Local Lending Specialization and Monetary Policy

Alejandro Casado[1] David Martinez-Miera[1,2]

[1] *Universidad Carlos III de Madrid*

[2] *CEPR*

BdE-CEMFI Conference on Financial Stability

29-30 June 2023

Motivation: Monetary policy and bank lending

- **Monetary Policy (MP) relevant tool for economic policy**
  - ▷ High potential to affect economy
  - ▷ Affects multiple agents through various channels

Motivation: Monetary policy and bank lending

- **Monetary Policy (MP) relevant tool for economic policy**
  - ▷ High potential to affect economy
  - ▷ Affects multiple agents through various channels
- **Banks at the core of MP transmission to the economy**
  - ▷ Transmit MP to the real economy through their decisions
  - ▷ Loans, deposits, asset purchases, ...
  - ▷ **Understanding what determines banks transmission of MP is key**

Motivation: Monetary policy and bank lending

- **Monetary Policy (MP) relevant tool for economic policy**
  - ▷ High potential to affect economy
  - ▷ Affects multiple agents through various channels
- **Banks at the core of MP transmission to the economy**
  - ▷ Transmit MP to the real economy through their decisions
  - ▷ Loans, deposits, asset purchases, ...
  - ▷ **Understanding what determines banks transmission of MP is key**
- **This paper: Focus on relation between bank lending and MP**
  - ▷ Bank lending channel of MP: Lending reacts to monetary policy
  - ▷ E.g. *Bernanke and Gertler (1995)*
  - ▷ *"Possible effect of monetary policy actions on the supply of loans"*

Motivation: Monetary policy and bank specialization

- Bank lending responses to MP are **heterogeneous**
- **Heterogeneous transmission of monetary policy** to bank lending
  - Bank characteristics: Size, liquidity and capital *(Kashyap and Stein, 2000; Jimenez et al., 2012)*
  - Banking market characteristics: Local deposit competition *(Drechsler et al., 2017)*
  - Bank-market characteristics: bank market share *(Giannetti and Saidi, 2019)*

Motivation: Monetary policy and bank specialization

- Bank lending responses to MP are **heterogeneous**
- **Heterogeneous transmission of monetary policy** to bank lending
  - Bank characteristics: Size, liquidity and capital *(Kashyap and Stein, 2000; Jimenez et al., 2012)*
  - Banking market characteristics: Local deposit competition *(Drechsler et al., 2017)*
  - Bank-market characteristics: bank market share *(Giannetti and Saidi, 2019)*
- Novel bank-market characteristic **local lending specialization**
  - Banks heterogeneously specialize in geographical markets
  - Influences information collection *(Loutskina and Strahan, 2011)*
  - It impacts bank exposure to local negative shocks *(Goetz et al., 2016)*

Overview: Research question

Research Question

Does local lending market specialization affect the transmission of monetary policy to banks' loan supply?

Overview: Research question

Research Question

Does local lending market specialization affect the transmission of monetary policy to banks' loan supply?

- **Bank's local specialization**
  - ▷ Relevance of each **geographical** lending market for a given bank-year
  - ▷ U.S. mortgage market

Overview: Research question

Research Question

Does local lending market specialization affect the transmission of monetary policy to banks' loan supply?

- **Bank's local specialization**
  - ▷ Relevance of each **geographical** lending market for a given bank-year
  - ▷ U.S. mortgage market
- **Monetary policy changes**
  - ▷ Fed funds target rate
  - ▷ Exogenous shocks *(Jarociński and Karadi, 2020)*

Specialization variable

- Capture the relevance of a given county for a given bank
- Specialization of a given bank b in county c and year t:

$$Spec_{bct} = \frac{A_{bct}}{A_{bt}} = \frac{\text{New mortgages by } \textbf{bank b} \text{ in county c in year t}}{\text{Total new mortgage lending by } \textbf{bank b} \text{ in year t}}$$

  - Where A refers to new mortgage lending
  - **Geographical** specialization

▸ Serial Correlation

Specialization variable

- Capture the relevance of a given county for a given bank
- Specialization of a given bank b in county c and year t:

$$Spec_{bct} = \frac{A_{bct}}{A_{bt}} = \frac{\text{New mortgages by } \textbf{bank b} \text{ in county c in year t}}{\text{Total new mortgage lending by } \textbf{bank b} \text{ in year t}}$$

  - Where A refers to new mortgage lending
  - **Geographical** specialization

- Higher values of bank's specialization in a given local market and year
  - Imply that such specific local market is relatively more important in banks' allocation of new mortgage lending

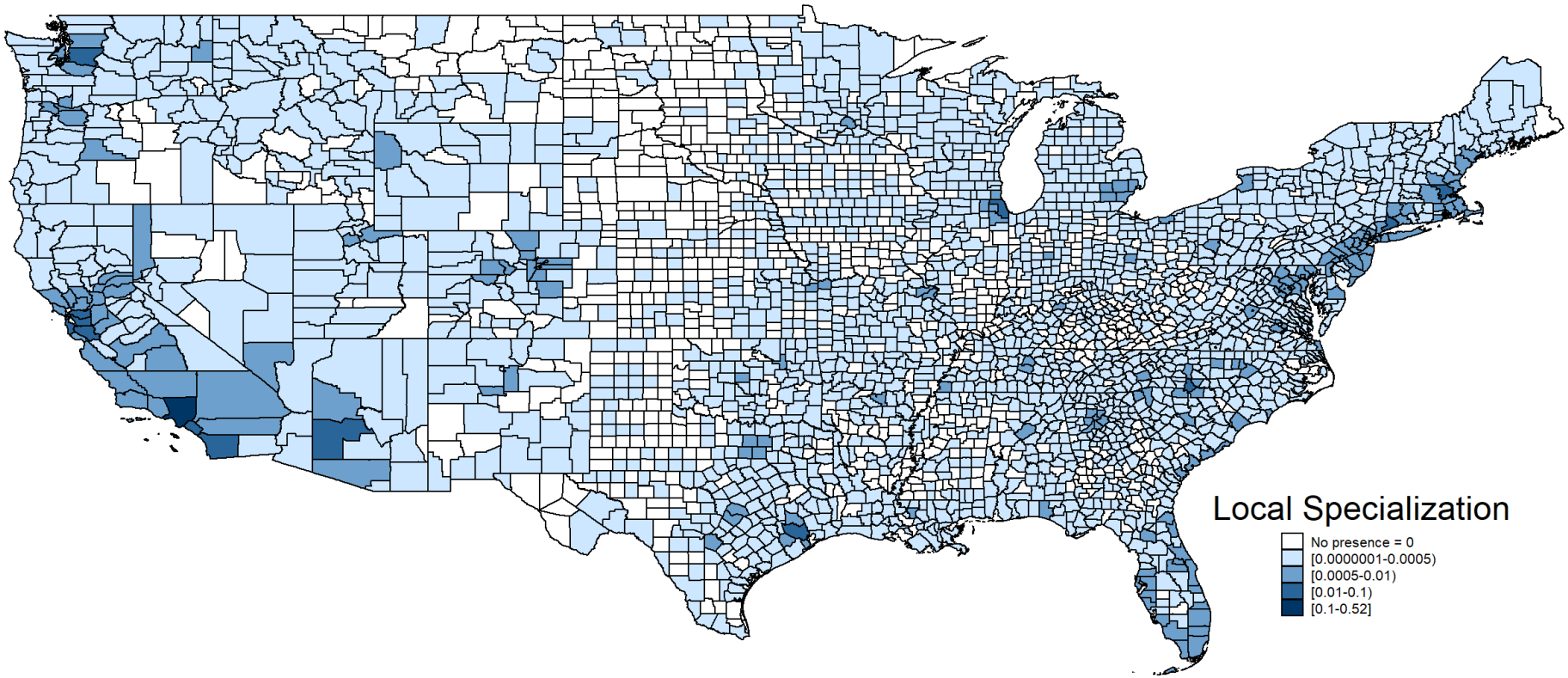
▸ Serial Correlation

Example specialization

- Bank 1
- Year 2001
- New mortgage lending:
  - Market A: \$9 million
  - Market B: \$1 million
- Specialization:
  - Market A: 0.9
  - Market B: 0.1

Real example specialization

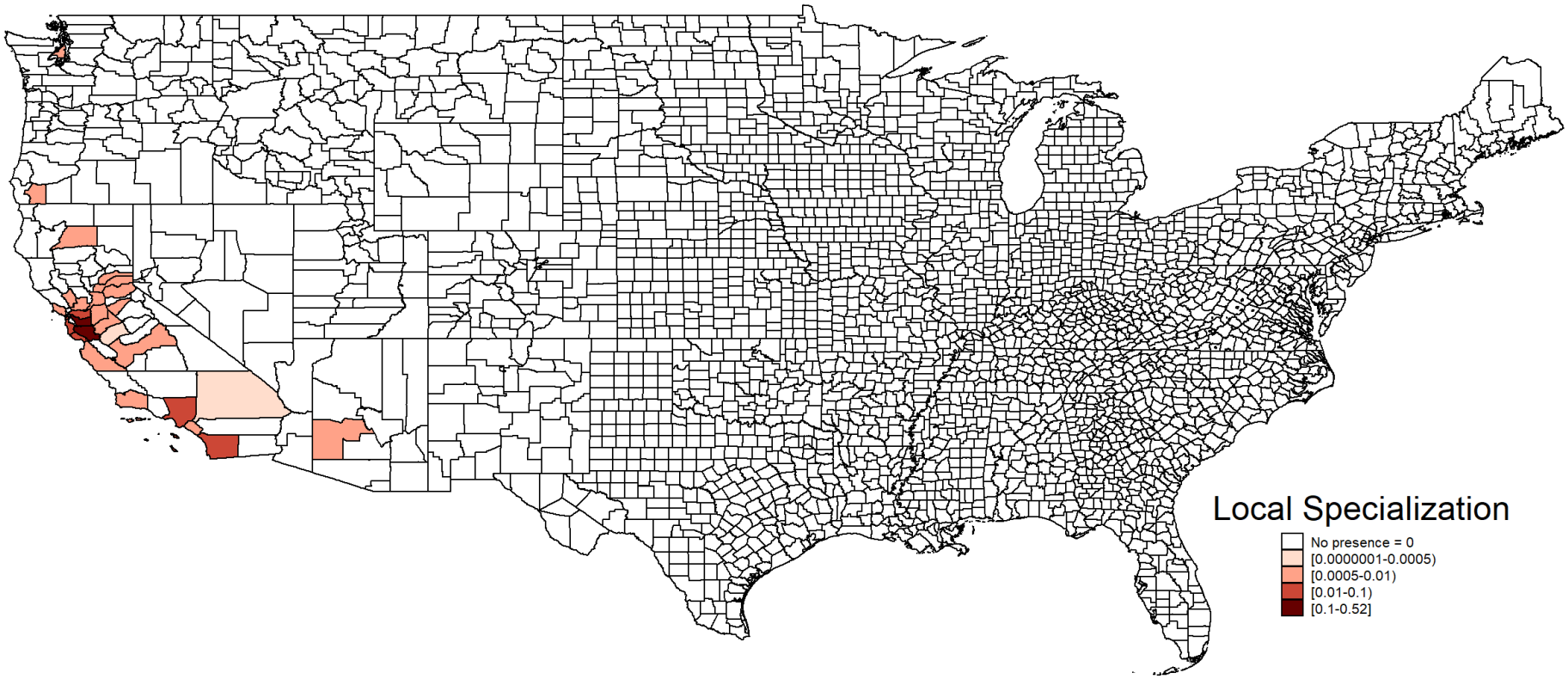
- Bank of America, National Association (2016) $60.1 billion
  - ▷ Los Angeles County $7.3 billion Spec=0.12 (highest)
  - ▷ Santa Clara County $3.3 billion Spec=0.06



◂ 2006

Real example specialization

- Technology Credit Union (2016) $297.4 million
  - ▷ Los Angeles County $4 million Spec=0.015
  - ▷ Santa Clara County $153 million Spec=0.52 (highest)



Specialization vs market share

- Specialization: relevance of a given county for a given bank

$$Spec_{bct} = \frac{A_{bct}}{A_{bt}} = \frac{\text{New mortgages by } \textbf{bank b} \text{ in county c in year t}}{\text{Total new mortgage lending by } \textbf{bank b} \text{ in year t}}$$

Specialization vs market share

- Specialization: relevance of a given county for a given bank

$$Spec_{bct} = \frac{A_{bct}}{A_{bt}} = \frac{\text{New mortgages by } \textbf{bank b} \text{ in county c in year t}}{\text{Total new mortgage lending by } \textbf{bank b} \text{ in year t}}$$

- Market share: capture the relevance of a given bank in a given county

$$MktSh_{bct} = \frac{A_{bct}}{A_{ct}} = \frac{\text{New mortgages by bank b in } \textbf{county c} \text{ in year t}}{\text{Total new mortgage lending in } \textbf{county c} \text{ in year t}}$$

- Market B:
  - ▷ Bank 1: \$1 million Spec=0.1 MktShare=1

Specialization vs market share

- Specialization: relevance of a given county for a given bank

$$Spec_{bct} = \frac{A_{bct}}{A_{bt}} = \frac{\text{New mortgages by } \textbf{bank b} \text{ in county c in year t}}{\text{Total new mortgage lending by } \textbf{bank b} \text{ in year t}}$$

- Market share: capture the relevance of a given bank in a given county

$$MktSh_{bct} = \frac{A_{bct}}{A_{ct}} = \frac{\text{New mortgages by bank b in } \textbf{county c} \text{ in year t}}{\text{Total new mortgage lending in } \textbf{county c} \text{ in year t}}$$

- Market A:
  - ▷ Bank 1: \$9 million Spec=0.9 MktShare=0.75
  - ▷ Bank 2: \$3 million Spec=1 MktShare=0.25

- Market B:
  - ▷ Bank 1: \$1 million Spec=0.1 MktShare=1

Overview: Preview of findings

- **Micro evidence**
- **Estimation strategy**
  - ▷ Within-bank and within-county

Overview: Preview of findings

- **Micro evidence**
- **Estimation strategy**
  - ▷ Within-bank and within-county
- **Main result**
  - ▷ After a reduction in the Fed funds rate
  - ▷ Banks increase new mortgage supply growth relatively more
  - ▷ in markets where they are more specialized
  - ▷ relative to other markets in which the bank is present
  - ▷ relative to other banks that are less specialized in such market

Overview: Preview of findings

- **Micro evidence**
- **Estimation strategy**
  - ▷ Within-bank and within-county
- **Main result**
  - ▷ After a reduction in the Fed funds rate
  - ▷ Banks increase new mortgage supply growth relatively more
  - ▷ in markets where they are more specialized
  - ▷ relative to other markets in which the bank is present
  - ▷ relative to other banks that are less specialized in such market
- **Economic magnitude**
  - ▷ 100 bps decrease in FF
  - ▷ A 1 s.d. increase in specialization
  - ▷ Increases new mortgage supply growth by 54 bps

Overview: Preview of findings

- **Aggregate evidence**

Overview: Preview of findings

- **Aggregate evidence**
- **Regional**
  - ▷ After a reduction in the Fed funds rate (100 bps)
  - ▷ Counties more exposed to specialized banks (1 s.d. increase)
  - ▷ Experience increase in growth of mortgage lending (138 bps), house price (14 bps), wage (9 bps) & employment (2 bps)

Overview: Preview of findings

- **Aggregate evidence**
- **Regional**
  - ▷ After a reduction in the Fed funds rate (100 bps)
  - ▷ Counties more exposed to specialized banks (1 s.d. increase)
  - ▷ Experience increase in growth of mortgage lending (138 bps), house price (14 bps), wage (9 bps) & employment (2 bps)
- **Bank**
  - ▷ After a reduction in the Fed funds rate (100 bps)
  - ▷ Banks increase specialization growth (47 bps) (decrease diversification)

Overview: Preview of findings

- **Mechanism evidence**

Overview: Preview of findings

- **Mechanism evidence**
- **Simple theoretical model**
  - ▷ Heterogenous bank-market specific lending costs

Overview: Preview of findings

- **Mechanism evidence**
- **Simple theoretical model**
  - ▷ Heterogenous bank-market specific lending costs
- **Empirical evidence**
  - ▷ Informational asymmetries proxies
  - ▷ Distance between county and bank headquarters

Literature review

- Heterogeneity in the transmission of monetary policy to the economy
  - Bank characteristics: Size, liquidity and capital *(Kashyap and Stein, 2000; Jimenez et al., 2012)*
  - Deposit market competition *(Drechsler et al., 2017)*
  - **New variable**: Banks' local specialization

Literature review

- Heterogeneity in the transmission of monetary policy to the economy
  - Bank characteristics: Size, liquidity and capital *(Kashyap and Stein, 2000; Jimenez et al., 2012)*
  - Deposit market competition *(Drechsler et al., 2017)*
  - **New variable**: Banks' local specialization

- Shocks affecting banks transmitted to the economy
  - Depending on bank market structure characteristics
  - Local bank market share *(Giannetti and Saidi, 2019)*
  - Share of mortgages retained *(Favara and Giannetti, 2017)*
  - **New variable**: Banks' local specialization

Literature review

- Bank specialization (opposite to diversification)
  - Advantages *(e.g., Loutskina and Strahan, 2011)*
  - Disadvantages *(e.g., Goetz et al., 2016)*
  - **New determinant**: Monetary policy

Literature review

- Bank specialization (opposite to diversification)
  - ▷ Advantages *(e.g., Loutskina and Strahan, 2011)*
  - ▷ Disadvantages *(e.g., Goetz et al., 2016)*
  - ▷ **New determinant**: Monetary policy

- Monetary policy and the mortgage market
  - ▷ Housing boom and nonbanks *(Drechsler et al., 2022)*
  - ▷ **New relevant characteristic**: Banks' local specialization

Agenda

- Data & variable definition
- Identification strategy
- Micro evidence
- Aggregate evidence
- Mechanism
- Conclusion

Agenda

- **Data & variable definition**
- Identification strategy
- Micro evidence
- Aggregate evidence
- Mechanism
- Conclusion

Data 1994-2019

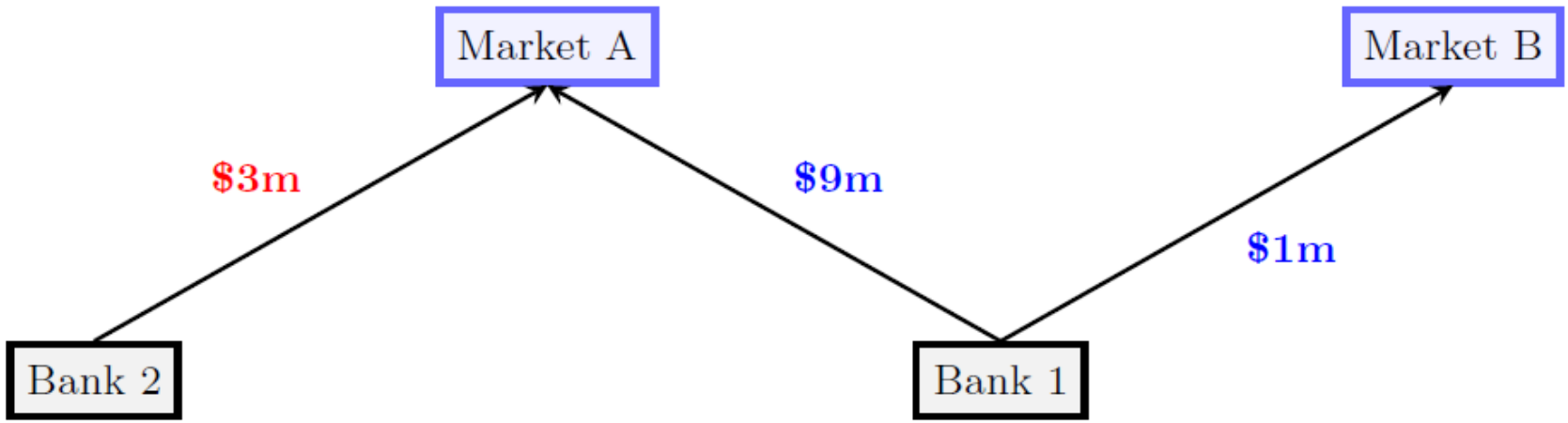
- Home Mortgage Disclosure Act (**HMDA**)
  - ▷ Bank-county-year level data on new mortgage lending quantities
- Federal Reserve Economic Data (FRED)
  - ▷ Annual monetary policy rates data (Fed funds target rate)
- Federal Housing Finance Agency (FHFA), Bureau of Labor Statistics (BLS), and Bureau of Economic Analysis (BEA)
  - ▷ County-year level data on house prices, wages, and employment
  - ▷ County-year controls on population and income per capita
- Summary of Deposits (SOD)
  - ▷ Branch-year level data on deposit quantities
- U.S. Call Reports
  - ▷ Bank-year level data on bank characteristics and HQ location

Agenda

- Data & variable definition
- **Identification strategy**
- Micro evidence
- Aggregate evidence
- Mechanism
- Conclusions

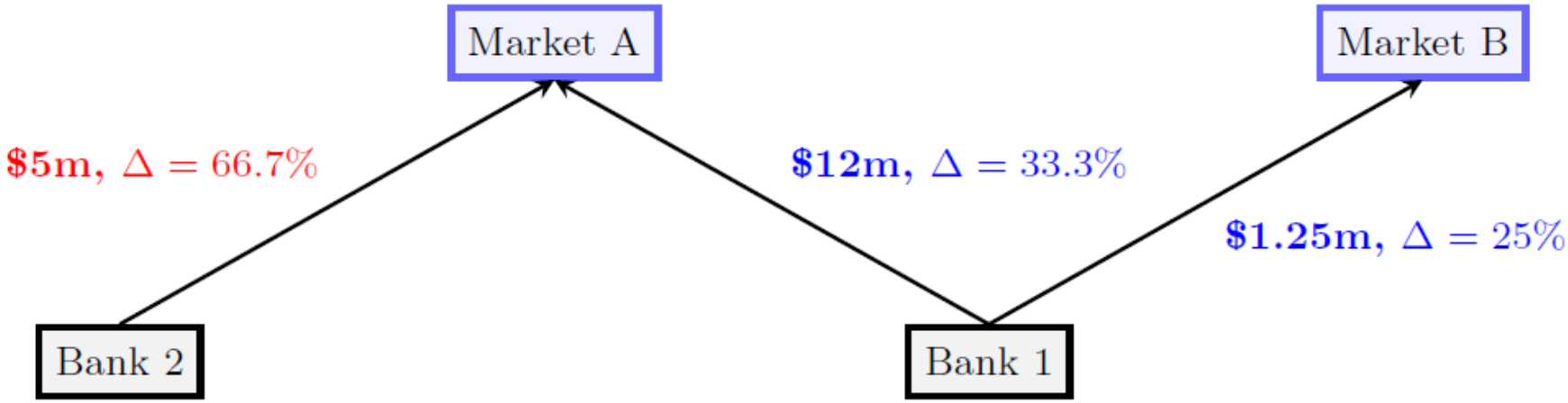
Identification strategy

- Differential response of bank's loan supply
  - ▷ To changes in the Fed funds rate
  - ▷ Depending on bank's local specialization



Identification strategy

- Differential response of bank's loan supply
  - ▷ To changes in the Fed funds rate
  - ▷ Depending on bank's local specialization



Identification strategy

- Most important omitted variables
- Change in **local lending opportunities**
  - ▷ *Change in loan demand*
- Time-variant **bank heterogeneity**
  - ▷ *Relevant bank characteristics*

Identification strategy

- Change in **local lending opportunities**

Identification strategy

- Change in **local lending opportunities**
- *Why?*
  - If Fed funds rate changes
  - Affect local lending opportunities differently across markets
  - Result may be caused by demand instead of supply

Identification strategy

- Change in **local lending opportunities**
- *Why?*
  - ▷ If Fed funds rate changes
  - ▷ Affect local lending opportunities differently across markets
  - ▷ Result may be caused by demand instead of supply
- *Solution*
  - ▷ County-time fixed effects

Identification strategy

- Change in **local lending opportunities**
- *Why?*
  - If Fed funds rate changes
  - Affect local lending opportunities differently across markets
  - Result may be caused by demand instead of supply
- *Solution*
  - County-time fixed effects
- *Identifying assumption*
  - Homogeneous demand inside markets

Identification strategy

- Change in **local lending opportunities**
- *Why?*
  - ▷ If Fed funds rate changes
  - ▷ Affect local lending opportunities differently across markets
  - ▷ Result may be caused by demand instead of supply
- *Solution*
  - ▷ County-time fixed effects
- *Identifying assumption*
  - ▷ Homogeneous demand inside markets
- E.g., *Drechsler et al. (2017)*

Identification strategy

- Time-variant **bank heterogeneity**

Identification strategy

- Time-variant **bank heterogeneity**
- *Why?*
  - If Fed funds rate changes
  - Affect liability side differently across banks
  - Result may be caused by bank financing instead of specialization

Identification strategy

- Time-variant **bank heterogeneity**
- *Why?*
  - ▷ If Fed funds rate changes
  - ▷ Affect liability side differently across banks
  - ▷ Result may be caused by bank financing instead of specialization
- *Solution*
  - ▷ Bank-time fixed effects

Identification strategy

- Time-variant **bank heterogeneity**
- *Why?*
  - If Fed funds rate changes
  - Affect liability side differently across banks
  - Result may be caused by bank financing instead of specialization
- *Solution*
  - Bank-time fixed effects
- *Identifying assumption*
  - Banks allocate funds internally

Identification strategy

- Time-variant **bank heterogeneity**
- *Why?*
  - ▷ If Fed funds rate changes
  - ▷ Affect liability side differently across banks
  - ▷ Result may be caused by bank financing instead of specialization
- *Solution*
  - ▷ Bank-time fixed effects
- *Identifying assumption*
  - ▷ Banks allocate funds internally
- Supported by *Gilje et al. (2016)*

Agenda

- Data & variable definition
- Identification strategy
- **Micro evidence**
- Aggregate evidence
- Mechanism
- Conclusion

Micro evidence: Baseline lending estimates

- Baseline regression:

$$\Delta y_{bct} = \omega_{bt} + \gamma_{ct} + \beta_1 \Delta FF_t \times Spec_{bc,t-1} + \beta_2 Spec_{bc,t-1} + \epsilon_{bct} \quad (1)$$

  - Δy_{bct} is growth rate of amount of new mortgage lending originated
  - By bank b in county c at year t

- $Spec_{bc,t-1}$
  - Bank's local specialization of bank b in market c and year $t-1$

- ΔFF_t
  - Difference in the Fed funds target rate from $t-1$ to t

- **County-time** (γ_{ct}) and **bank-time** (ω_{bt}) **fixed effects**

Dependent variable

- Growth rate of new lending

$$Growth_{bct} = \frac{A_{bct} - A_{bc,t-1}}{(A_{bct} + A_{bc,t-1})/2}$$

  - A refers to new mortgage lending
  - b, c and t represent bank, county and year

- Advantages:
  - Mitigates the effect of outliers (e.g., due to small denominator)
  - Include in robustness entries and exits

- *Cortés et al. (2020)*, among others

- Result robust to use log-difference and (non-symmetrical) growth rate

Micro evidence: Bank-county estimation

Table 1: Lending, Local Specialization, and Monetary Policy

	New mortgage lending growth			
	(1)	(2)	(3)	(4)
ΔFF$\times$Spec	-0.0283***	-0.0323***	-0.0692***	-0.0749***
	(0.00293)	(0.00253)	(0.0136)	(0.0148)
Spec	-0.0465***	-0.0545***	0.0412***	0.0363***
	(0.00632)	(0.00666)	(0.00932)	(0.00960)
Observations	1,557,766	1,562,955	1,594,588	1,599,605
R-squared	0.424	0.383	0.177	0.131
Bank-Year FE	Y	Y	N	N
County-Year FE	Y	N	Y	N
Bank FE	N	N	Y	Y
County FE	N	N	N	Y
Year FE	N	N	N	Y
Fipszero FE	N	Y	N	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County

Micro evidence: Bank-county estimation

Table 1: Lending, Local Specialization, and Monetary Policy

	New mortgage lending growth			
	(1)	(2)	(3)	(4)
ΔFF$\times$Spec	-0.0283***	-0.0323***	-0.0692***	-0.0749***
	(0.00293)	(0.00253)	(0.0136)	(0.0148)
Spec	-0.0465***	-0.0545***	0.0412***	0.0363***
	(0.00632)	(0.00666)	(0.00932)	(0.00960)
Observations	1,557,766	1,562,955	1,594,588	1,599,605
R-squared	0.424	0.383	0.177	0.131
Bank-Year FE	Y	Y	N	N
County-Year FE	Y	N	Y	N
Bank FE	N	N	Y	Y
County FE	N	N	N	Y
Year FE	N	N	N	Y
Fipszero FE	N	Y	N	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County

- Per 100 bps decrease in FF, a 1 s.d. increase in *Spec* (0.192):
  - ▷ Increases bank's new mortgage lending supply by 54.3 bps ¨

Micro evidence: Bank-county estimation

Table 1: Lending, Local Specialization, and Monetary Policy

	New mortgage lending growth			
	(1)	(2)	(3)	(4)
ΔFF$\times$Spec	-0.0283***	-0.0323***	-0.0692***	-0.0749***
	(0.00293)	(0.00253)	(0.0136)	(0.0148)
Spec	-0.0465***	-0.0545***	0.0412***	0.0363***
	(0.00632)	(0.00666)	(0.00932)	(0.00960)
Observations	1,557,766	1,562,955	1,594,588	1,599,605
R-squared	0.424	0.383	0.177	0.131
Bank-Year FE	Y	Y	N	N
County-Year FE	Y	N	Y	N
Bank FE	N	N	Y	Y
County FE	N	N	N	Y
Year FE	N	N	N	Y
Fipszero FE	N	Y	N	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County

- Per 100 bps decrease in FF, a 1 s.d. increase in *Spec* (0.192):
  - ▷ Increases bank's new mortgage lending supply by 54.3 bps ¨

Other market structure characteristics

- **Control** for **market structure characteristics**
  - ▷ Market structure can affect transmission of monetary policy
  - ▷ Be correlated with local market specialization ▸ Correlation Matrix
- **Local market share** *(Giannetti and Saidi, 2019)* ▸ Variable Definition
- **Exposure to local deposit market competition** *(Drechsler et al., 2017)* ▸ Variable Definition

Control for other market structure characteristics

Table 2: Lending, Specialization, and MP: Market Structure Controls

	New mortgage lending growth		
	(1)	(2)	(3)
ΔFF×Spec	-0.0190***	-0.0638***	-0.0708***
	(0.00415)	(0.0184)	(0.0195)
Spec	0.00419	0.0704***	0.0473***
	(0.00834)	(0.0108)	(0.0114)
ΔFF×MktSh	-0.0937***	-0.272***	-0.216***
	(0.0312)	(0.0389)	(0.0432)
MktSh	-0.466***	-0.698***	-0.587***
	(0.0602)	(0.0724)	(0.0617)
ΔFF×Bank-HHI-Dep		-0.0328	-0.0239
		(0.0814)	(0.0796)
Bank-HHI-Dep		-0.0328	-0.0239
		(0.0814)	(0.0796)
ΔFF×C-HHI-Dep			0.0272*
			(0.0118)
C-HHI-Dep			0.0272**
			(0.0118)
Observations	1,557,766	1,019,762	1,025,192
R-squared	0.424	0.196	0.134
Bank-Year FE	Y	N	N
County-Year FE	Y	Y	N
Bank FE	N	Y	Y
County FE	N	N	Y
Year FE	N	N	Y
Fipszero FE	N	N	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County

Control for other market structure characteristics

Table 2: Lending, Specialization, and MP: Market Structure Controls

	New mortgage lending growth		
	(1)	(2)	(3)
ΔFF×Spec	-0.0190***	-0.0638***	-0.0708***
	(0.00415)	(0.0184)	(0.0195)
Spec	0.00419	0.0704***	0.0473***
	(0.00834)	(0.0108)	(0.0114)
ΔFF×MktSh	-0.0937***	-0.272***	-0.216***
	(0.0312)	(0.0389)	(0.0432)
MktSh	-0.466***	-0.698***	-0.587***
	(0.0602)	(0.0724)	(0.0617)
ΔFF×Bank-HHI-Dep		-0.0328	-0.0239
		(0.0814)	(0.0796)
Bank-HHI-Dep		-0.0328	-0.0239
		(0.0814)	(0.0796)
ΔFF×C-HHI-Dep			0.0272*
			(0.0118)
C-HHI-Dep			0.0272**
			(0.0118)
Observations	1,557,766	1,019,762	1,025,192
R-squared	0.424	0.196	0.134
Bank-Year FE	Y	N	N
County-Year FE	Y	Y	N
Bank FE	N	Y	Y
County FE	N	N	Y
Year FE	N	N	Y
Fipszero FE	N	N	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County

Control for other market structure characteristics

Table 2: Lending, Specialization, and MP: Market Structure Controls

	New mortgage lending growth		
	(1)	(2)	(3)
ΔFF×Spec	-0.0190***	-0.0638***	-0.0708***
	(0.00415)	(0.0184)	(0.0195)
Spec	0.00419	0.0704***	0.0473***
	(0.00834)	(0.0108)	(0.0114)
ΔFF×MktSh	-0.0937***	-0.272***	-0.216***
	(0.0312)	(0.0389)	(0.0432)
MktSh	-0.466***	-0.698***	-0.587***
	(0.0602)	(0.0724)	(0.0617)
ΔFF×Bank-HHI-Dep		-0.0328	-0.0239
		(0.0814)	(0.0796)
Bank-HHI-Dep		-0.0328	-0.0239
		(0.0814)	(0.0796)
ΔFF×C-HHI-Dep			0.0272*
			(0.0118)
C-HHI-Dep			0.0272**
			(0.0118)
Observations	1,557,766	1,019,762	1,025,192
R-squared	0.424	0.196	0.134
Bank-Year FE	Y	N	N
County-Year FE	Y	Y	N
Bank FE	N	Y	Y
County FE	N	N	Y
Year FE	N	N	Y
Fipszero FE	N	N	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County

Control for other market structure characteristics

- After a 100 bps decrease in the Fed funds rate:
  - ▷ 1 s.d. increase in **Spec** increases new mortgage growth by 36.5 bps
  - ▷ 1 s.d. increase in MktSh increases new mortgage growth by 65.6 bps

Other measures of Monetary policy stance

- Address endogeneity concern of monetary policy variable
- Use **monetary policy shocks**
  - ▷ *Jarociński and Karadi (2020)*
- Unexpected interest rate changes
  - ▷ Negative co-movement
  - ▷ Between interest rate and stock price changes
  - ▷ Using central bank announcements
- Other measures of MP stance
  - ▷ Shadow rates
  - ▷ Fed funds target rate (average aggregation method)

Other Monetary Policy stance measures

Table 3: Lending, Specialization, and MP Stance

	New mortgage lending growth		
	FF avg	JK Shocks	Shadow Rate
	(1)	(2)	(3)
MP×Spec	-0.0236***	-0.114***	-0.0155**
	(0.00428)	(0.0315)	(0.00362)
Spec	0.00502	9.37e-05	0.00320
	(0.00835)	(0.00846)	(0.00839)
MP×MktSh	-0.106***	-0.699***	-0.0717**
	(0.0285)	(0.205)	(0.0255)
MktSh	-0.470***	-0.497***	-0.467***
	(0.0600)	(0.0620)	(0.0605)
Observations	1,557,766	1,557,766	1,557,766
R-squared	0.424	0.424	0.424
Bank-Year FE	Y	Y	Y
County-Year FE	Y	Y	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County

Other Monetary Policy stance measures

Table 3: Lending, Specialization, and MP Stance

	New mortgage lending growth		
	FF avg	JK Shocks	Shadow Rate
	(1)	(2)	(3)
MP×Spec	-0.0236***	-0.114***	-0.0155**
	(0.00428)	(0.0315)	(0.00362)
Spec	0.00502	9.37e-05	0.00320
	(0.00835)	(0.00846)	(0.00839)
MP×MktSh	-0.106***	-0.699***	-0.0717**
	(0.0285)	(0.205)	(0.0255)
MktSh	-0.470***	-0.497***	-0.467***
	(0.0600)	(0.0620)	(0.0605)
Observations	1,557,766	1,557,766	1,557,766
R-squared	0.424	0.424	0.424
Bank-Year FE	Y	Y	Y
County-Year FE	Y	Y	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County

Further robustness

- Growth variable ▸ Table A4
  - ▷ Log difference, number mortgages, average amount, rejection rates
- Specialization lag ▸ Table A5
  - ▷ 2 & 3 periods lag, average all & 5 years, previous sample, physical branch, outlier
- Sample periods ▸ Table A6
  - ▷ Boom, non-boom & excluding great recession or low interest rate environment
- Easing & tightening of MP ▸ Table A7
- Mortgage markets ▸ Table A8
  - ▷ All markets, to hold, jumbo, growth control, entry&exit, income bracket
  - ▷ Depository & non-depository institutions ▸ Non-Depository Relevance

Alternative lending market: New small business loans

- Community Reinvestment Act (CRA) data from the FFIEC 1997-2019

Table 4: Lending, Specialization, and MP: Small Business Lending

	New mortgage lending growth			
	(1)	(2)	(3)	(4)
ΔFF×Spec	-0.0197*	-0.0118*	-0.0428**	-0.0769***
	(0.0101)	(0.00610)	(0.0207)	(0.0273)
Spec	0.139***	0.131***	0.228***	0.201***
	(0.0211)	(0.0225)	(0.0247)	(0.0254)
ΔFF×MktSh	-0.00895	-0.0258*	-0.118**	-0.0755**
	(0.0200)	(0.0149)	(0.0464)	(0.0379)
MktSh	-0.543***	-0.544***	-0.662***	-0.635***
	(0.0522)	(0.0549)	(0.0637)	(0.0670)
Observations	867,699	869,904	869,399	871,598
R-squared	0.376	0.316	0.182	0.115
Bank-Year FE	Y	Y	N	N
County-Year FE	Y	N	Y	N
Bank FE	N	N	Y	Y
County FE	N	N	N	Y
Year FE	N	N	N	Y
Fipszero FE	N	Y	N	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County

▸ Map BofA

Alternative lending market: New small business loans

- Community Reinvestment Act (CRA) data from the FFIEC 1997-2019

Table 4: Lending, Specialization, and MP: Small Business Lending

	New mortgage lending growth			
	(1)	(2)	(3)	(4)
ΔFF×Spec	-0.0197*	-0.0118*	-0.0428**	-0.0769***
	(0.0101)	(0.00610)	(0.0207)	(0.0273)
Spec	0.139***	0.131***	0.228***	0.201***
	(0.0211)	(0.0225)	(0.0247)	(0.0254)
ΔFF×MktSh	-0.00895	-0.0258*	-0.118**	-0.0755**
	(0.0200)	(0.0149)	(0.0464)	(0.0379)
MktSh	-0.543***	-0.544***	-0.662***	-0.635***
	(0.0522)	(0.0549)	(0.0637)	(0.0670)
Observations	867,699	869,904	869,399	871,598
R-squared	0.376	0.316	0.182	0.115
Bank-Year FE	Y	Y	N	N
County-Year FE	Y	N	Y	N
Bank FE	N	N	Y	Y
County FE	N	N	N	Y
Year FE	N	N	N	Y
Fipszero FE	N	Y	N	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County

▸ Map BofA

Block summary: Micro evidence

- **So far:**
- **Banks' local mortgage specialization**
  - ▷ Relevant for the transmission of monetary policy

Block summary: Micro evidence

- **So far:**
- **Banks' local mortgage specialization**
  - ▷ Relevant for the transmission of monetary policy
- **Easing monetary policy**
- **Robust**
  - ▷ *Additional evidence for small business loans*

Agenda

- Data & variable definition
- Identification strategy
- Micro evidence
- **Aggregate evidence**
- Mechanism
- Conclusion

Aggregate evidence: Regional implication

- The specialization channel
  - ▷ May create **aggregate regional implications**
  - ▷ County level

Aggregate evidence: Regional implication

- The specialization channel
  - ▷ May create **aggregate regional implications**
  - ▷ County level

- New mortgage lending

Aggregate evidence: Regional implication

- The specialization channel
  - ▷ May create **aggregate regional implications**
  - ▷ County level
- New mortgage lending
- House prices
  - ▷ *(Favara and Imbs, 2015)*

Aggregate evidence: Regional implication

- The specialization channel
  - ▷ May create **aggregate regional implications**
  - ▷ County level
- New mortgage lending
- House prices
  - ▷ *(Favara and Imbs, 2015)*
- Economic activity
  - ▷ Wages and employment
  - ▷ Direct effect *(Drechsler et al., 2017)*
  - ▷ Indirect effect *(Cloyne et al., 2019)*

County specialization variable

- $CSpec_{ct}$
  - Measures market exposure to banks that are specialized in that market

$$CSpec_{ct} = \sum_{b=1}^{n} \frac{Spec_{bct} \times A_{bct}}{A_{ct}}$$

Example county specialization

- Market A
- New mortgage lending:
  - ▷ Bank 1: \$9 million
  - ▷ Bank 2: \$3 million
- Specialization:
  - ▷ Bank 1: 0.9
  - ▷ Bank 2: 1
- County specialization $= (0.9 \times \frac{9}{12}) + (1 \times \frac{3}{12}) =$ **0.925**

Real example county specialization

- Variation on county specialization in 2016

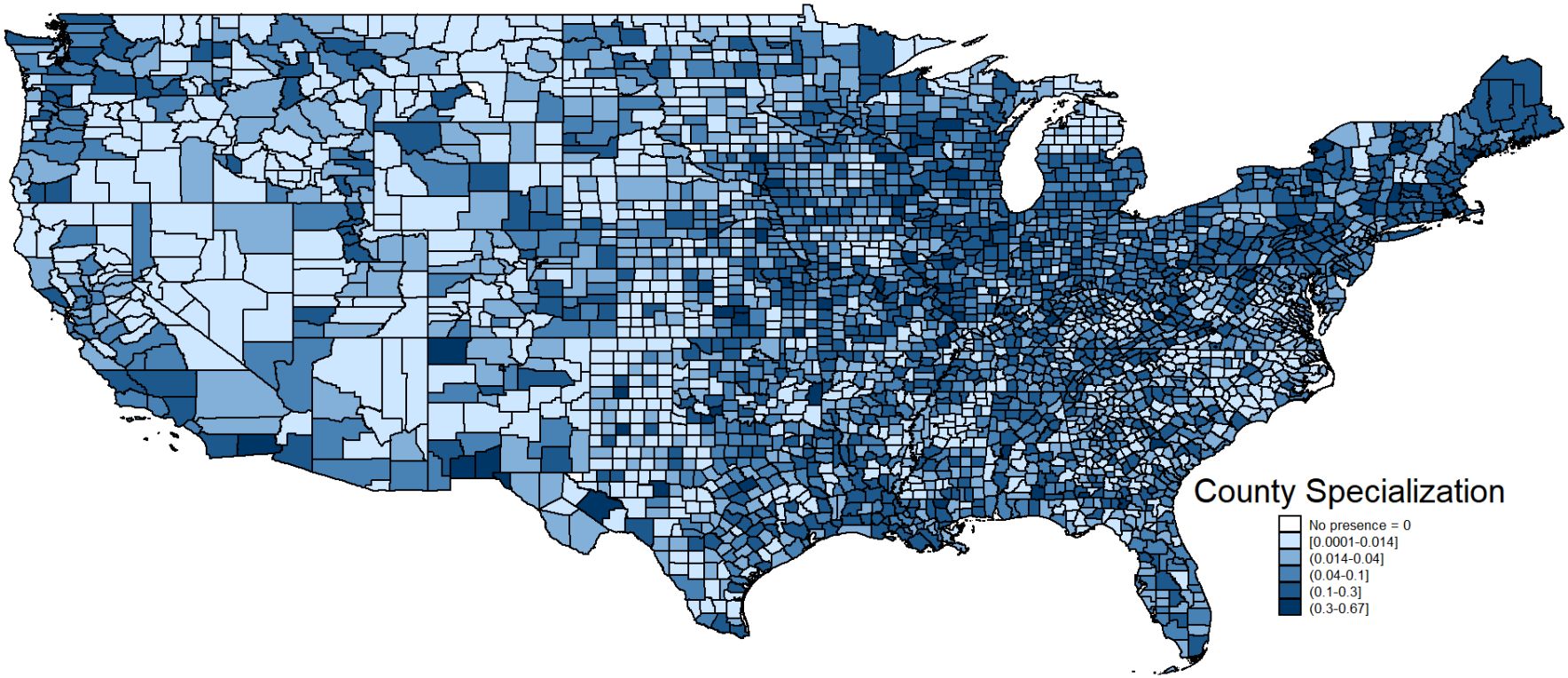


Figure 1: Map of county exposure to bank's local mortgage specialization (2016)

Aggregate evidence: Regional implication

- Baseline regression:

$$\Delta y_{ct} = \alpha_c + \omega_t + \beta_1 \Delta FF_t \times CSpec_{c,t-1} + \beta_2 CSpec_{c,t-1} + \epsilon_{ct}, \quad (2)$$

  - Δy_{ct} is new mortgage, house price, employment or wage growth rate
  - In county c from year $t-1$ to t

- $CSpec_{c,t-1}$
  - County exposure to bank's specialization in market c and year $t-1$

- ΔFF_t
  - Difference in the Fed funds target rate from $t-1$ to t

- County fixed effects (α_c) and time fixed effects (ω_t)

County estimation

Table 5: Specialization, MP, and County Implications

	New mortgage lending growth (1)	HPI growth (2)	Wage growth (3)	Employment growth (4)
ΔFF$\times$CSpec	-0.129***	-0.00902***	-0.00266	-0.000105
	(0.00941)	(0.00127)	(0.00163)	(0.000868)
CSpec	-1.160***	-0.00478*	0.00946***	0.00238
	(0.0299)	(0.00288)	(0.00307)	(0.00199)
Observations	78,545	64,111	78,500	78,457
R-squared	0.475	0.401	0.222	0.214
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Fipszero FE	Y	Y	Y	Y
County Controls	N	N	N	N
Cluster s.e.	County	County	County	County

County estimation with controls

Table 6: Specialization, MP, and County Implications: Controls

	New mortgage lending growth (1)	HPI growth (2)	Wage growth (3)	Employment growth (4)
$\Delta FF \times CSpec$	-0.144***	-0.0150***	-0.00905***	-0.00173*
	(0.0104)	(0.00159)	(0.00175)	(0.000938)
CSpec	-1.193***	-0.00555*	0.00334	0.000251
	(0.0297)	(0.00305)	(0.00319)	(0.00210)
$\Delta FF \times CMktSh$	-0.0183	0.000428	-0.00248	-0.00477***
	(0.0182)	(0.00247)	(0.00281)	(0.00141)
CMktSh	0.357***	0.0173***	0.000239	-0.00150
	(0.0266)	(0.00279)	(0.00269)	(0.00177)
Observations	75,029	62,828	75,011	75,008
R-squared	0.500	0.411	0.232	0.218
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Fipszero FE	Y	Y	Y	Y
County Controls	Y	Y	Y	Y
Cluster s.e.	County	County	County	County

▸ Controls ▸ Comparison

County estimation with controls

Table 6: Specialization, MP, and County Implications: Controls

	New mortgage lending growth (1)	HPI growth (2)	Wage growth (3)	Employment growth (4)
$\Delta FF \times CSpec$	-0.144***	-0.0150***	-0.00905***	-0.00173*
	(0.0104)	(0.00159)	(0.00175)	(0.000938)
CSpec	-1.193***	-0.00555*	0.00334	0.000251
	(0.0297)	(0.00305)	(0.00319)	(0.00210)
$\Delta FF \times CMktSh$	-0.0183	0.000428	-0.00248	-0.00477***
	(0.0182)	(0.00247)	(0.00281)	(0.00141)
CMktSh	0.357***	0.0173***	0.000239	-0.00150
	(0.0266)	(0.00279)	(0.00269)	(0.00177)
Observations	75,029	62,828	75,011	75,008
R-squared	0.500	0.411	0.232	0.218
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Fipszero FE	Y	Y	Y	Y
County Controls	Y	Y	Y	Y
Cluster s.e.	County	County	County	County

- Per 100 bps increase in FF, a 1 s.d. increase in *CSpec* (0.096):
  - ▷ Increases NML growth by 138.24 bps, HPI growth by 14.4 bps
  - ▷ Increases wage growth by 8.69 bps, employment growth by 1.66 bps

▸ Controls ▸ Comparison

Robustness

- Use monetary policy shocks ▸ Monetary Policy Shocks
  - ▷ *Jarociński and Karadi (2020)*
- Alteranative growth variable ▸ Log Difference
  - ▷ Log difference
- Excluding low interest rate environment ▸ 1994-2013
  - ▷ 1994-2013

Aggregate evidence: Bank implication

- This channel impacts **overall bank specialization/diversification**
  - ▷ Easing of monetary policy
  - ▷ *Higher overall bank specialization growth*

Aggregate evidence: Bank implication

- This channel impacts **overall bank specialization/diversification**
  - ▷ Easing of monetary policy
  - ▷ *Higher overall bank specialization growth*

- $BSpec_{bt}$
  - ▷ Captures the extent to which a bank is on average specialized
  - ▷ In local U.S. mortgage markets in a given year

$$BSpec_{bt} = \sum_{c=1}^{n} \frac{Spec_{bct} \times A_{bct}}{A_{bt}}$$

Aggregate evidence: Bank implication

- This channel impacts **overall bank specialization/diversification**
  - ▷ Easing of monetary policy
  - ▷ *Higher overall bank specialization growth*

- $BSpec_{bt}$
  - ▷ Captures the extent to which a bank is on average specialized
  - ▷ In local U.S. mortgage markets in a given year

$$BSpec_{bt} = \sum_{c=1}^{n} \frac{Spec_{bct} \times A_{bct}}{A_{bt}}$$

- Bank geographical specialization/diversification is important
  - ▷ It may impact bank exposure to negative shocks to local markets
  - ▷ *Goetz et al. (2016)*

Example bank specialization

- Bank 1
- New mortgage lending:
  - Market A: \$9 million
  - Market B: \$1 million
- Specialization:
  - Market A: 0.9
  - Market B: 0.1
- Bank avg. specialization $= (0.9 \times \frac{9}{10}) + (0.1 \times \frac{1}{10}) = \mathbf{0.82}$

Aggregate evidence: Bank implication

- Baseline regression:

$$\Delta y_{bt} = \alpha_b + \beta_1 \Delta FF_t + \epsilon_{bt}, \tag{3}$$

  - Where Δy_{bt} is bank average specialization (BSpec) growth rate
  - Of bank b from year $t-1$ to t

- ΔFF_t
  - Difference in the Fed funds target rate from $t-1$ to t

- Bank fixed effects (α_b)
  - Control for time-invariant bank heterogeneity

Bank estimation

Table 7: Aggregate Bank Specialization and MP

	Bank's average specialization growth	
	(1)	(2)
ΔFF	-0.00412***	-0.00474***
	(0.000561)	(0.000689)
Observations	150,863	105,717
R-squared	0.040	0.048
Bank FE	Y	Y
Bank Controls	N	Y
Cluster s.e.	Bank	Bank

▸ Example ▸ Visual Evidence

Bank estimation

Table 7: Aggregate Bank Specialization and MP

	Bank's average specialization growth	
	(1)	(2)
ΔFF	-0.00412***	-0.00474***
	(0.000561)	(0.000689)
Observations	150,863	105,717
R-squared	0.040	0.048
Bank FE	Y	Y
Bank Controls	N	Y
Cluster s.e.	Bank	Bank

- A 100 bps decrease in the Fed funds rate
  - ▷ Increases bank's average specialization growth by 47.4 bps

▸ Example ▸ Visual Evidence

Robustness

- Robustness ▸ Table
- Monetary policy shocks
  - ▷ *Jarociński and Karadi (2020)*
- Alternative growth variable
  - ▷ Log difference
- Excluding low interest rate environment
  - ▷ 1994-2013

Block summary: Aggregate evidence

- **So far:**
- **Aggregate implications**
  - ▷ Regional mortgage lending, house prices, total wages, and total employment
  - ▷ Bank overall specialization
- **Robust**

Agenda

- Data & variable definition
- Identification strategy
- Micro evidence
- Aggregate evidence
- **Mechanism**
- Conclusion

Mechanism

- **Heterogeneous bank-market-specific lending costs**
  - ▷ Relevant driver

Mechanism

- **Heterogeneous bank-market-specific lending costs**
  - ▷ Relevant driver
- Simple theoretical setup
  - ▷ Differential marginal lending costs across markets (convexity)
  - ▷ Hypotheses in line with our empirical findings
- Empirical evidence
  - ▷ Proxy related to informational asymmetries
  - ▷ Distance to headquarters
  - ▷ Headquarter county

Theoretical model: Setup

- One period risk neutral economy
- Three type of agents
  - Borrowers
  - Investors
  - A bank
- In each market there is a continuum of heterogeneous borrowers
- Symmetrical markets if nothing explicitly stated

Theoretical model: Setup

- **Investors**
  - ▷ They can only fund banks (not borrowers)
  - ▷ Perfectly elastic supply of funds at R_0
- **Borrowers**
  - ▷ Located in two different markets, A and B
  - ▷ Penniless
  - ▷ Need L units to buy a house
  - ▷ Generate Y units of income
  - ▷ Differ in a borrower specific observable characteristic x_i

Theoretical model: Setup

- **Bank**
  - Is a monopolist
  - Invests in lending to borrowers
  - Funds itself at R_0 (proxy for the monetary policy rate)

- x_i:
  - Determines the cost of lending to such borrower $c(x_i)$
  - Observable for the bank
  - E.g., distance between borrower and bank branch

Theoretical model: Lending cost function

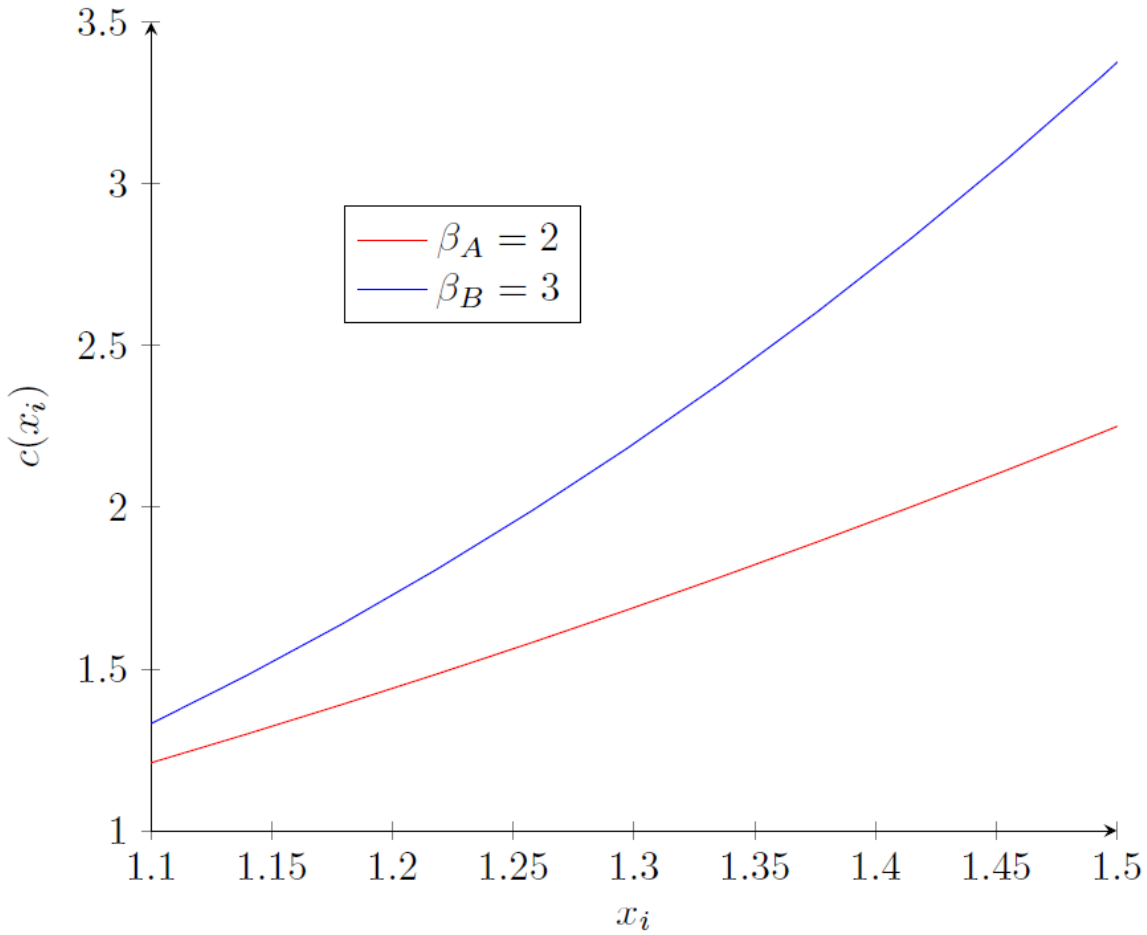
- Lending cost function:

$$c(x_i) = x_i^{\beta_j} \tag{4}$$

  - Where $x_i > 1$ and $\beta_j > 1$
  - More costly, and increasingly so, for higher x_i
  - Higher inc. marginal cost in market B than in market A ($\beta_A < \beta_B$)
  - Differences in the familiarity of the bank with each given market
  - E.g., distance from headquarters to markets

Theoretical model: Lending cost function

$$c(x_i) = x_i^{\beta_j}$$



Theoretical model: Equilibrium

- Lending revenues equals to borrower's income
  - ▷ Profit of the bank from serving borrower x_i in market j:

$$Y - LR_0 - x_i^{\beta_j} \tag{5}$$

- Equilibrium
  - ▷ Last borrower the bank serves ($\hat{x}_j$) in each market is defined by:

$$\begin{aligned} Y - LR_0 - x^{\beta_j} &= 0. \\ \hat{x}_j &= (Y - LR_0)^{\frac{1}{\beta_j}} \end{aligned} \tag{6}$$

  - ▷ $L\hat{x}_j$ determines the supply of loans in each market

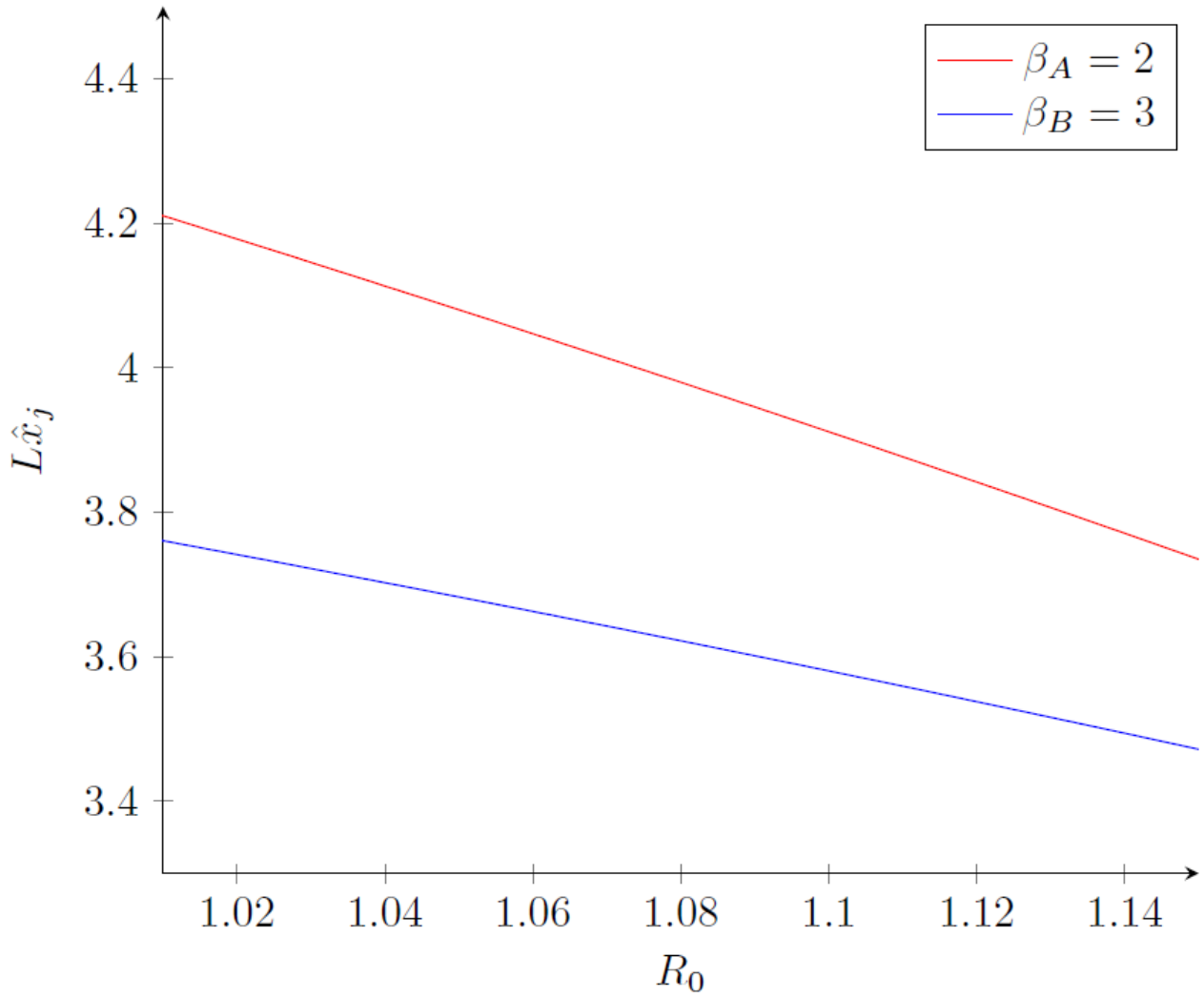
Theoretical model: Propositions

- We obtain the following results consistent with our empirical findings
- Proposition 1: **Specialization result**
  - The **bank** lends more, i.e. is **more specialized**, in market A ($\hat{x}_A > \hat{x}_B$)
  - Where the bank faces lower marginal lending costs ($\beta_A < \beta_B$)
- Proposition 2: **Differential response** to R_0
  - A decrease in R_0 leads to a **higher relative increase** in loan supply by the bank in market A than in market B
  - $\frac{\frac{dL\hat{x}_A}{dR_0}}{L\hat{x}_A} < \frac{\frac{dL\hat{x}_B}{dR_0}}{L\hat{x}_B} < 0$

◂ Proof 1 ◂ Proof 2

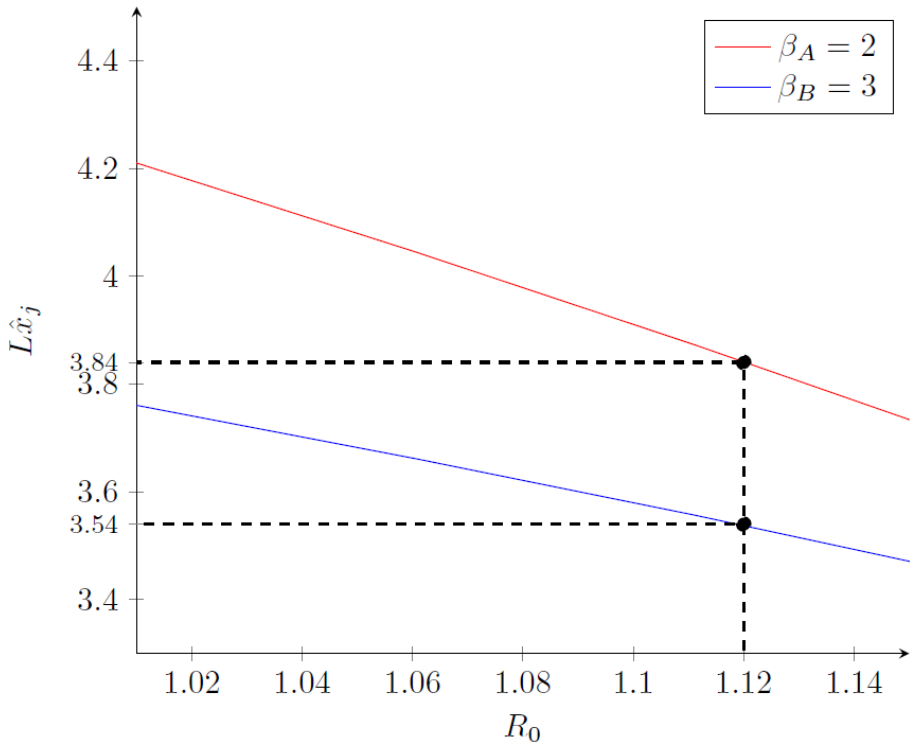
Theoretical model: Example equilibrium

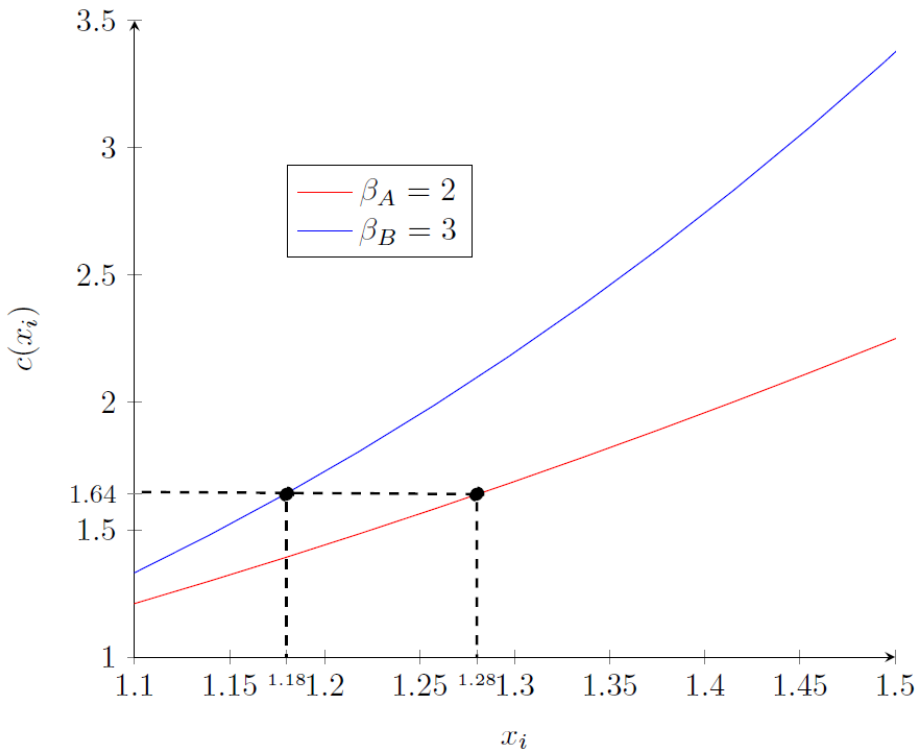
- Equilibrium for $L = 3$ and $Y = 5$



Theoretical model: Example equilibrium

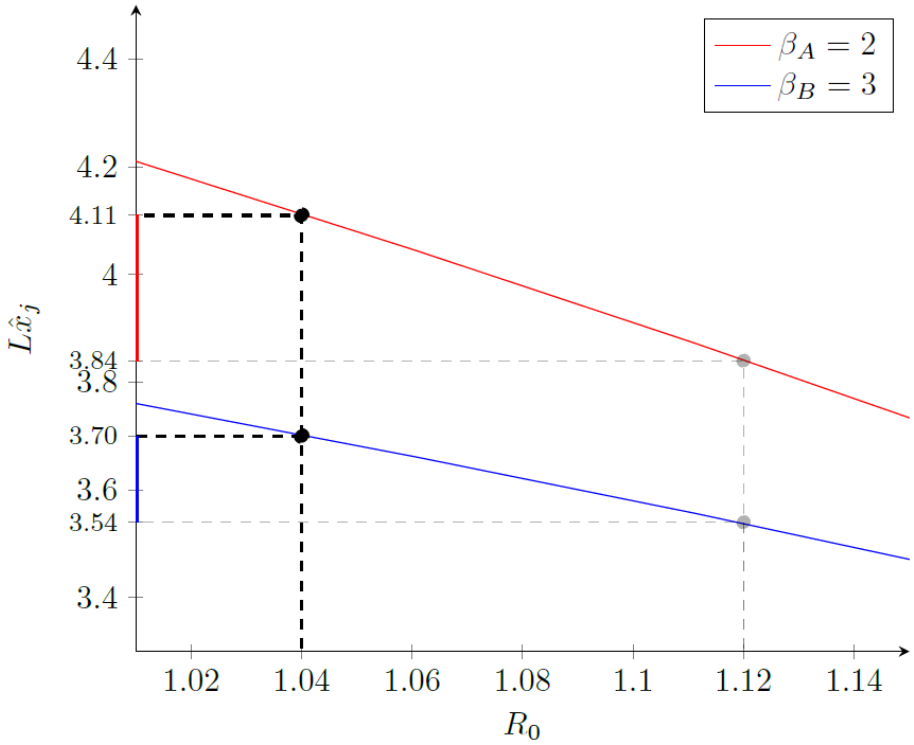
- $R_0 = 1.12$

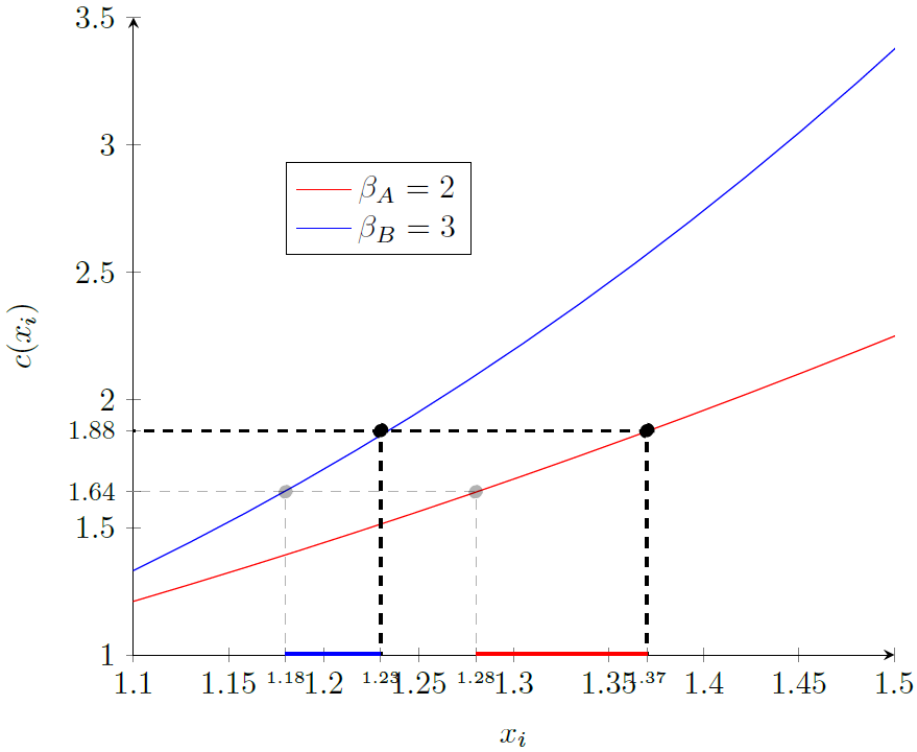




Theoretical model: FF decrease

- $R_0' = 1.04$ $\quad$ $GrowthRate_A = 6.8\%$ $\quad$ $GrowthRate_B = 4.4\%$





Empirical evidence

- **Heterogeneous bank-market-specific lending costs**
  - ▷ E.g., due to informational asymmetries

Empirical evidence

- **Heterogeneous bank-market-specific lending costs**
  - ▷ E.g., due to informational asymmetries
- **Relationship lending and distance** in banking
  - ▷ Relationship lending *(Petersen and Rajan, 1994)*
  - ▷ Distance *(Agarwal and Hauswald, 2010)*
  - ▷ Information asymmetry proxy

Empirical evidence

- **Heterogeneous bank-market-specific lending costs**
  - ▷ E.g., due to informational asymmetries
- **Relationship lending and distance** in banking
  - ▷ Relationship lending *(Petersen and Rajan, 1994)*
  - ▷ Distance *(Agarwal and Hauswald, 2010)*
  - ▷ Information asymmetry proxy
- **Distance to bank's headquarters**
  - ▷ Transmission of soft information
  - ▷ *Bolton et al. (2016)*
  - ▷ Distance to bank's headquarters *(Dist)*: Higher β

Empirical evidence: Bank-county

- **Specialize where they face lower inc. marginal lending costs**
  - ▷ Markets closer to headquarters (HQ)
  - ▷ *Proposition 1 of the theoretical model*

Table 8: Specialization and Distance

	Spec	
	(1)	(2)
Dist	-0.0762***	-0.0436***
	(0.00354)	(0.00199)
MktSh		0.258***
		(0.0436)
Observations	1,362,255	1,362,255
R-squared	0.666	0.672
Bank-Year FE	Y	Y
County-Year FE	Y	Y
Cluster s.e.	Bank&County	Bank&County

◂ Correlation Matrix

Empirical evidence: Bank-county

- **After a decrease in the FF**:
  - ▷ Banks increase loan supply growth by more in markets **closer to HQ**
  - ▷ *Proposition 2 of the theoretical model*

Table 9: Lending, Distance, and MP

	New mortgage lending growth	
	(1)	(2)
ΔFF×Dist	0.00599***	0.00500***
	(0.00118)	(0.00113)
Dist	-0.0467***	-0.0411***
	(0.00249)	(0.00175)
ΔFF×MktSh		-0.0746***
		(0.0288)
MktSh		-0.742***
		(0.0516)
Observations	1,362,255	1,362,255
R-squared	0.420	0.422
Bank-Year FE	Y	Y
County-Year FE	Y	Y
Cluster s.e.	Bank&County	Bank&County

◂ Economic Magnitude

Empirical evidence: County

- **After a decrease in the FF**:
  - ▷ Counties exposed to banks that have their HQ closer
  - ▷ Experience higher increase in lending, house price and wage growth
  - ▷ *Aggregate regional implication*

Table 10: Distance, MP, and County Implications

	Lending growth		HPI growth		Wage growth		Employment growth	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔFF × CDist	0.0120***	0.0160***	0.00251***	0.00247***	0.000236*	0.000350**	-0.000393***	-0.000223**
	(0.000772)	(0.000944)	(0.000168)	(0.000181)	(0.000143)	(0.000159)	(8.33e-05)	(9.36e-05)
CDist	0.0709***	0.0793***	0.00123***	0.00107***	-0.000194	0.000555	0.000412*	0.000689***
	(0.00226)	(0.00245)	(0.000278)	(0.000298)	(0.000337)	(0.000351)	(0.000221)	(0.000229)
ΔFF × CMktSh		-0.0226		0.00153		-0.00594***		-0.00491***
		(0.0190)		(0.00252)		(0.00211)		(0.00144)
CMktSh		0.363***		0.0166***		-0.00278		-0.00217
		(0.0277)		(0.00286)		(0.00258)		(0.00183)
Observations	78,055	74,599	63,965	62,682	78,035	74,582	77,991	74,578
R-squared	0.464	0.487	0.406	0.414	0.225	0.235	0.214	0.218
County FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Fipszero FE	Y	Y	Y	Y	Y	Y	Y	Y
Additional Controls	N	Y	N	Y	N	Y	N	Y
Cluster s.e.	County	County	County	County	County	County	County	County

◂ Economic Magnitude

Empirical evidence: Bank

- **After a decrease in the FF**:
  - Banks decrease the growth of the distance
  - To markets in which they originate mortgage lending
  - *Aggregate bank implication*

Table 11: Aggregate Bank Distance and MP

	BDist growth	
	(1)	(2)
ΔFF	0.00479***	0.00532***
	(0.00129)	(0.00130)
Observations	102,284	102,283
R-squared	0.044	0.047
Bank FE	Y	Y
Additional Controls	N	Y
Cluster s.e.	Bank	Bank

◂ Economic Magnitude

Robustness

- Alternative mechanism variable ▸ Table A14
- Indicator variable for the market where the bank is HQ
  - ▷ *SameMkt*

Block summary: Mechanism evidence

- **So far:**
- **Simple theoretical model**
  - ▷ Bank-market specific heterogeneous increasingly marginal costs

Block summary: Mechanism evidence

- **So far:**
- **Simple theoretical model**
  - ▷ Bank-market specific heterogeneous increasingly marginal costs
- **Empirical evidence**
  - ▷ Distance

Agenda

- Data & variable definition
- Identification strategy
- Micro evidence
- Aggregate evidence
- Mechanism evidence
- **Conclusion**

Concluding remarks

- Bank's local mortgage market specialization
  - ▷ Affects sensitivity of new mortgage lending to monetary policy changes
  - ▷ Absorbing **change in local opportunities** & **bank-year heterogeneity**
- Aggregate implications on regional lending and house prices
  - ▷ *Contributes* to heterogeneous transmission of monetary policy
- Monetary policy impacts diversification decisions in local markets
  - ▷ *Contributes* to determinants of bank geographical diversification
- Explained by **heterogeneous bank-market-specific lending costs**

Thank you!

Summary statistics

Table A1: Summary Statistics

VARIABLES	N	mean	sd
Panel A: Bank-county-level mortgage lending (HMDA and FDIC)			
New mortgage lending (mill. $)	1,600,174	17.298	126.663
New mortgage lending growth	1,600,174	-0.115	0.710
Number of new mortgages	1,600,174	89.169	405.981
ΔFF	1,600,174	-0.154	1.534
Spec	1,600,174	0.079	0.192
MktSh	1,600,174	0.035	0.070
Bank-HHI-Dep	1,025,741	0.226	0.083
C-HHI-Dep	1,599,973	0.239	0.131
Dist (miles)	1,391,438	524.286	631.917
Dist (log)	1,391,438	5.144	1.980

◂ Back

Summary statistics

VARIABLES	N	mean	sd
Panel B: County-level (HMDA, FHFA and BLS)			
New mortgage lending (mill. $)	79,619	376.276	2,080.451
New mortgage lending growth	79,619	0.080	0.449
Total employment (thousand)	79,531	44.635	143.978
Employment growth	79,524	0.004	0.042
HPI	65,071	241.844	155.881
HPI growth	64,261	0.027	0.052
Total wages (bill. $)	79,580	1.766	8.264
Wage growth	79,571	0.035	0.060
ΔFF	79,619	-0.156	1.439
CSpec	78,558	0.068	0.096

◂ Back

Summary statistics

VARIABLES	N	mean	sd
Panel B: County-level (HMDA, FHFA and BLS)			
CMktSh	79,619	0.169	0.162
C-HHI-Expo	79,516	0.239	0.052
C-HHI-Dep	79,323	0.354	0.211
Population (thousand)	76,296	97.101	311.732
Population (log)	76,296	10.271	1.435
Income per capita (thousand $)	76,296	31.822	11.894
Income per capita (log)	76,296	10.271	1.435
Securitized mortgages (%)	79,619	51.089	55.688
Banks (number)	78,558	36.954	39.596
CDist	78,069	4.825	1.249

◂ Back

Summary statistics

VARIABLES	N	mean	sd
Panel C: Bank-level (HMDA)			
BSpec	151,713	0.485	0.270
BSpec growth	151,713	-0.028	0.307
ΔFF	151,713	-0.168	1.440
Mkts (number)	151,713	27.537	137.298
Size (bill. \$)	106,401	0.758	2.013
Size (log)	106,401	12.404	1.279
Deposit ratio (%)	106,400	82.6	8.7
Liquidity ratio (%)	106,400	5.9	5.3
Leverage ratio (%)	106,400	89.7	3.5
BDist	106,410	1.893	1.410
BDist growth	102,995	0.050	0.628

◂ Back

Serial correlation

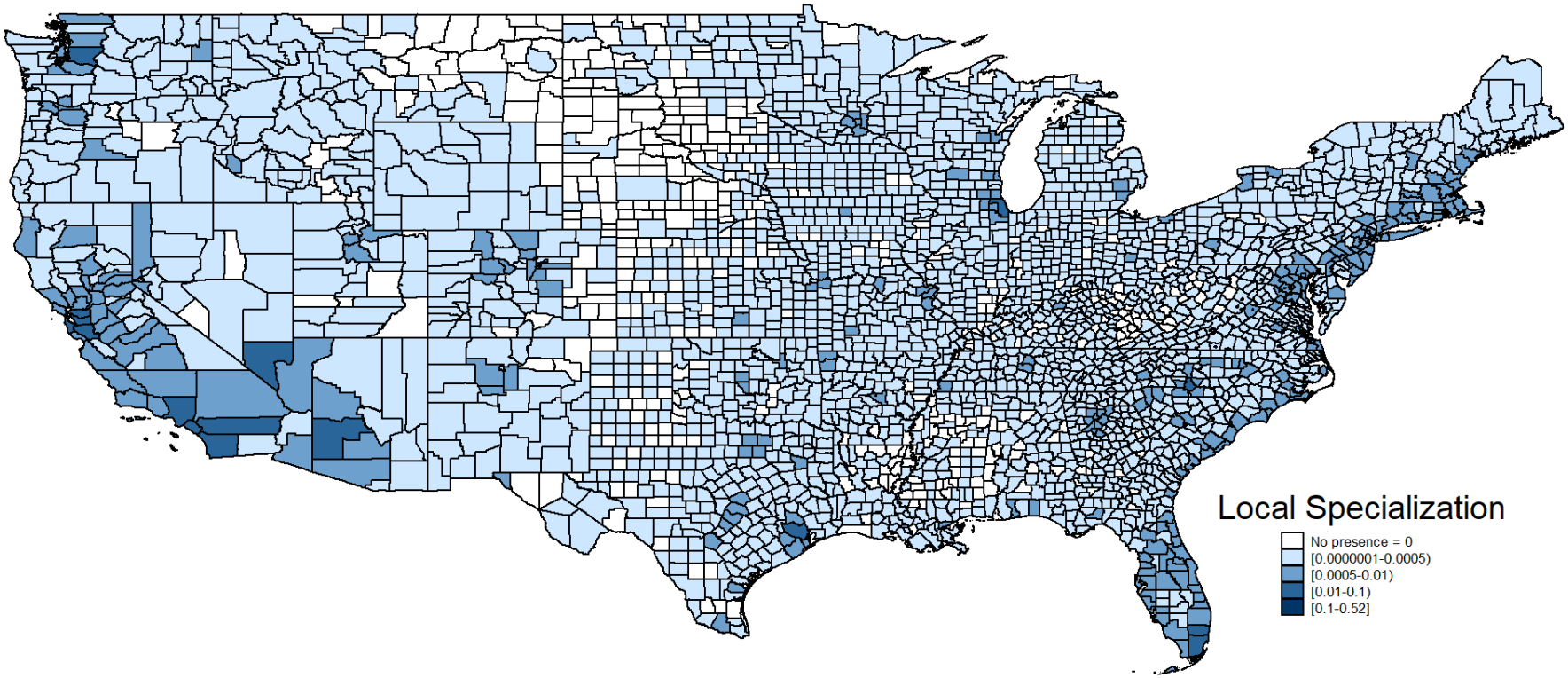
Table A2: Serial Correlation Specialization

	Spec t		
	(1)	(2)	(3)
Spec t-1	0.936***		
	(0.000174)		
Spec t-5		0.866***	
		(0.00356)	
Spec t-10			0.797***
			(0.00577)
Observations	2,903,057	1,254,409	586,308
R-squared	0.903	0.862	0.822
Year FE	Yes	Yes	Yes
Cluster s.e.	Bank&County	Bank&County	Bank&County

▸ Back

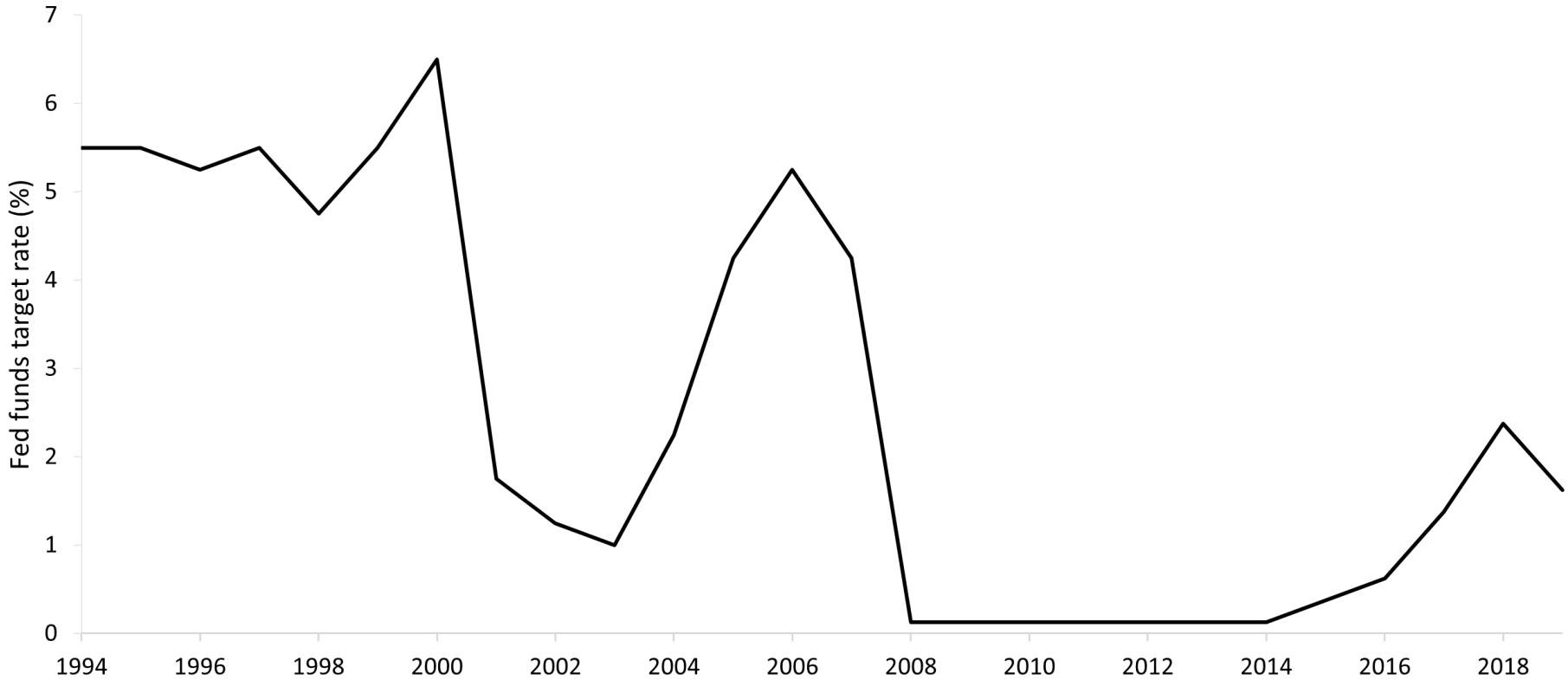
Real example specialization

- Bank of America, National Association (2006)
  - ▷ Los Angeles County $5.5 billion Spec=0.06 (highest)
  - ▷ Santa Clara County $1.9 billion Spec=0.02



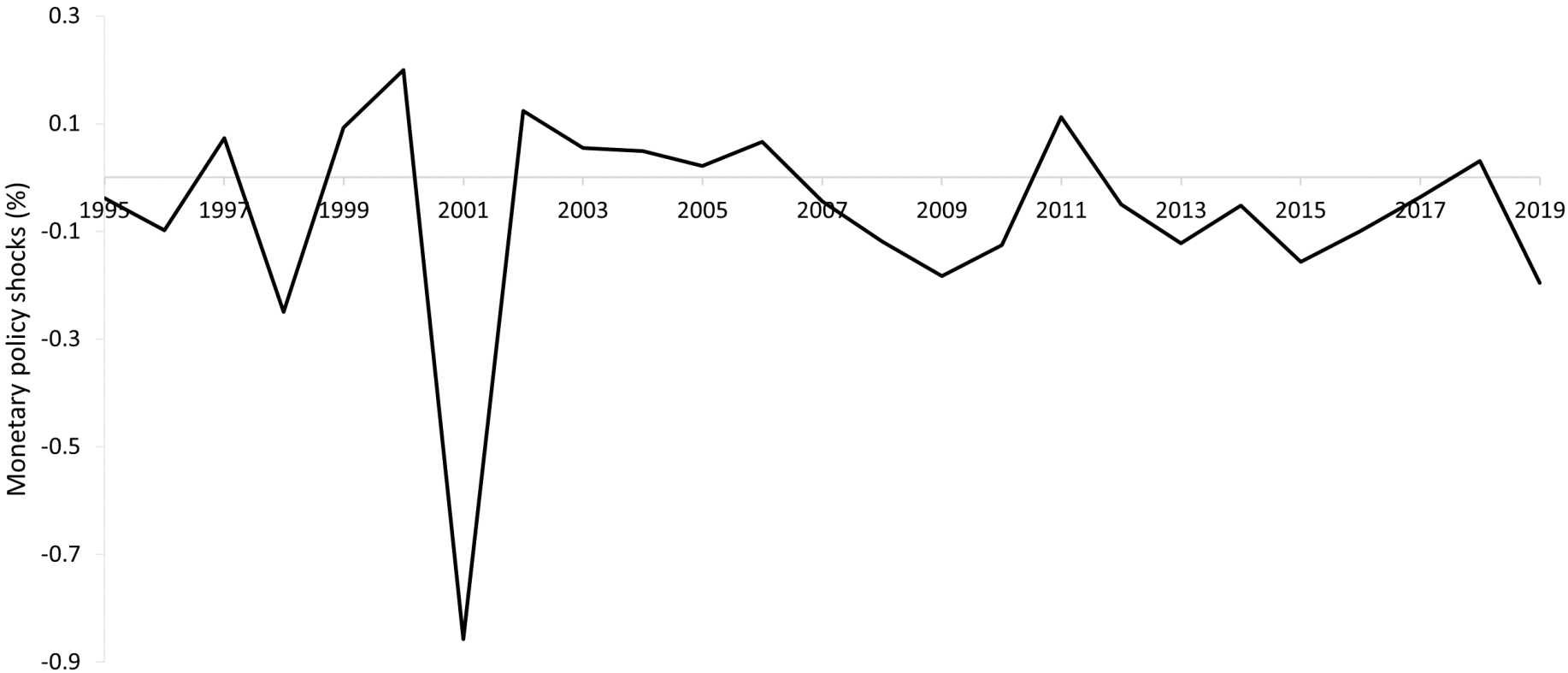
◂ Back

Fed funds rate



◂ Back

Monetary policy shocks



◂ Back

Correlation matrix

Table A3: Correlation Matrix: Market Structure Characteristics

Variables	$Spec_{bct-1}$	$MktSh_{bct-1}$	Bank-HHI-Dep$_{bt-1}$	C-HHI-Dep
$Spec_{bct-1}$	1.000			
$MktSh_{bct-1}$	0.063	1.000		
Bank-HHI-Dep$_{bt-1}$	-0.062	0.118	1.000	
C-HHI-Dep	-0.100	0.233	0.124	1.000

◂ Back

Market share

- Bank's local mortgage market share
- Following *Giannetti and Saidi (2019)*

$$MktSh_{bct} = \frac{A_{bct}}{A_{ct}}$$

- Aggregate measure at the county level
  - Summing up the squared mortgage-market shares of all banks in a given county and year (HHI)
  - $CMktSh_{ct}$

◂ Back Bank-County ◂ Back County ◂ Back County Controls

Exposure deposit concentration

- Following *Drechsler et al. (2017)*

- Local deposit market concentration
  - ▷ *C-HHI-Dep*$_c$: summing up the squared deposit-market shares of all banks with branches in a given county and year, and then averaging over all years

- Bank exposure to local deposit market concentration
  - ▷ *Bank-HHI-Dep*$_{bt}$: averaging C-HHI-Dep$_c$ at the bank level, using lagged deposit shares across branches as weights

- Aggregate *Bank-HHI-Dep*$_{bt}$ at the county level
  - ▷ Captures to which new lending of a market is originated by banks that raise deposits in concentrated deposit markets
  - ▷ *C-HHI-Expo*$_{ct}$

◂ Back Bank-County ◂ Back County ◂ Back County Controls

Economic relevance

- Column 3 of Table 4
- Not controlling for bank time-variant heterogeneity
- After a 100 bps decrease in the Fed funds rate:
  - ▷ 1 s.d. increase in **Spec** increases new mortgage growth by 122.5 bps
  - ▷ 1 s.d. increase in MktSh increases new mortgage growth by 190.4 bps
  - ▷ 1 s.d. increase in Bank-HHI increases new mortgage growth by 27.2 bps (not statistically significant)

◂ Back

Further robustness

Table A4: Lending, Specialization, and MP: Growth Variables

	New mortgage lending growth			
	Logdifference	New # Loans	Avg Amount	Approval Ratio
	(1)	(2)	(3)	(4)
ΔFF×Spec	-0.0120**	-0.0187***	0.00131	-0.235**
	(0.00535)	(0.00353)	(0.00233)	(0.113)
Spec	0.0339***	0.0970***	-0.0778***	-0.109
	(0.0100)	(0.00787)	(0.00456)	(0.111)
ΔFF×MktSh	-0.0744*	-0.101***	0.0213	3.048***
	(0.0406)	(0.0271)	(0.0170)	(1.043)
MktSh	-0.474***	-0.0892	-0.362***	-4.066***
	(0.0739)	(0.0610)	(0.0234)	(0.798)
Observations	1,557,766	1,557,766	1,557,766	1,557,766
R-squared	0.419	0.462	0.247	0.234
Bank-Year FE	Y	Y	Y	Y
County-Year FE	Y	Y	Y	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County

◂ Back

Further robustness

Table A5: Lending, Specialization, and MP: Specialization Variables

	New mortgage lending growth						
	Spec t-2	Spec Avg	Spec Avg 5y	Spec Prev. Sample	Spec t-3	Physical Branch	Spec Outlier
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\Delta FF \times Spec$	-0.0186***	-0.0193***	-0.0198***	-0.0130***	-0.0156***	-0.0235***	-0.00501**
	(0.00335)	(0.00391)	(0.00372)	(0.00372)	(0.00348)	(0.00430)	(0.00219)
Spec	0.139***	0.180***	0.114***	0.137***	0.125***	0.196***	-0.0217***
	(0.00753)	(0.0125)	(0.00684)	(0.00818)	(0.00761)	(0.00677)	(0.00393)
$\Delta FF \times MktSh$	-0.125***	-0.172***	-0.138***	-0.0776***	-0.142***	-0.0316	-0.0962***
	(0.0232)	(0.0274)	(0.0275)	(0.0258)	(0.0269)	(0.0242)	(0.0317)
MktSh	0.253***	0.979***	0.0749*	0.437***	0.266***	-0.967***	-0.429***
	(0.0481)	(0.0966)	(0.0454)	(0.0622)	(0.0477)	(0.0565)	(0.0635)
Observations	1,395,035	1,557,766	1,557,766	793,781	1,223,720	1,557,766	1,557,766
R-squared	0.432	0.428	0.424	0.411	0.443	0.431	0.425
Bank-Year FE	Y	Y	Y	Y	Y	Y	Y
County-Year FE	Y	Y	Y	Y	Y	Y	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County

◂ Back

Further robustness

Table A6: Lending, Specialization, and MP: Alternative Periods

	New mortgage lending growth					
	Boom	Non-Boom	Without Crisis	1994-2013	Alt. Boom	Alt. Non-Boom
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta FF \times Spec$	-0.0413***	-0.0190***	-0.0199***	-0.0201***	-0.0416***	-0.0174***
	(0.0120)	(0.00492)	(0.00535)	(0.00430)	(0.0101)	(0.00482)
Spec	0.0350*	0.00158	-0.00173	0.00971	0.0263*	0.00272
	(0.0188)	(0.00803)	(0.00820)	(0.00865)	(0.0150)	(0.00840)
$\Delta FF \times MktSh$	-0.204**	-0.0687*	-0.136***	-0.0984***	-0.223***	-0.0749**
	(0.0824)	(0.0358)	(0.0400)	(0.0329)	(0.0822)	(0.0339)
MktSh	-0.479***	-0.435***	-0.451***	-0.496***	-0.429***	-0.454***
	(0.143)	(0.0547)	(0.0563)	(0.0684)	(0.120)	(0.0578)
Observations	349,281	1,208,485	1,339,333	1,234,411	339,808	1,217,958
R-squared	0.398	0.431	0.413	0.442	0.395	0.432
Bank-Year FE	Y	Y	Y	Y	Y	Y
County-Year FE	Y	Y	Y	Y	Y	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County	Bank&County

◂ Back

Further robustness

Table A7: Lending, Specialization, and MP: Easing and Tightening

	New mortgage lending growth			
	ΔFF<0	ΔFF>0	JK Shocks<0	JK Shocks>0
	(1)	(2)	(3)	(4)
ΔFF×Spec	-0.0102*	-0.00155	-0.118***	-0.162
	(0.00551)	(0.0141)	(0.0395)	(0.143)
Spec	0.0296**	-0.0241	-0.00175	0.00491
	(0.0122)	(0.0161)	(0.0105)	(0.0164)
ΔFF×MktSh	-0.263***	-0.209**	-0.611**	0.523
	(0.0671)	(0.0894)	(0.281)	(0.844)
MktSh	-0.376***	-0.448***	-0.461***	-0.627***
	(0.0765)	(0.0868)	(0.0664)	(0.112)
Observations	1,031,890	652,887	844,558	713,208
R-squared	0.444	0.367	0.450	0.390
Bank-Year FE	Y	Y	Y	Y
County-Year FE	Y	Y	Y	Y
Cluster s.e.	Bank&County	Bank&County	Bank&County	Bank&County

◂ Back

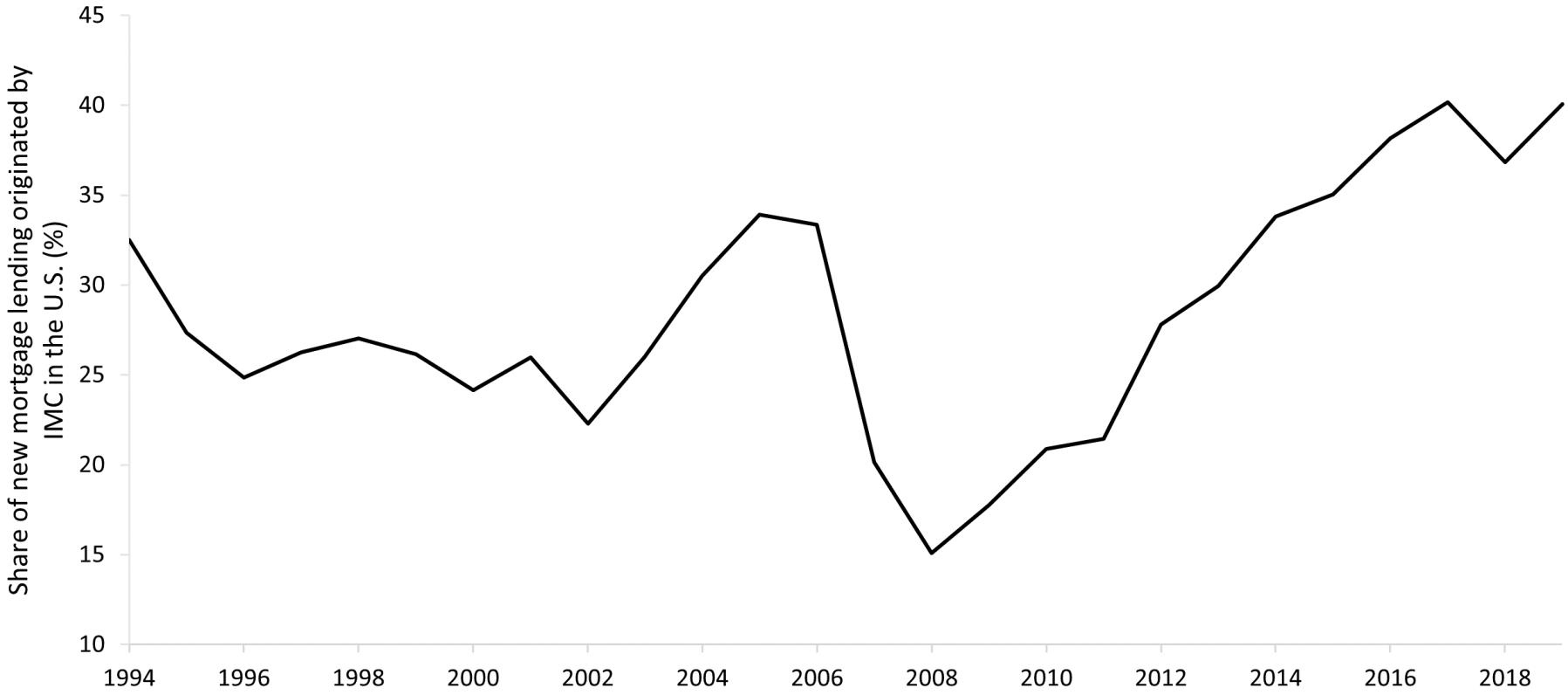
Further robustness

Table A8: Lending, Specialization, and MP: Mortgage Markets

	New mortgage lending growth							
	Growth Control	Exit & Entry	No Filter	To Hold	Jumbo	Income B.	All Inst.	All Inst.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔFF×Spec	-0.0173***	-0.0249***	-0.0398***	-0.0186***	-0.0362***	-0.0159***	-0.0248***	-0.0217***
	(0.00384)	(0.00415)	(0.00344)	(0.00637)	(0.0115)	(0.00466)	(0.00378)	(0.00390)
Spec	-0.0224***	-0.580***	-0.275***	-0.0264***	-0.124***	0.182***	-0.0127	-0.00904
	(0.00761)	(0.0164)	(0.0121)	(0.00968)	(0.0260)	(0.00902)	(0.00786)	(0.00834)
ΔFF×MktSh	-0.112***	-0.109***	-0.103***	-0.0401	-0.00423	-0.119***	-0.104***	-0.101***
	(0.0314)	(0.0417)	(0.0291)	(0.0383)	(0.0466)	(0.0305)	(0.0351)	(0.0373)
MktSh	-0.473***	-3.341***	-1.789***	-0.556***	-1.940***	0.308***	-0.615***	-0.489***
	(0.0554)	(0.168)	(0.0868)	(0.0485)	(0.139)	(0.0579)	(0.0696)	(0.0775)
ΔFF×Spec×Nb								-0.0290***
								(0.00891)
ΔFF×MktSh×Nb								-0.0438
								(0.115)
Spec×Nb								-0.0567***
								(0.0219)
MktSh×Nb								-1.278***
								(0.423)
Observations	1,395,035	5,965,916	2,882,326	1,002,039	220,600	2,953,142	2,411,061	2,411,061
R-squared	0.467	0.273	0.258	0.457	0.467	0.441	0.413	0.413
Bank-Year FE	Y	Y	Y	Y	Y	Y	Y	Y
County-Year FE	Y	Y	Y	Y	Y	N	Y	Y
County-Year-IB FE	N	N	N	N	N	Y	N	N
Cluster s.e.	B&C	B&C	B&C	B&C	B&C	B&County	B&C	B&C

◂ Back

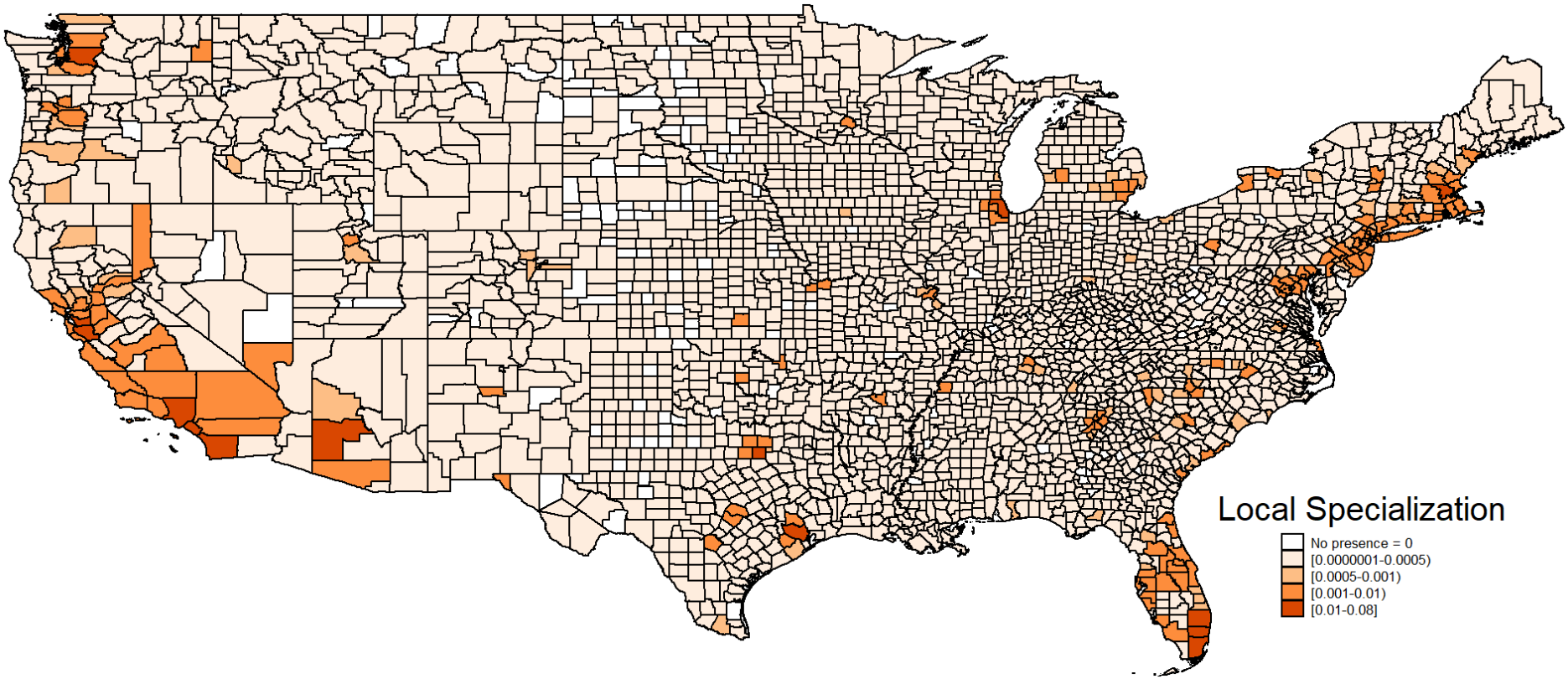
Nonbank relevance



▸ Back

Real example specialization SBL

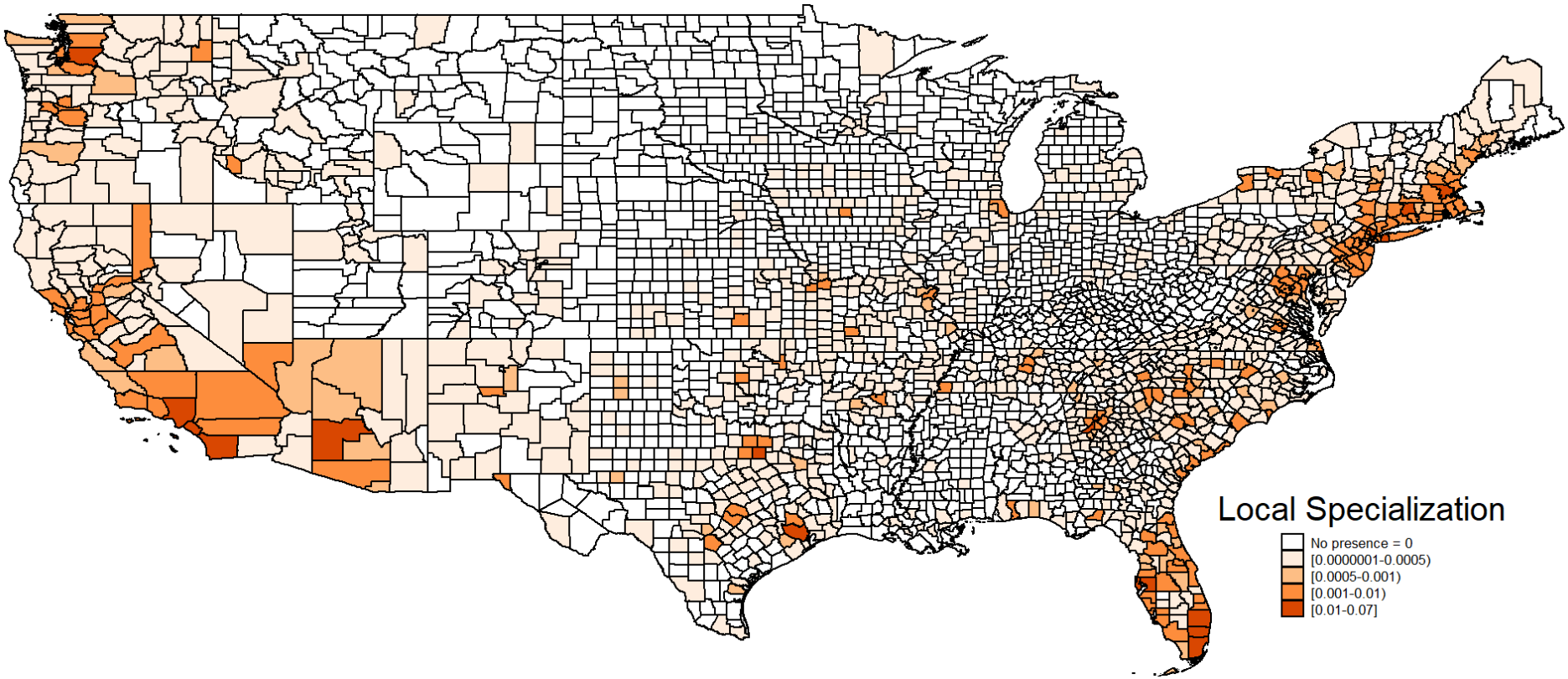
- Bank of America, National Association (2016)
  - ▷ Los Angeles County Spec=0.07 (highest)



◂ Back

Real example specialization SBL

- Bank of America, National Association (2006)
  - ▷ Los Angeles County Spec=0.06 (highest)



◂ Back

Example county result

- Reduction in the Fed funds target rate from 2001 to 2002
- Market A
  - County specialization: 0.925
  - New lending growth: 0.8
  - HPI growth: 0.2
  - Wages growth: 0.05
  - Employment growth: 0.04
- Market B
  - County specialization: 0.1
  - New lending growth: 0.3
  - HPI growth: 0.05
  - Wages growth: 0.03
  - Employment growth: 0.03

◂ Back

County controls

- Income per capita, population, and proportion of securitized mortgages
- CMktSh ▸ Definition
- C-HHI-Expo and C-HHI-Dep ▸ Definition
- And their interactions with changes in the Fed funds rate

◂ Back

Economic relevance UPDATED

- Column 1 of Table 6 on **new mortgage lending growth**
  - ▷ After a 100 bps decrease in the Fed funds rate
  - ▷ 1 s.d. increase in **CSpec** increases NML growth by 138.24 bps
  - ▷ 1 s.d. increase in CMktSh increases NML growth by 29.65 bps. Not statistically significant at standard levels

◂ Back

Economic relevanceUPDATED

- Column 2 of Table 6 on **HPI growth**
  - ▷ After a 100 bps decrease in the Fed funds rate:
  - ▷ 1 s.d. increase in **CSpec** increases HPI growth by 14.4 bps

◂ Back

Economic relevanceUPDATED

- Column 3 of Table 6 on **wage growth**
  - ▷ After a 100 bps decrease in the Fed funds rate:
  - ▷ 1 s.d. increase in **CSpec** increases wage growth by 8.69 bps
  - ▷ 1 s.d. increase in CMktSh increases wage growth by 4 bps. Not statistically significant at standard levels

◂ Back

Economic relevanceUPDATED

- Column 4 of Table 6 on **employment growth**
  - ▷ After a 100 bps decrease in the Fed funds rate:
  - ▷ 1 s.d. increase in **CSpec** increases employment growth by 1.66 bps
  - ▷ 1 s.d. increase in CMktSh increases employment growth by 7.7 bps

◂ Back

Monetary policy shocks

Table A9: Specialization Channel and County Implications: MP Shocks

	New mortgage growth (1)	HPI growth (2)	Wage growth (3)	Employment growth (4)
MP × CSpec	-0.715***	-0.0192***	-0.0280***	-0.0229***
	(0.0617)	(0.00630)	(0.0107)	(0.00674)
CSpec	-1.229***	-0.00464	0.00301	-0.000911
	(0.0306)	(0.00312)	(0.00328)	(0.00219)
MP × CMktSh	-0.0558	0.0133	-0.00995	-0.0182*
	(0.0617)	(0.00630)	(0.0107)	(0.00674)
CMktSh	0.358***	0.0153***	-0.00101	-0.00247
	(0.0270)	(0.00286)	(0.00283)	(0.00193)
Observations	75,029	62,828	75,011	75,008
R-squared	0.501	0.402	0.230	0.217
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Fipszero FE	Y	Y	Y	Y
County Controls	Y	Y	Y	Y
Cluster s.e.	County	County	County	County

◂ Back

Log difference

Table A10: Specialization Channel and County Implications: Log Difference

	Logdiff new mortgage (1)	Logdiff HPI (2)	Logdiff wage (3)	Logdiff employment (4)
$\Delta FF \times CSpec$	-0.151***	-0.0151***	-0.00912***	-0.00173*
	(0.0114)	(0.00159)	(0.00176)	(0.000940)
CSpec	-1.571***	-0.00557*	0.00324	0.000250
	(0.0426)	(0.00305)	(0.00322)	(0.00210)
$\Delta FF \times CMktSh$	-0.0319	0.000461	-0.00236	-0.00476***
	(0.0253)	(0.00248)	(0.00286)	(0.00142)
CMktSh	0.585***	0.0173***	0.000424	-0.00147
	(0.0397)	(0.00280)	(0.00276)	(0.00178)
Observations	75,029	62,828	75,011	75,008
R-squared	0.463	0.410	0.227	0.217
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Fipszero FE	Y	Y	Y	Y
County Controls	Y	Y	Y	Y
Cluster s.e.	County	County	County	County

◂ Back

1994-2013

Table A11: Specialization Channel and County Implications: 1994-2013

	New mortgage growth (1)	HPI growth (2)	Wage growth (3)	Employment growth (4)
$\Delta FF \times CSpec$	-0.177***	-0.0159***	-0.00933***	-0.00114
	(0.0109)	(0.00166)	(0.00181)	(0.000987)
CSpec	-1.436***	-0.00384	-0.000374	-0.00262
	(0.0375)	(0.00411)	(0.00413)	(0.00269)
$\Delta FF \times CMktSh$	0.0228	0.00278	-0.00258	-0.00478***
	(0.0192)	(0.00257)	(0.00306)	(0.00158)
CMktSh	0.439***	0.0259***	0.00353	0.000377
	(0.0293)	(0.00318)	(0.00295)	(0.00212)
Observations	56,754	46,735	56,742	56,733
R-squared	0.545	0.499	0.279	0.238
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Fipszero FE	Y	Y	Y	Y
County Controls	Y	Y	Y	Y
Cluster s.e.	County	County	County	County

◂ Back

Example bank result

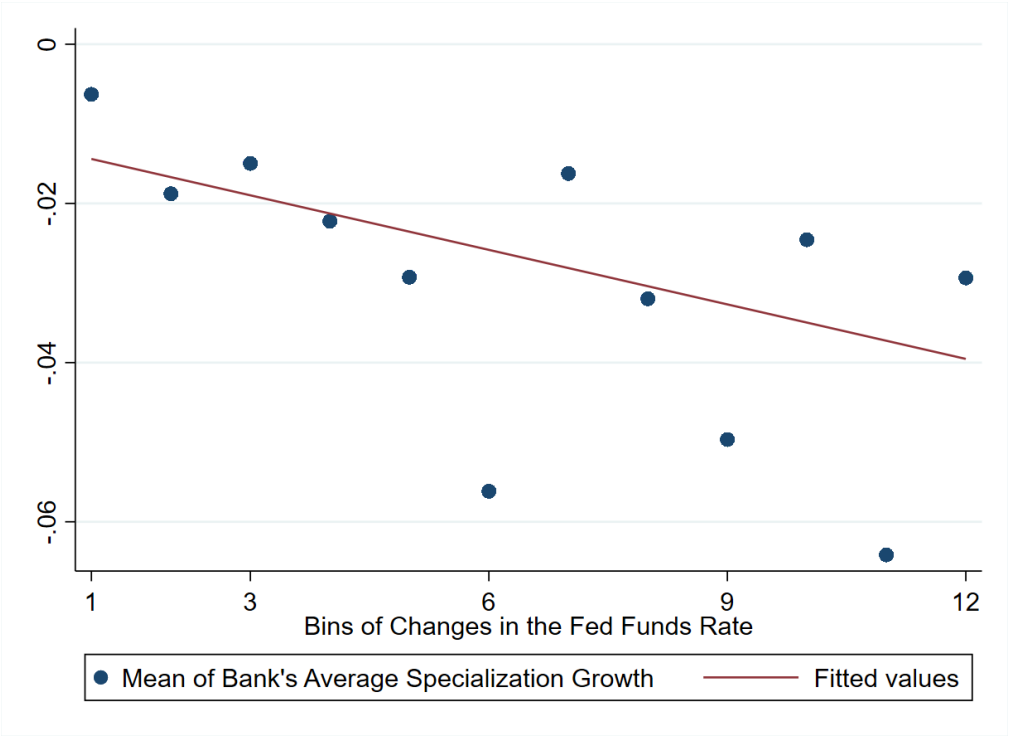
- Bank
  - Year 2001
  - Bank specialization: 0.82
- Decrease in the Fed funds target rate from 2001 to 2002
- Specialization (year 2002): 0.906
- Specialization growth: 0.1

▸ Back

Visual evidence bank aggregate

- Banks's specialization growth affected by monetary policy changes
  - ▷ Sort all years into 12 bins according to change in the FF target rate
  - ▷ Average the growth of bank's average specialization by bin

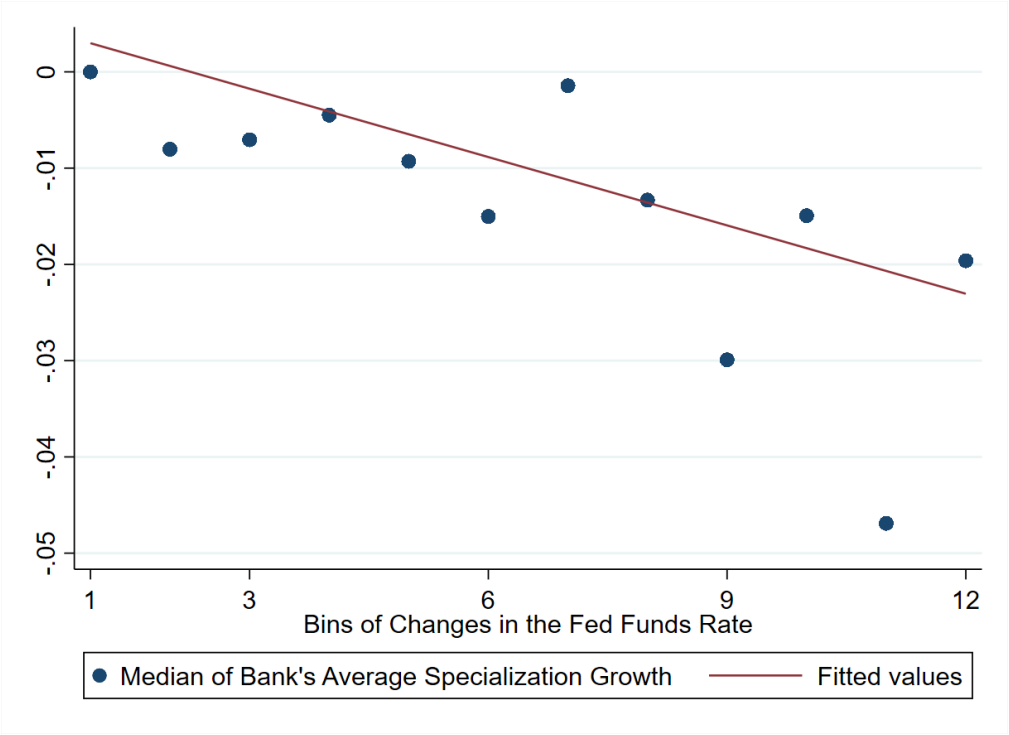
Figure A1: Bank's Average Specialization Growth and Changes in the FF Rate



◂ Back

Visual evidence robustness

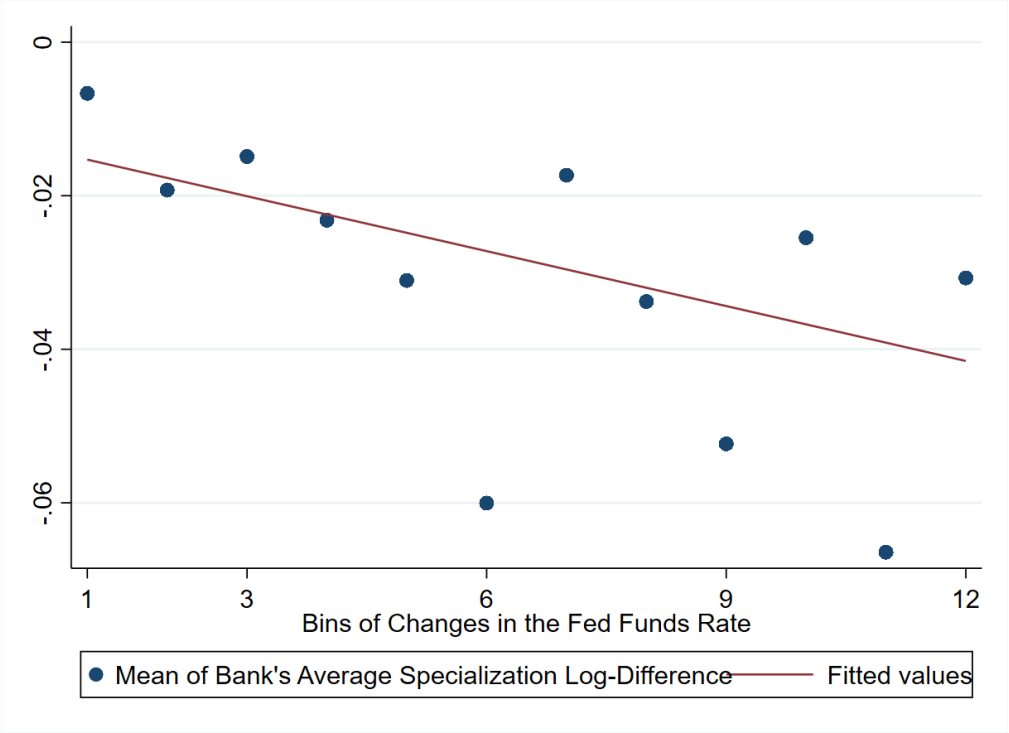
Figure A2: Bank's Median Specialization Growth and Changes in the FF Rate



◂ Back

Visual evidence robustness

Figure A3: Bank's Average Specialization Log-difference and Changes in the FF Rate



◂ Back

Robustness

Table A12: Aggregate Bank Specialization and MP: Robustness

	Bank's average specialization growth		
	JK Shocks	Logdifference	1994-2013
	(1)	(2)	(3)
ΔFF	-0.0446***	-0.00507***	-0.00483***
	(0.00530)	(0.000767)	(0.000703)
Observations	105,717	105,717	85,771
R-squared	0.048	0.051	0.059
Bank FE	Y	Y	Y
Bank Controls	Y	Y	Y
Cluster s.e.	Bank	Bank	Bank

◂ Back

Theoretical model: Proof 1

- Given that $\hat{x}_A = (Y - LR_0)^{\frac{1}{\beta_A}}$ and $\hat{x}_B = (Y - LR_0)^{\frac{1}{\beta_B}}$
- It is direct to show that $\frac{L\hat{x}_A}{L\hat{x}_A + L\hat{x}_B} > \frac{L\hat{x}_B}{L\hat{x}_A + L\hat{x}_B}$
- Follows from $\beta_A < \beta_B$

◂ Back

Theoretical model: Proof 2

- Given $\frac{\frac{dL\hat{x}_A}{dR_0}}{L\hat{x}_A} = -\frac{\frac{L^2}{\beta_A}(Y-LR_0)^{\frac{1}{\beta_A}-1}}{L(Y-LR_0)^{\frac{1}{\beta_A}}}$

- And $\frac{\frac{dL\hat{x}_B}{dR_0}}{L\hat{x}_B} = -\frac{\frac{L^2}{\beta_B}(Y-LR_0)^{\frac{1}{\beta_B}-1}}{L(Y-LR_0)^{\frac{1}{\beta_B}}}$

- We can show that:

$$-\frac{\frac{L^2}{\beta_A}(Y-LR_0)^{\frac{1}{\beta_A}-1}}{L(Y-LR_0)^{\frac{1}{\beta_A}}} < -\frac{\frac{L^2}{\beta_B}(Y-LR_0)^{\frac{1}{\beta_B}-1}}{L(Y-LR_0)^{\frac{1}{\beta_B}}}$$

$$-\frac{1}{\beta_A}\left(\frac{L}{Y-LR_0}\right) < -\frac{1}{\beta_B}\left(\frac{L}{Y-LR_0}\right)$$

- Follows from $\beta_B > \beta_A$

◂ Back

Correlation matrix mechanism

Table A13: Correlation Matrix: Mechanism

Variables	*Spec*	*Dist*	*SameMkt*
Spec	1.000		
Dist	-0.612	1.000	
SameMkt	0.770	-0.579	1.000

◂ Back

Economic magnitude

- Per 100 bps decrease in the Fed funds rate
- A one standard deviation decrease in *Dist* (1.98) increases:
  - ▷ Bank's lending supply by 99 bps
- A one standard deviation decrease in *CDist* (1.23) increases:
  - ▷ Aggregate lending growth by 196.8 bps
  - ▷ HPI growth by 30.38 bps
  - ▷ Wage growth by 4.31 bps
- Decreases
  - ▷ Growth of bank lending exposure to distance to HQ by 53.2 bps

◂ Back Bank-County ◂ Back County ◂ Back Bank

Same market

Table A14: Lending, County and Bank Implications, Same Market, and MP

	Bank-county level	County level				Bank level
	Lending growth	Lending growth	HPI growth	Wage growth	Employment growth	BSameMkt growth
	(1)	(2)	(3)	(4)	(5)	(6)
ΔFF×SameMkt	-0.00813***					
	(0.00203)					
SameMkt	0.117***					
	(0.00405)					
ΔFF×MktSh	-0.100***					
	(0.0314)					
MktSh	-0.613***					
	(0.0551)					
ΔFF×CSameMkt		-0.0523***	-0.00803***	-0.00492***	-0.000844	
		(0.00638)	(0.000900)	(0.00108)	(0.000608)	
CSameMkt		-0.402***	-0.00547***	-0.000879	-0.00166	
		(0.0134)	(0.00171)	(0.00193)	(0.00135)	
ΔFF×CMktSh		-0.0192	0.00189	-0.00255	-0.00469***	
		(0.0184)	(0.00251)	(0.00281)	(0.00142)	
CMktSh		0.345***	0.0166***	-0.00180	-0.00227	
		(0.0281)	(0.00287)	(0.00265)	(0.00183)	
ΔFF						-0.00465***
						(0.00102)
Observations	1,362,781	74,635	62,682	74,617	74,614	103,395
R-squared	0.420	0.480	0.411	0.235	0.217	0.051
Bank-Year FE	Y	N	N	N	N	N
County-Year FE	Y	N	N	N	N	N
County FE	N	Y	Y	Y	Y	N
Year FE	N	Y	Y	Y	Y	N
Fipszero FE	N	Y	Y	Y	Y	N
Bank FE	N	N	N	N	N	Y
Additional Controls	N	Y	Y	Y	Y	Y
Cluster s.e.	Bank&County	County	County	County	County	Bank

◂ Back