender class  $g$ .
- ▶ County fixed effects ( $\delta_c$ )
  - ▶ e.g., controls for potential unobserved, time-varying county-level factors that both drives 2009 Big4 share *and* post-crisis lending growth.  
[beyond the demographic and banking market characteristics included in prior tests]
- ▶ Individual lender fixed effects ( $\lambda_l$ )
  - ▶ e.g., controls potential unobserved, lender-specific heterogeneity (shocks to capital, unrelated strategy changes) ...

## Within-Lender Reallocation: Loan Growth

$$\Delta \log(\text{loans})_{c,l,g}^{2009-2013} = \Theta \left[ (\Delta \text{Big4 Share})_c^{2009-2013} \times \mathbb{I}_g \right] + \delta_c + \lambda_l + \epsilon_{c,l,g} \quad (4)$$

- ▶ Unit of observation: individual lender  $\times$  county
- ▶  $\hat{\theta}_g$  measures the average sensitivity of lending by those in lender class  $g$ .
- ▶ County fixed effects ( $\delta_c$ )
  - ▶ e.g., controls for potential unobserved, time-varying county-level factors that both drives 2009 Big4 share *and* post-crisis lending growth.  
[beyond the demographic and banking market characteristics included in prior tests]
- ▶ Individual lender fixed effects ( $\lambda_l$ )
  - ▶ e.g., controls potential unobserved, lender-specific heterogeneity (shocks to capital, unrelated strategy changes) ...

## Within-Lender Reallocation: Loan Growth

$$\Delta \log(\text{loans})_{c,l,g}^{2009-2013} = \Theta \left[ (\Delta \text{Big4 Share})_c^{2009-2013} \times \mathbb{I}_g \right] + \delta_c + \lambda_l + \epsilon_{c,l,g} \quad (4)$$

- ▶ Unit of observation: individual lender  $\times$  county
- ▶  $\hat{\theta}_g$  measures the average sensitivity of lending by those in lender class  $g$ .
- ▶ County fixed effects ( $\delta_c$ )
  - ▶ e.g., controls for potential unobserved, time-varying county-level factors that both drives 2009 Big4 share *and* post-crisis lending growth.  
[beyond the demographic and banking market characteristics included in prior tests]
- ▶ Individual lender fixed effects ( $\lambda_l$ )
  - ▶ e.g., controls potential unobserved, lender-specific heterogeneity (shocks to capital, unrelated strategy changes) ...

## Within-Lender Reallocation

	(1) OLS	(2) IV
$\mathbb{1}(\text{Large Banks}) \times z\Delta\text{Share}_{\text{county}}^{\text{Big4}}$	-0.172*** ( $<0.01$ )	-0.120 (0.11)
$\mathbb{1}(\text{Small Banks}) \times z\Delta\text{Share}_{\text{county}}^{\text{Big4}}$	-0.279*** ( $<0.01$ )	-0.326*** ( $<0.01$ )
$\mathbb{1}(\text{Credit Unions}) \times z\Delta\text{Share}_{\text{county}}^{\text{Big4}}$	-0.148*** ( $<0.01$ )	-0.017 (0.83)
$\mathbb{1}(\text{Shadow Banks}) \times z\Delta\text{Share}_{\text{county}}^{\text{Big4}}$	-0.274*** ( $<0.01$ )	-0.145* (0.07)
$\mathbb{1}(\text{Fintech}) \times z\Delta\text{Share}_{\text{county}}^{\text{Big4}}$	-0.237*** ( $<0.01$ )	-0.044 (0.43)
Individual Lender FE	Yes	Yes
County FE	Yes	Yes
Observations	62505	62505

2009-2013 change in  $\log(\text{loans})$ :

- ▶ within-lender
- ▶ within-county

## Within-Lender Reallocation

	(1) OLS	(2) IV
$\mathbb{1}(\text{Large Banks}) \times z\Delta Share_{county}^{Big4}$	-0.172*** ( $<0.01$ )	-0.120 (0.11)
$\mathbb{1}(\text{Small Banks}) \times z\Delta Share_{county}^{Big4}$	-0.279*** ( $<0.01$ )	-0.326*** ( $<0.01$ )
$\mathbb{1}(\text{Credit Unions}) \times z\Delta Share_{county}^{Big4}$	-0.148*** ( $<0.01$ )	-0.017 (0.83)
$\mathbb{1}(\text{Shadow Banks}) \times z\Delta Share_{county}^{Big4}$	-0.274*** ( $<0.01$ )	-0.145* (0.07)
$\mathbb{1}(\text{Fintech}) \times z\Delta Share_{county}^{Big4}$	-0.237*** ( $<0.01$ )	-0.044 (0.43)
Individual Lender FE	Yes	Yes
County FE	Yes	Yes
Observations	62505	62505

2009-2013 change in log(loans):

- ▶ within-lender
- ▶ within-county

Within the average small bank, counties in their footprint that have a one-s.d. decrease in  $\Delta Share_{county}^{Big4}$  has:

- ▶ 27pp<sup>†</sup> higher loan growth rate than in counties that experience the overall mean change in Big4 share.

<sup>†</sup>  $100 * [e^{-0.326} - 1]$

# Why Small Banks?



# Why Small Banks?

What features of small banks make them particularly well-equipped to step in?

Potential channels we examine:

1. *Credit-supply* side: institutional features

- ▶ Bank have balance sheet capacity while nonbanks do not.
- ▶ Nonbanks acting as pass-throughs must originate loans that conform to GSE or FHA standards (Buchak et al 2018b; Fuster et al 2018).

2. *Credit-demand* side: consumer choice

- ▶ Many borrowers simply would rather borrow from a bank for reasons such as relationships (e.g., Boot 2000), bundling of services/economies of scope, and greater trust in banks (e.g., Merton & Thakor 2018), stability.

# Why Small Banks?

What features of small banks make them particularly well-equipped to step in?

Potential channels we examine:

## 1. Credit-*supply* side: institutional features

- ▶ Bank have balance sheet capacity while nonbanks do not.
- ▶ Nonbanks acting as pass-throughs must originate loans that conform to GSE or FHA standards (Buchak et al 2018b; Fuster et al 2018).

## 2. Credit-*demand* side: consumer choice

- ▶ Many borrowers simply would rather borrow from a bank for reasons such as relationships (e.g., Boot 2000), bundling of services/economies of scope, and greater trust in banks (e.g., Merton & Thakor 2018), stability.

# Why Small Banks?

What features of small banks make them particularly well-equipped to step in?

Potential channels we examine:

## 1. Credit-*supply* side: institutional features

- ▶ Bank have balance sheet capacity while nonbanks do not.
- ▶ Nonbanks acting as pass-throughs must originate loans that conform to GSE or FHA standards (Buchak et al 2018b; Fuster et al 2018).

## 2. Credit-*demand* side: consumer choice

- ▶ Many borrowers simply would rather borrow from a bank for reasons such as relationships (e.g., Boot 2000), bundling of services/economies of scope, and greater trust in banks (e.g., Merton & Thakor 2018), stability.

## Supply-Side: Securitizability

- ▶ Nonbanks act primarily as a pass-through to the government-sponsored securitization markets (Fannie Mae, Freddie Mac) and government-insured mortgages (FHA, VA).
  - ▶ We call these *government-supported loan programs* (GSLP).
- ▶ Thus, nonbanks have limited scope to make loans that do not conform to the relevant standards.
  - ▶ e.g., loans that are too large, or depend too much on soft information
- ▶ We compute the long-run average of the share of GSLP loans for each county.

Hypothesis: Small banks respond more strongly where lower need for GSLP.

- ▶ (+) coefficient on  $\Delta Share_{county}^{Big4} \times HiGSLP$

## Supply-Side: Securitizability

- ▶ Nonbanks act primarily as a pass-through to the government-sponsored securitization markets (Fannie Mae, Freddie Mac) and government-insured mortgages (FHA, VA).
  - ▶ We call these *government-supported loan programs* (GSLP).
- ▶ Thus, nonbanks have limited scope to make loans that do not conform to the relevant standards.
  - ▶ e.g., loans that are too large, or depend too much on soft information
- ▶ We compute the long-run average of the share of GSLP loans for each county.

Hypothesis: Small banks respond more strongly where lower need for GSLP.

- ▶ (+) coefficient on  $\Delta Share_{county}^{Big4} \times HiGSLP$

## Supply-Side: Securitizability

- ▶ Nonbanks act primarily as a pass-through to the government-sponsored securitization markets (Fannie Mae, Freddie Mac) and government-insured mortgages (FHA, VA).
  - ▶ We call these *government-supported loan programs* (GSLP).
- ▶ Thus, nonbanks have limited scope to make loans that do not conform to the relevant standards.
  - ▶ e.g., loans that are too large, or depend too much on soft information
- ▶ We compute the long-run average of the share of GSLP loans for each county.

Hypothesis: Small banks respond more strongly where lower need for GSLP.

- ▶ (+) coefficient on  $\Delta Share_{county}^{Big4} \times HiGSLP$

# Supply-Side: Securitizedability

	Small Banks			Shadow Banks			Fintech		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$z\Delta Share_{county}^{Big4}$	-0.048*** ( $<0.01$ )	-0.046*** ( $<0.01$ )	-0.061*** ( $<0.01$ )						
zGSLP	0.020*** ( $<0.01$ )	0.014*** ( $<0.01$ )							
$z\Delta Share_{county}^{Big4} \times zGSLP$	0.008*** (0.01)	0.007** (0.03)							
HiGSLP			0.014** (0.01)						
$z\Delta Share_{county}^{Big4} \times HiGSLP$			0.022** (0.03)						
Controls	No	Yes	Yes						
State FE	Yes	Yes	Yes						
Observations	3050	2985	2985						
$R^2$	0.203	0.223	0.216						
Fstat	157	230	93						

# Supply-Side: Securitizedizability

	Small Banks			Shadow Banks			Fintech		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$z\Delta Share_{county}^{Big4}$	-0.048*** ( $<0.01$ )	-0.046*** ( $<0.01$ )	-0.061*** ( $<0.01$ )	-0.011*** ( $<0.01$ )	-0.013*** ( $<0.01$ )	-0.004 (0.44)	-0.008*** ( $<0.01$ )	-0.007*** ( $<0.01$ )	-0.007*** ( $<0.01$ )
zGSLP	0.020*** ( $<0.01$ )	0.014*** ( $<0.01$ )		-0.005 (0.16)	-0.000 (0.90)		0.001 (0.34)	0.001 (0.39)	
$z\Delta Share_{county}^{Big4} \times zGSLP$	0.008*** (0.01)	0.007** (0.03)		-0.007** (0.04)	-0.005 (0.13)		0.000 (0.83)	0.000 (0.92)	
HiGSLP			0.014** (0.01)			0.003 (0.39)			0.002 (0.22)
$z\Delta Share_{county}^{Big4} \times HiGSLP$			0.022** (0.03)			-0.015 (0.13)			0.000 (0.86)
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3050	2985	2985	3050	2985	2985	3050	2985	2985
$R^2$	0.203	0.223	0.216	0.033	0.074	0.069	-0.023	-0.011	-0.011
Fstat	157	230	93	157	230	93	157	230	93



## Demand-Side: Consumer Choice for Banks (over Nonbanks)

Some people just would rather deal with a bank . . . but how can we measure this?

- ▶ HMDA has all applications, so we we classify loan applications from 2001-2009 into:
  1. loan denied
  2. loan originated
  3. approved, but not originated

$$ChooseBanks_{county} = \frac{\#originations_{Banks}}{\#application\ not\ denied_{Banks}} - \frac{\#originations_{nonbanks}}{\#application\ not\ denied_{nonbanks}} \quad (5)$$

Hypothesis: Small banks respond more strongly where there is a higher choice for banks.

- ▶ (−) coefficient on  $\Delta Share_{county}^{Big4} \times HiChooseBanks$

## Demand-Side: Consumer Choice for Banks (over Nonbanks)

Some people just would rather deal with a bank ... but how can we measure this?

- ▶ HMDA has all applications, so we we classify loan applications from 2001-2009 into:
  1. loan denied
  2. loan originated
  3. approved, but not originated

$$ChooseBanks_{county} = \frac{\#originations_{Banks}}{\#application\ not\ denied_{Banks}} - \frac{\#originations_{nonbanks}}{\#application\ not\ denied_{nonbanks}} \quad (5)$$

Hypothesis: Small banks respond more strongly where there is a higher choice for banks.

- ▶ (−) coefficient on  $\Delta Share_{county}^{Big4} \times HiChooseBanks$

## Demand-Side: Consumer Choice for Banks (over Nonbanks)

Some people just would rather deal with a bank ... but how can we measure this?

- ▶ HMDA has all applications, so we we classify loan applications from 2001-2009 into:
  1. loan denied
  2. loan originated
  3. approved, but not originated

$$ChooseBanks_{county} = \frac{\#originations_{Banks}}{\#application\ not\ denied_{Banks}} - \frac{\#originations_{nonbanks}}{\#application\ not\ denied_{nonbanks}} \quad (5)$$

Hypothesis: Small banks respond more strongly where there is a higher choice for banks.

- ▶ (−) coefficient on  $\Delta Share_{county}^{Big4} \times HiChooseBanks$

## Demand-Side: Consumer Choice for Banks (over Nonbanks)

Some people just would rather deal with a bank ... but how can we measure this?

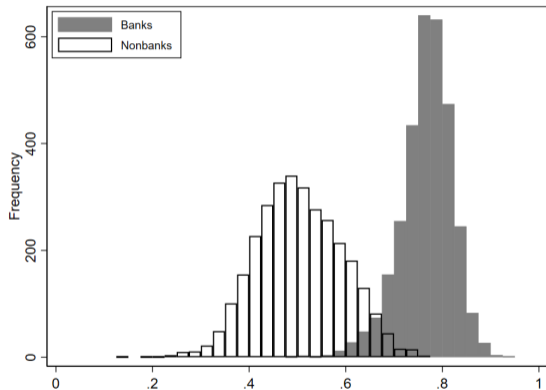
- ▶ HMDA has all applications, so we we classify loan applications from 2001-2009 into:
  1. loan denied
  2. loan originated
  3. approved, but not originated

$$ChooseBanks_{county} = \frac{\#originations_{Banks}}{\#application\ not\ denied_{Banks}} - \frac{\#originations_{nonbanks}}{\#application\ not\ denied_{nonbanks}} \quad (5)$$

Hypothesis: Small banks respond more strongly where there is a higher choice for banks.

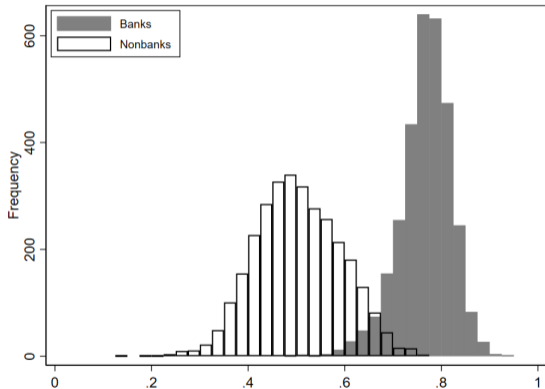
- ▶ (−) coefficient on  $\Delta Share_{county}^{Big4} \times HiChooseBanks$

# Choice for Banks (over Nonbanks) [▶ Map](#)

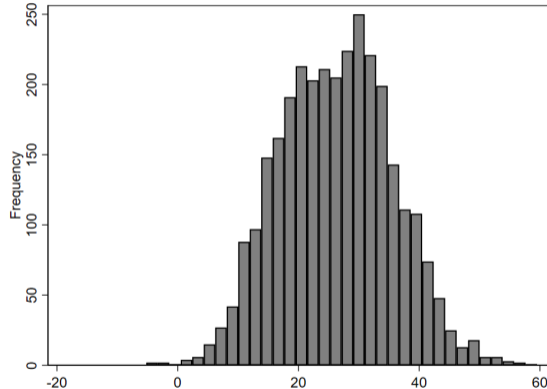


Conversion Rates by Group

# Choice for Banks (over Nonbanks) ▶ Map



Conversion Rates by Group



Choice of Banks over NonBanks

# Choice for Banks (over Nonbanks)

	Small Banks			Shadow Banks			Fintech		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$z\Delta Share_{county}^{Big4}$	-0.043*** ( $<0.01$ )	-0.040*** ( $<0.01$ )	-0.030*** ( $<0.01$ )						
$zChooseBanks$	-0.020*** ( $<0.01$ )	-0.017*** ( $<0.01$ )							
$z\Delta Share_{county}^{Big4} \times zChooseBanks$	-0.010* (0.06)	-0.013** (0.03)							
$HiChooseBanks$			-0.019*** ( $<0.01$ )						
$z\Delta Share_{county}^{Big4} \times HiChooseBanks$			-0.030** (0.03)						
Controls	No	Yes	Yes						
State FE	Yes	Yes	Yes						
Observations	3033	2972	2972						
$R^2$	0.214	0.238	0.230						
Fstat	129	121	82						

# Choice for Banks (over Nonbanks)

	Small Banks			Shadow Banks			Fintech		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$z\Delta Share_{county}^{Big4}$	-0.043*** ( $<0.01$ )	-0.040*** ( $<0.01$ )	-0.030*** ( $<0.01$ )	-0.018*** ( $<0.01$ )	-0.018*** ( $<0.01$ )	-0.019*** ( $<0.01$ )	-0.006*** ( $<0.01$ )	-0.007*** ( $<0.01$ )	-0.007*** ( $<0.01$ )
$zChooseBanks$	-0.020*** ( $<0.01$ )	-0.017*** ( $<0.01$ )		0.017*** ( $<0.01$ )	0.015*** ( $<0.01$ )		-0.005*** ( $<0.01$ )	-0.005*** ( $<0.01$ )	
$z\Delta Share_{county}^{Big4} \times zChooseBanks$	-0.010* (0.06)	-0.013** (0.03)		0.004 (0.27)	0.004 (0.36)		-0.000 (0.73)	-0.000 (0.96)	
$HiChooseBanks$			-0.019*** ( $<0.01$ )			0.015** (0.02)			-0.005** (0.02)
$z\Delta Share_{county}^{Big4} \times HiChooseBanks$			-0.030** (0.03)			0.007 (0.45)			0.000 (0.92)
Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3033	2972	2972	3033	2972	2972	3033	2972	2972
$R^2$	0.214	0.238	0.230	0.074	0.100	0.089	0.007	0.007	-0.006
Fstat	129	121	82	129	121	82	129	121	82.227



## Horse Race: Independent Effects

	Small Banks		Shadow Banks		Fintech	
	(1)	(2)	(3)	(4)	(5)	(6)
$z\Delta Share_{county}^{Big4}$	-0.037*** ( $<0.01$ )	-0.046*** ( $<0.01$ )				
GSLP	0.017*** ( $<0.01$ )					
zChooseBanks	-0.023*** ( $<0.01$ )					
$z\Delta Share_{county}^{Big4} \times zGSLP$	0.007 (0.17)					
$z\Delta Share_{county}^{Big4} \times zChooseBanks$	-0.015* (0.07)					
HiGSLP		0.030*** ( $<0.01$ )				
HiChooseBanks		-0.033*** ( $<0.01$ )				
$z\Delta Share_{county}^{Big4} \times HiGSLP$		0.031*** ( $<0.01$ )				
$z\Delta Share_{county}^{Big4} \times HiChooseBanks$		-0.028*** ( $<0.01$ )				
Controls	Yes	Yes				
State FE	Yes	Yes				
Observations	2972	2972				
$R^2$	0.246	0.234				
Fstat	47	55				

## Horse Race: Independent Effects

	Small Banks		Shadow Banks		Fintech	
	(1)	(2)	(3)	(4)	(5)	(6)
$z\Delta Share_{county}^{Big4}$	-0.037*** ( $<0.01$ )	-0.046*** ( $<0.01$ )				
GSLP	0.017*** ( $<0.01$ )					
zChooseBanks	-0.023*** ( $<0.01$ )					
$z\Delta Share_{county}^{Big4} \times zGSLP$	0.007 (0.17)					
$z\Delta Share_{county}^{Big4} \times zChooseBanks$	-0.015* (0.07)					
HiGSLP		0.030*** ( $<0.01$ )				
HiChooseBanks		-0.033*** ( $<0.01$ )				
$z\Delta Share_{county}^{Big4} \times HiGSLP$		0.031*** ( $<0.01$ )				
$z\Delta Share_{county}^{Big4} \times HiChooseBanks$		-0.028*** ( $<0.01$ )				
Controls	Yes	Yes				
State FE	Yes	Yes				
Observations	2972	2972				
$R^2$	0.246	0.234				
Fstat	47	55				

## Horse Race: Independent Effects

	Small Banks		Shadow Banks		Fintech	
	(1)	(2)	(3)	(4)	(5)	(6)
$z\Delta Share_{county}^{Big4}$	-0.037*** ( $<0.01$ )	-0.046*** ( $<0.01$ )	-0.018*** ( $<0.01$ )	-0.012** (0.01)	-0.007*** ( $<0.01$ )	-0.006*** ( $<0.01$ )
GSLP	0.017*** ( $<0.01$ )		-0.002 (0.69)		0.000 (0.86)	
zChooseBanks	-0.023*** ( $<0.01$ )		0.017*** ( $<0.01$ )		-0.005*** ( $<0.01$ )	
$z\Delta Share_{county}^{Big4} \times zGSLP$	0.007 (0.17)		-0.005 (0.32)		-0.001 (0.68)	
$z\Delta Share_{county}^{Big4} \times zChooseBanks$	-0.015* (0.07)		0.005 (0.35)		0.000 (1.00)	
HiGSLP		0.030*** ( $<0.01$ )		-0.005 (0.47)		0.001 (0.80)
HiChooseBanks		-0.033*** ( $<0.01$ )		0.020*** (0.01)		-0.004* (0.07)
$z\Delta Share_{county}^{Big4} \times HiGSLP$		0.031*** ( $<0.01$ )		-0.017* (0.07)		-0.002 (0.36)
$z\Delta Share_{county}^{Big4} \times HiChooseBanks$		-0.028*** ( $<0.01$ )		0.009 (0.15)		-0.000 (0.97)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2972	2972	2972	2972	2972	2972
$R^2$	0.246	0.234	0.097	0.085	0.010	-0.001
Fstat	47	55	47	55	47	55

# Does the composition of mortgage credit matter?

- ▶ Access and cost of credit
  - ▶ Costs of renting and mortgage denial rates (Gete & Reher 2018)
  - ▶ [the distribution of mortgage credit \(D'Acunto & Rossi 2017\)](#)
- ▶ Loan Quality and Stability of Suppliers of Credit
  - ▶ Loan quality (Demyanyk & Loutskina 2016)
  - ▶ Systemic risk (Kim, Laufer, Stanton, Wallace, & Pence 2018)
- ▶ Effects of capital regulation and monetary policy transmission
  - ▶ Buchak, Matvos, Piskorski, & Seru (2018)
  - ▶ Elliott, Meisenzahl, Peydro, & Turner (2019)

## Effects on the Distribution of Credit

	(1) <100k	(2) 100k-200k	(3) 200k-417k	(4) 417k-700k	(5) >700k
Big4 × Post2011	-0.03 (0.15)	-0.04*** (<0.01)	-0.05*** (<0.01)	-0.01 (0.51)	0.26*** (<0.01)
zSmall/Nonbanks × Post2011	-0.00 (0.80)	0.00** (0.01)	-0.00*** (<0.01)	0.00 (0.21)	0.01 (0.44)
Big4 × Post2011 × zSmall/Nonbanks	0.00 (0.82)	-0.00 (0.38)	0.02*** (<0.01)	-0.03 (0.34)	-0.07 (0.42)
Big4	0.05** (0.01)	-0.01 (0.55)	-0.02** (0.03)	-0.01 (0.71)	-0.09 (0.30)
Income, Home Prices, Demographics Year and County FE	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
Observations	1850037	4471876	3818419	504023	194023
$R^2$	0.07	0.17	0.33	0.19	0.38

$p$ -values in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Effects on the Distribution of Credit

	(1) <100k	(2) 100k-200k	(3) 200k-417k	(4) 417k-700k	(5) >700k
Big4 × Post2011	-0.03 (0.15)	-0.04*** (<0.01)	-0.05*** (<0.01)	-0.01 (0.51)	0.26*** (<0.01)
zSmall/Nonbanks × Post2011	-0.00 (0.80)	0.00** (0.01)	-0.00*** (<0.01)	0.00 (0.21)	0.01 (0.44)
Big4 × Post2011 × zSmall/Nonbanks	0.00 (0.82)	-0.00 (0.38)	0.02*** (<0.01)	-0.03 (0.34)	-0.07 (0.42)
Big4	0.05** (0.01)	-0.01 (0.55)	-0.02** (0.03)	-0.01 (0.71)	-0.09 (0.30)
Income, Home Prices, Demographics Year and County FE	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
Observations	1850037	4471876	3818419	504023	194023
$R^2$	0.07	0.17	0.33	0.19	0.38

$p$ -values in parentheses

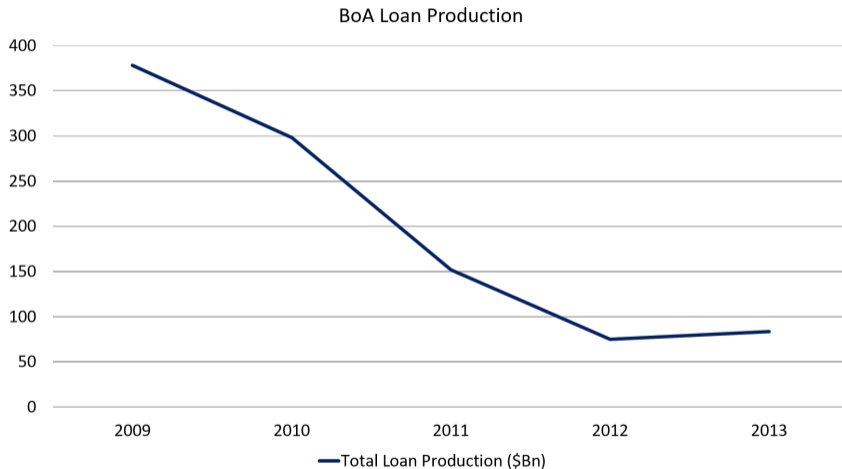
\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Granularity in the Mortgage Market: Bank of America

Bank of America (BoA) had the sharpest withdrawal of the Big4 during the sample period.

- ▶ Around \$80bn in fines since the crisis, with \$50bn from activities related to Countrywide.
- ▶ Post-crisis, BoA sharply dropped their participation in the mortgage origination market.
- ▶ Examining BoA's sharp retreat provides a nice setting to study a single (very large) player's degree of influence in this market.

# Bank of America's Loan Production



Source: BoA 10Ks



## Granularity in the Mortgage Market: Bank of America

Bank of America (BoA) had the sharpest withdrawal of the Big4 during the sample period.

Same setup as before, but also exploit a second instrument for change in BoA's share

## Granularity in the Mortgage Market: Bank of America

Bank of America (BoA) had the sharpest withdrawal of the Big4 during the sample period.

Same setup as before, but also exploit a second instrument for change in BoA's share

- ▶ Prior to the acquisition, Countrywide was the top originator in the country.
- ▶ Despite the increases to BoA's market share, the acquisition proved financially disastrous.

## Granularity in the Mortgage Market: Bank of America

Bank of America (BoA) had the sharpest withdrawal of the Big4 during the sample period.

Same setup as before, but also exploit a second instrument for change in BoA's share

- ▶ Prior to the acquisition, Countrywide was the top originator in the country.
- ▶ Despite the increases to BoA's market share, the acquisition proved financially disastrous.
- ▶ We now use Countrywide's 2007 (i.e., pre-acquisition) county share of originations ( $Share_{CW}^{07}$ ) as an alternative instrument for  $\Delta Share_{BoA}^{09-13}$ .

## Granularity in the Mortgage Market: Bank of America

Bank of America (BoA) had the sharpest withdrawal of the Big4 during the sample period.

Same setup as before, but also exploit a second instrument for change in BoA's share

- ▶ Prior to the acquisition, Countrywide was the top originator in the country.
- ▶ Despite the increases to BoA's market share, the acquisition proved financially disastrous.
- ▶ We now use Countrywide's 2007 (i.e., pre-acquisition) county share of originations ( $Share_{CW}^{07}$ ) as an alternative instrument for  $\Delta Share_{BoA}^{09-13}$ .

We find a substantial reallocation: strongest effects for small banks.

# Conclusions

# Conclusions

We present a more nuanced picture of the post-crisis mortgage market:

- ▶ Retreat of traditional banks is concentrated in large banks – small banks are constant.
- ▶ Nonbanks' growth is (relatively) insensitive to local Big4 withdrawal.
- ▶ Small banks are very responsive to fill this gap in post-crisis mortgage lending.
  - ▶ within-lender reallocation toward areas vacated by the Big4.

Some implications:

- ▶ Small banks remain important, even in a time of increasing tech innovation.
  - ▶ policies affecting small banks should take their unique role into account.
- ▶ Even in good times, market participation decisions of a single player amongst the TBTF banks (e.g., BoA) can have far-reaching effects through the reallocation of lending.

# Conclusions

We present a more nuanced picture of the post-crisis mortgage market:

- ▶ Retreat of traditional banks is concentrated in large banks – small banks are constant.
- ▶ Nonbanks' growth is (relatively) insensitive to local Big4 withdrawal.
- ▶ Small banks are very responsive to fill this gap in post-crisis mortgage lending.
  - ▶ within-lender reallocation toward areas vacated by the Big4.

Some implications:

- ▶ Small banks remain important, even in a time of increasing tech innovation.
  - ▶ policies affecting small banks should take their unique role into account.
- ▶ Even in good times, market participation decisions of a single player amongst the TBTF banks (e.g., BoA) can have far-reaching effects through the reallocation of lending.

# Conclusions

We present a more nuanced picture of the post-crisis mortgage market:

- ▶ Retreat of traditional banks is concentrated in large banks – small banks are constant.
- ▶ Nonbanks' growth is (relatively) insensitive to local Big4 withdrawal.
- ▶ Small banks are very responsive to fill this gap in post-crisis mortgage lending.
  - ▶ within-lender reallocation toward areas vacated by the Big4.

Some implications:

- ▶ Small banks remain important, even in a time of increasing tech innovation.
  - ▶ policies affecting small banks should take their unique role into account.
- ▶ Even in good times, market participation decisions of a single player amongst the TBTF banks (e.g., BoA) can have far-reaching effects through the reallocation of lending.



# Conclusions

We present a more nuanced picture of the post-crisis mortgage market:

- ▶ Retreat of traditional banks is concentrated in large banks – small banks are constant.
- ▶ Nonbanks' growth is (relatively) insensitive to local Big4 withdrawal.
- ▶ Small banks are very responsive to fill this gap in post-crisis mortgage lending.
  - ▶ within-lender reallocation toward areas vacated by the Big4.

Some implications:

- ▶ Small banks remain important, even in a time of increasing tech innovation.
  - ▶ policies affecting small banks should take their unique role into account.
- ▶ Even in good times, market participation decisions of a single player amongst the TBTF banks (e.g., BoA) can have far-reaching effects through the reallocation of lending.

# Conclusions

We present a more nuanced picture of the post-crisis mortgage market:

- ▶ Retreat of traditional banks is concentrated in large banks – small banks are constant.
- ▶ Nonbanks' growth is (relatively) insensitive to local Big4 withdrawal.
- ▶ Small banks are very responsive to fill this gap in post-crisis mortgage lending.
  - ▶ within-lender reallocation toward areas vacated by the Big4.

Some implications:

- ▶ Small banks remain important, even in a time of increasing tech innovation.
  - ▶ policies affecting small banks should take their unique role into account.
- ▶ Even in good times, market participation decisions of a single player amongst the TBTF banks (e.g., BoA) can have far-reaching effects through the reallocation of lending.

# Conclusions

We present a more nuanced picture of the post-crisis mortgage market:

- ▶ Retreat of traditional banks is concentrated in large banks – small banks are constant.
- ▶ Nonbanks' growth is (relatively) insensitive to local Big4 withdrawal.
- ▶ Small banks are very responsive to fill this gap in post-crisis mortgage lending.
  - ▶ within-lender reallocation toward areas vacated by the Big4.

Some implications:

- ▶ Small banks remain important, even in a time of increasing tech innovation.
  - ▶ policies affecting small banks should take their unique role into account.
- ▶ Even in good times, market participation decisions of a single player amongst the TBTF banks (e.g., BoA) can have far-reaching effects through the reallocation of lending.

# Small bank lending in the era of fintech and shadow banking: a sideshow?

Taylor Begley<sup>1</sup>    Kandarp Srinivasan<sup>2</sup>

<sup>1</sup>Washington University in St. Louis

<sup>2</sup>Northeastern University

November 2019

Financial System of the Future Conference