How Monetary Policy Shaped the Housing Boom

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May 2019

Monetary Policy and the Housing Boom

1. The role of monetary policy in the housing boom remains unresolved
   - on one side: Taylor (2007) argues that the Fed kept rates "too low for too long," leading to excessive investment in housing
   - on the other side: Bernanke (2010) argues that monetary policy was not too loose. Real culprit was a decline in mortgage lending standards that accompanied the shift from traditional bank portfolio lending to securitized lending
2. This debate is unresolved in part because the housing boom actually accelerated from 2003 to 2006, when the Fed *tightened* by 425 bps
   - mortgage spreads narrowed in mid-2003 (Justiniano et al., 2017)
   - lending standards fell and house prices took off

$\Rightarrow$ **What impact, if any, did Fed tightening have on the housing boom?**

Mortgage lending and the housing boom

1. Expansion of mortgage lending was a key driver of the housing boom (e.g., Mian and Sufi, 2009)

2. Private-Label Securitization (PLS) and non-bank lending grew disproportionately relative to bank portfolio lending and GSEs
   - areas with more non-banks experienced a bigger housing boom (Mian and Sufi, 2018)

3. Relation to monetary policy?
   "The deposits channel" (Drechsler, Savov, and Schnabl, 2017)
   $\rightarrow$ as the Fed tightens, bank deposits flow out
   $\rightarrow$ banks contract their portfolio lending
   $\rightarrow$ lending shifts to PLS and non-banks?

In this paper we find

1. Fed tightening led to large outflows of bank deposits, as predicted by the deposits channel

2. This induced a substantial contraction in bank portfolio mortgage lending

3. But, it also induced a large shift to PLS, led by non-banks, which largely offset the contraction in bank portfolio lending
   - rate of substitution: 65% of reduced bank portfolio lending came back as PLS (most by non-banks)
   - mortgage market shifted from stable deposit funding to run-prone wholesale funding

$\Rightarrow$ **Fed tightening:**

- **was ineffective at curbing mortgage lending**
- **accelerated the shift to PLS/non-banks**
- **raised exposure of housing market to runs/freezes**

Related literature

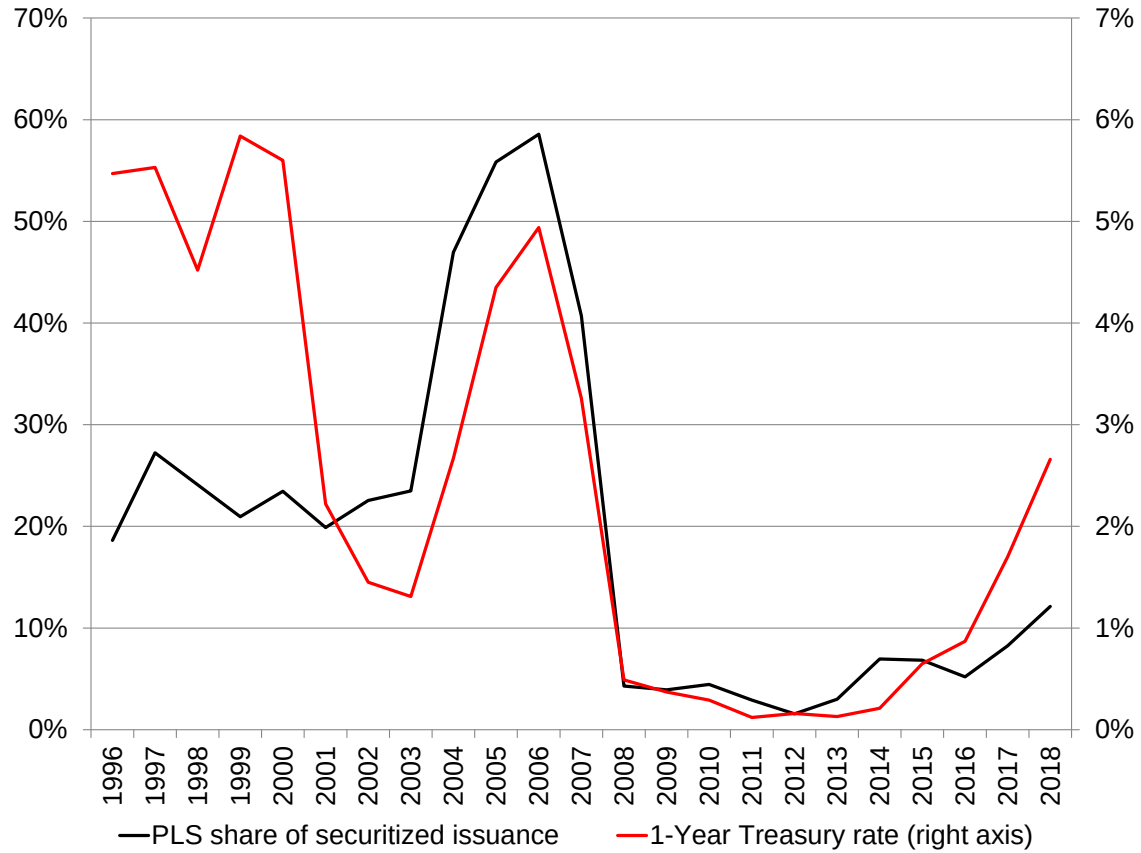
1. **Mortgage lending, housing booms, and financial crises:** Mian and Sufi (2009); Adelino, Schoar, and Severino (2016); Schularick and Taylor (2012), Jordà, Schularick, and Taylor (2016); Justiniano, Primiceri and Tambalotti (2017)

2. **Bank lending/deposits channel of monetary policy:** Bernanke (1983); Bernanke and Blinder (1988); Kashyap and Stein (1994, 2000); Landier, Sraer, and Thesmar (2013); Scharfstein and Sunderam (2016); Hanson, Shleifer, Stein, and Vishny (2015); Drechsler, Savov and Schnabl (2017)

3. **Monetary policy and financial stability:** Kashyap, Stein, and Wilcox (1993); Stein (1998, 2012); Diamond and Rajan (2012); Greenwood, Hanson, and Stein (2014); Stein and Sunderam (2016); Drechsler, Savov and Schnabl (2018); Xiao (2018)

4. **Competition between banks and shadow banks:** Gennaioli, Shleifer, and Vishny (2013); Sunderam (2014); Moreira and Savov (2017); Xiao (2018); Buchak, Matvos, Piskorski, and Seru (2018)

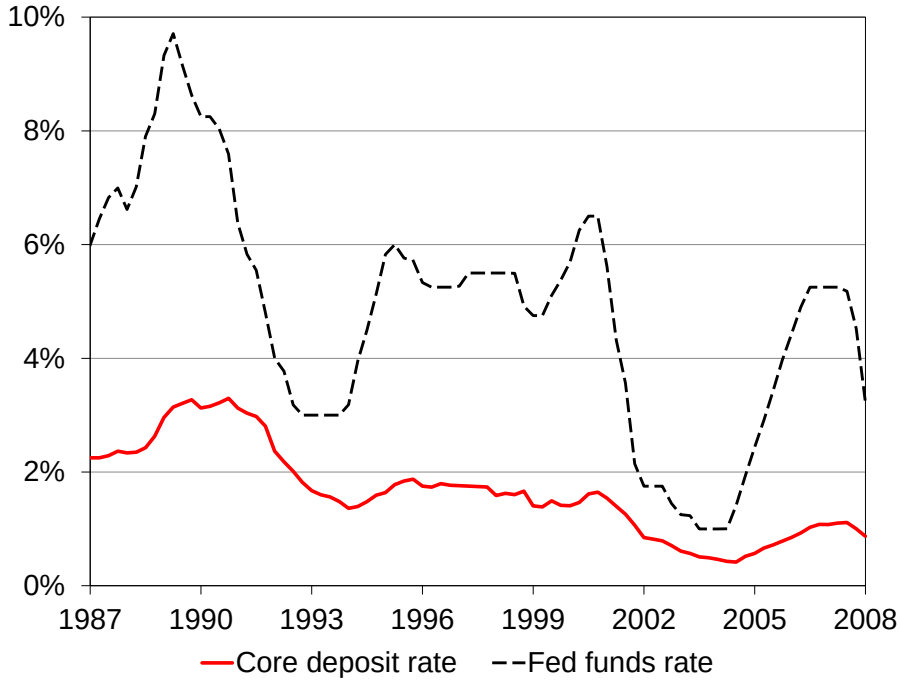
Private-label securitization (PLS) and Monetary Policy

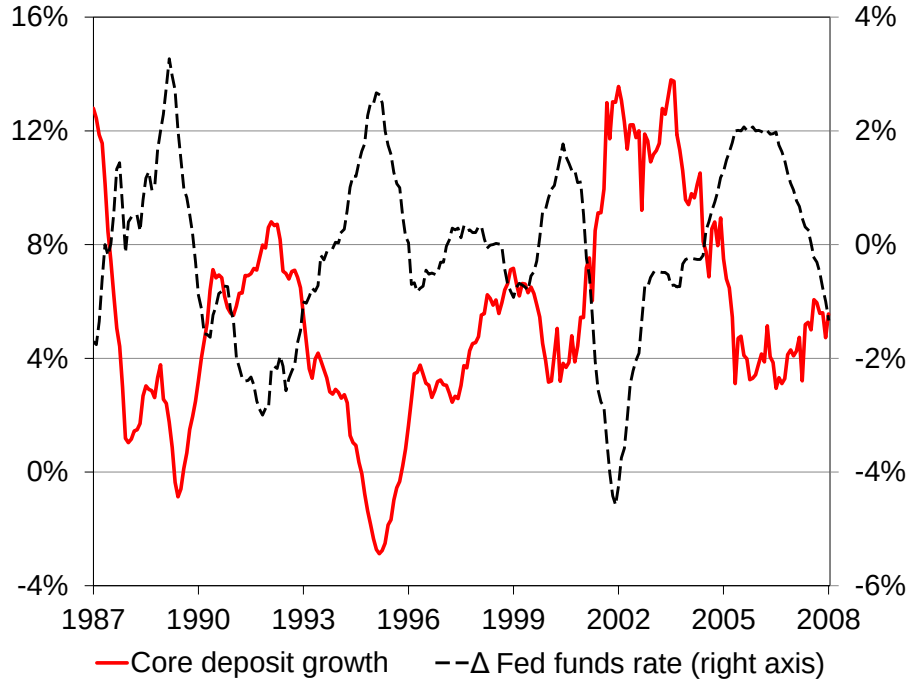


1. Strong positive co-movement between interest rates and PLS since 2002
   - before 2002, PLS share of total securitization was $< 25\%$
   - mid-2003 to 2006: as Fed tightens, PLS share rises sharply to $\approx 60\%$
   - PLS non-existent during ZLB period
   - has re-emerged as interest rates rise

Drechsler, Savov, and Schnabl (2018)

The deposits channel (DSS 2017)





1. Fed tightening induces outflows of bank deposits
   - banks have market power over retail (core) deposit markets
   - when the Fed funds rate rises, banks charge higher deposit spreads
   - this causes deposits to flow out
2. Deposits are the main source of bank funding (77% of liabilities)/ Banks value deposits for their unique stability

   $\Rightarrow$ deposit outflows induce banks to contract lending

Drechsler, Savov, and Schnabl (2018)

The deposits channel, 2003–2006

1. Did Fed tightening shrink deposit supply during the housing boom?
   - identification challenge: Fed tightening also weakens loan demand
2. Cross-sectional analysis: deposit spreads should rise more and deposits should flow out more in less competitive areas
   - measure local competition using deposit spread betas: for all branches b in county c, run

$$\Delta DepositSpread_{b,c,t} = \beta_c \Delta FedFunds_t + \varepsilon_{b,c,t}$$

   - β_c captures pricing power of branches in county c (Branch beta)
   - estimate β_c's from prior cycles (pre-2002)
3. Control for loan demand by comparing branches of the *same* bank ("within-bank estimation")
   - identifying assumption: a deposit dollar raised at one branch can be lent out at another branch

Branch-level analysis

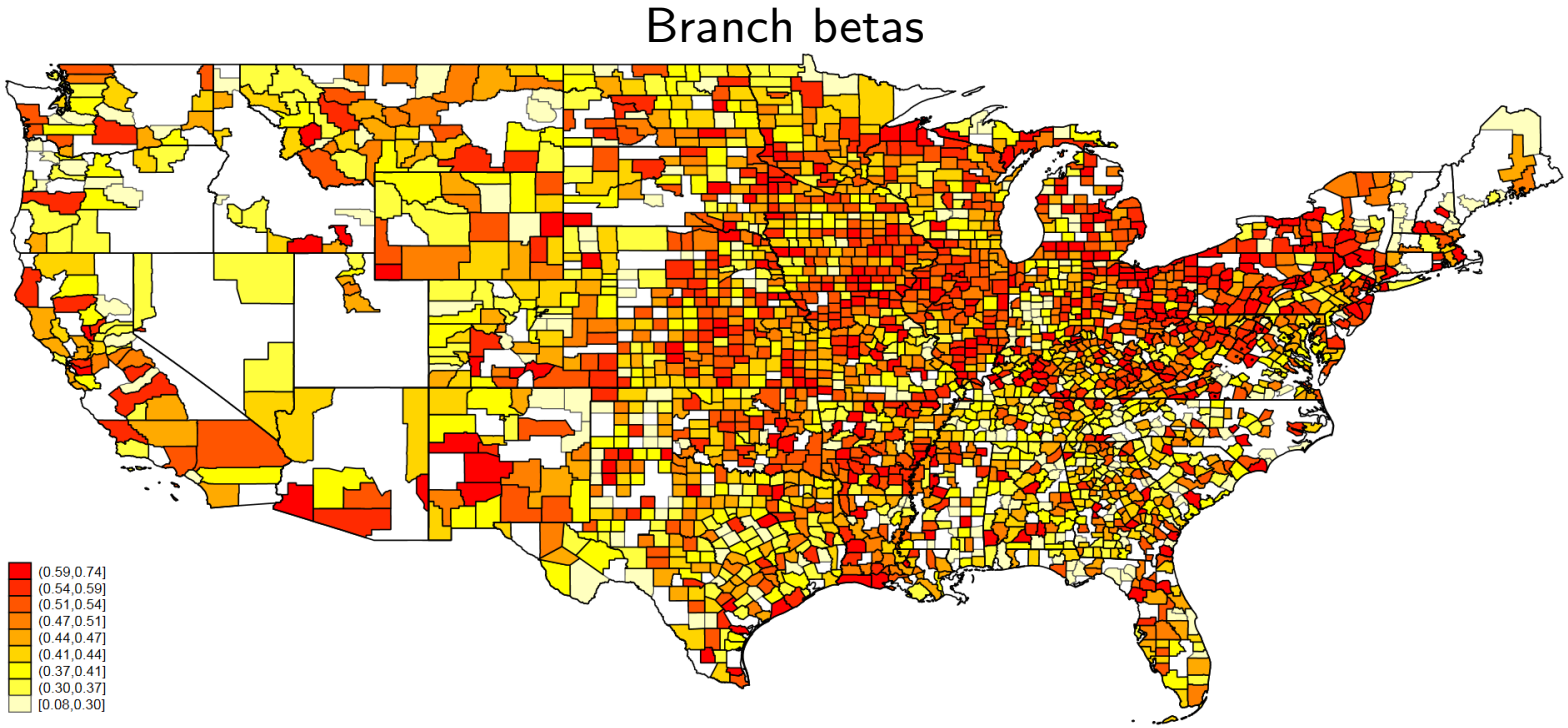
Data:

1. Branch- and product-level deposit rates: Ratewatch (1997–2015)
2. Branch-level deposits: FDIC (1994–2015)
3. Bank balance sheets: U.S. Call Reports (1986–2015)
4. County characteristics: County Business Patterns

Measures:

1. Deposit spread = Fed funds rate − deposits rate
2. Branch betas: estimate using pre-2002 data, use to predict deposit supply during 2003–2006

Distribution of Branch betas



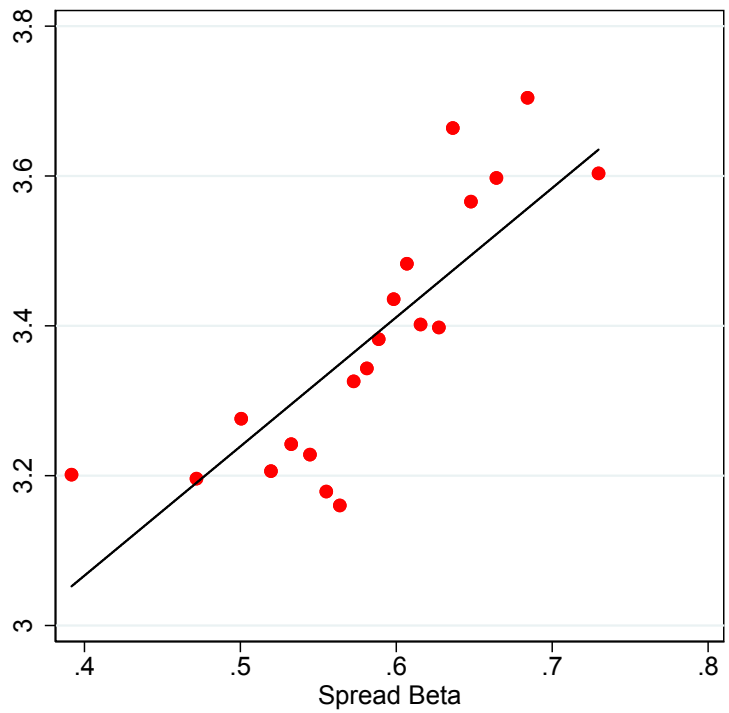
1. Branch betas average 0.58 $\Rightarrow$ deposit spreads increase on average by 58 bps per 100 bps increase in the Fed funds rate
2. There is substantial cross-sectional variation
   - DSS (2017) show that local deposit market power is explained by market concentration, income, education, demographics

Deposit spreads, 2003–2006

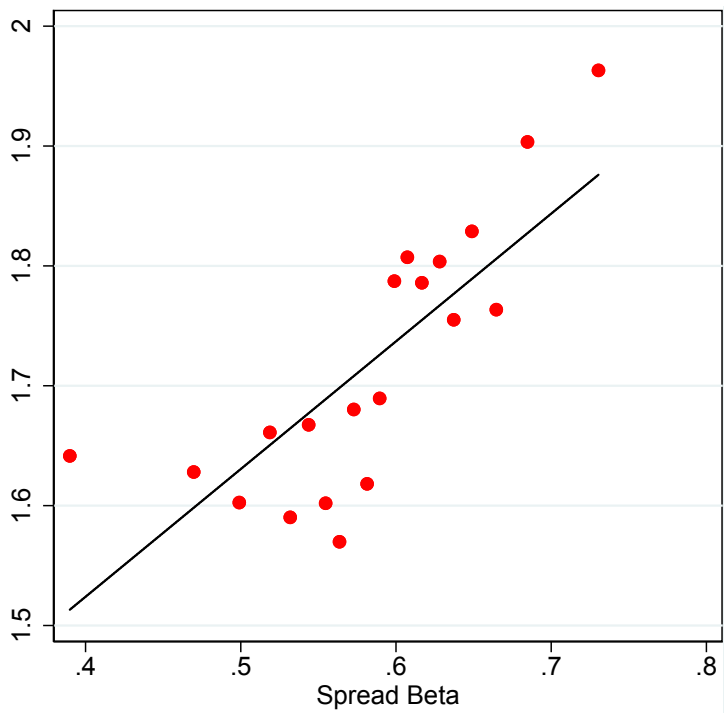
$$\Delta DepositSpread_{branch,2003-2006} = \alpha + \gamma BranchBeta_{2002} + \varepsilon$$

Bin-scatter plots:

Δ Savings deposits spread



Δ Small time deposits spread

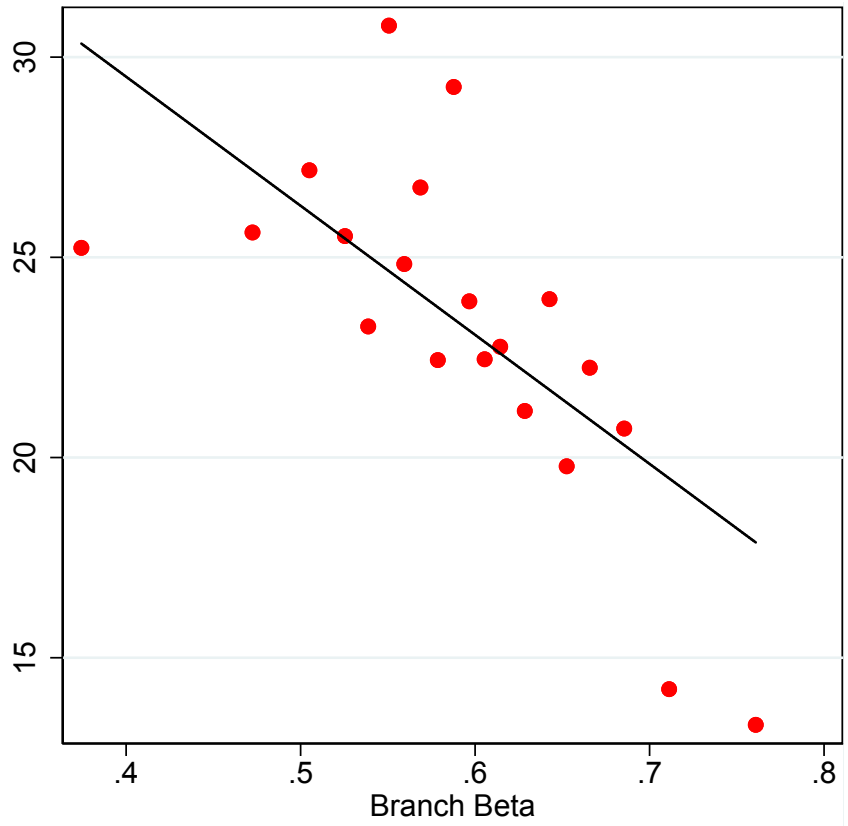


1. Deposit spreads rose strongly during the 2003-2006 period
2. Pre-2002 branch betas strongly predict the deposit spread changes

Drechsler, Savov, and Schnabl (2018)

Deposit growth, 2003–2006

$$\Delta \text{Log(Deposits)}_{branch,2003-2006} = \alpha + \gamma BranchBeta_{2002} + \varepsilon$$



1. Higher branch beta ⇒ spread increases more ⇒ lower deposit growth
   ⇒ Fed tightening induces inward shift in deposit *supply* (higher prices, lower quantities)

Drechsler, Savov, and Schnabl (2018)

Deposit growth, 2003–2006, within-bank estimation

$$\Delta \text{Log(Deposits)}_{branch,2003-2006} = \mu_{bank} + \gamma BranchBeta_{2002} + \varepsilon$$

	Panel B: Deposit Growth	
	(1)	(2)
Branch beta	−0.322***	−0.213***
	(5.046)	(6.037)
Bank Fixed Effects	N	Y
Observations	59,700	57,497
R^2	0.002	0.186

1. Pre-2002 branch betas predict 2003–2006 deposit growth across different branches of the *same* bank
   ⇒ not driven by differences in loan demand

⇒ Fed tightening shrank aggregate deposits by 12.4%
- $= -0.213 \times 0.58$ (average branch beta)
- consistent with aggregate time series

Drechsler, Savov, and Schnabl (2018)

Bank-level analysis

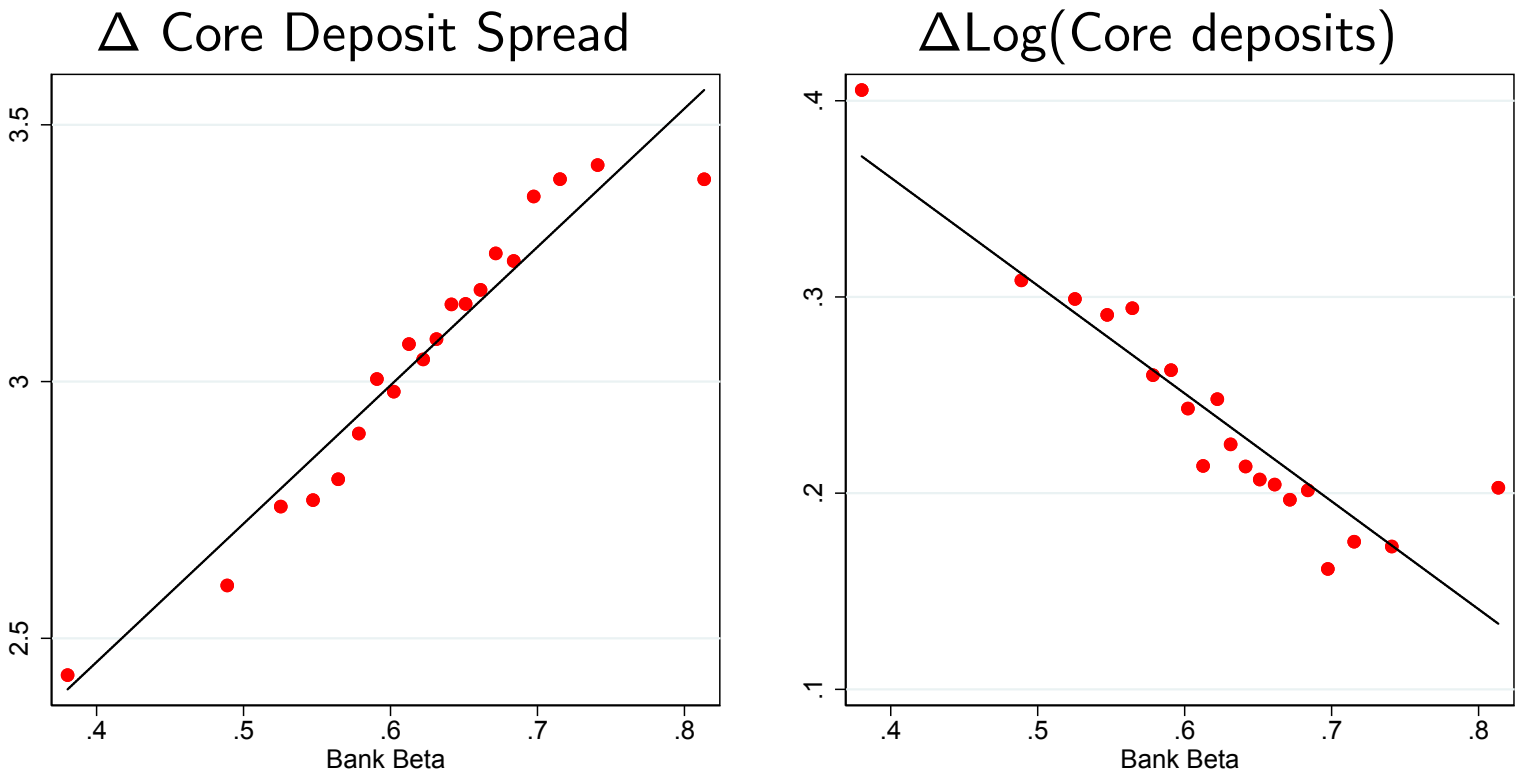
1. Verify branch-level deposits results aggregate up to bank level
2. Extend analysis to asset side of bank balance sheets
3. U.S. Call Reports 1986–2015 (6,356 banks)
   - measure deposit market power of bank B using its Bank beta β_B:

$$\Delta DepositSpread_{B,t} = \alpha_B + \beta_B \Delta FedFunds_t + \varepsilon_{B,t}$$

   - estimate β_B (Bank beta) using pre-2002 data
   - Bank beta captures a bank's exposure to the deposits channel
   - use Bank betas to predict deposit supply and bank assets during 2003–2006

Bank-level deposit supply, 2003–2006

$$\Delta y_{Bank,2003-2006} = \alpha + \gamma BankBeta_{2002} + \varepsilon$$

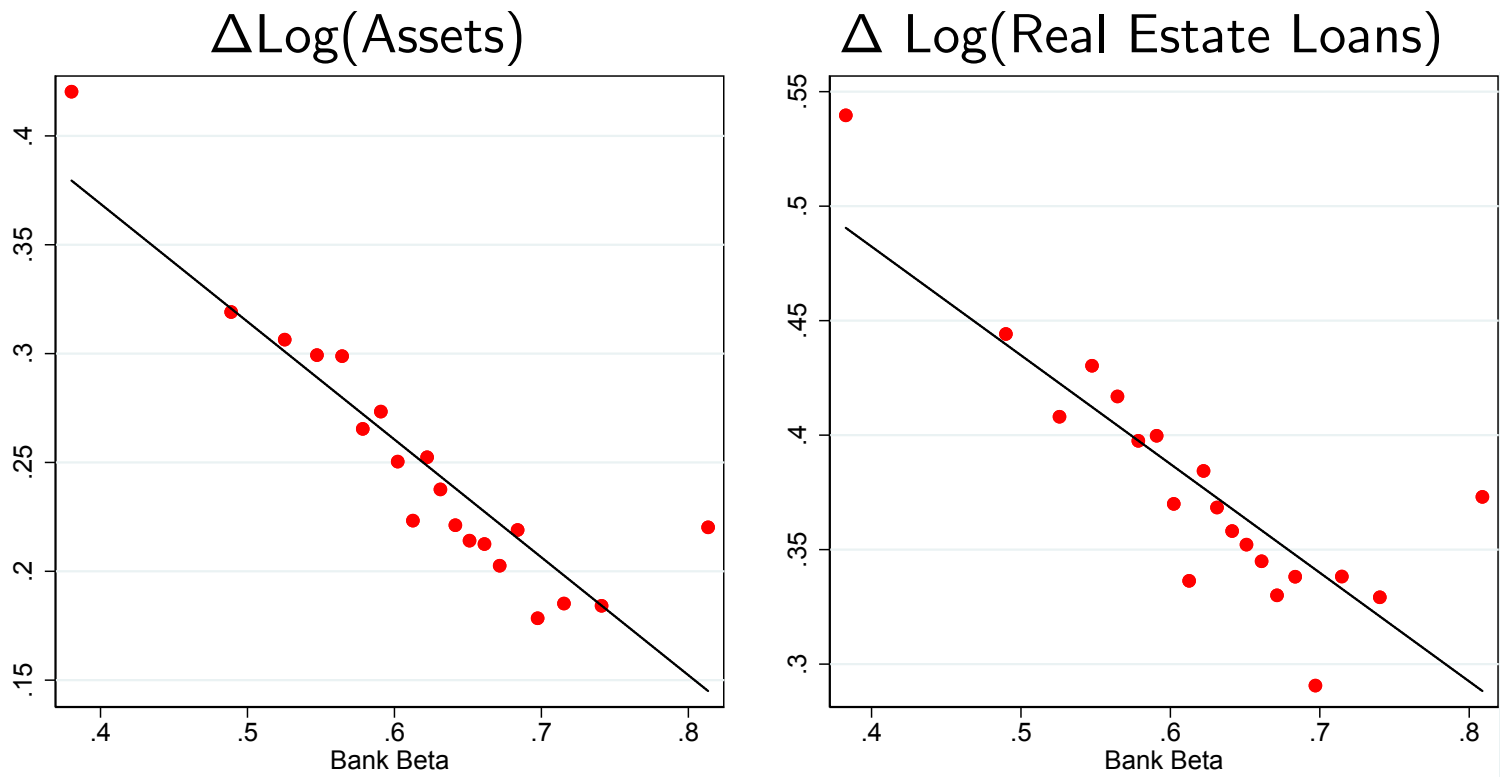


⇒ Pre-2002 Bank betas predict deposit spreads and deposit growth during the housing boom

- verifies branch-level results at the bank level (different datasets)

Bank-level real estate loans and securities

$$\Delta y_{Bank,2003-2006} = \alpha + \gamma BankBeta_{2002} + \varepsilon$$



⇒ Fed tightening induced a substantial contraction in banks' holdings of real estate loans and securities through the deposits channel

Drechsler, Savov, and Schnabl (2018)

Bank-level deposits, real estate loans, and securities

$$\Delta y_{Bank,2003-2006} = \alpha + \gamma BankBeta_{2002} + \varepsilon$$

	Δ Deposits (1)	Δ Real Estate Loans (2)
Bank Beta	−0.262***	−0.213***
	(0.037)	(0.052)
Observations	6,396	6,367
R-squared	0.137	0.054

1. Deposits contract by 26% and and real estate loans by 21% at a bank with a beta of 1 (maximally exposed) relative to a bank with a beta of 0 (unexposed)
   - average bank beta is 0.62 ⇒ implied aggregate impact is 16.2% contraction in deposits, 13.2% contraction in real estate loans

Drechsler, Savov, and Schnabl (2018)

County-level analysis

1. Examine how Fed tightening impacted the level and composition of mortgage lending through the deposits channel

2. Construct county-level exposure to deposits channel
   = average Bank beta in a county, weighted by 2002 portfolio lending shares:
   $$CountyBeta_c = \sum_b s_{b,c} BankBeta_b$$
   - county beta mean of 0.53; st. dev. of 0.06

3. Use County betas to predict mortgage lending during the housing boom, 2003–2006
   - Focus on bank portfolio and PLS-funding loans: financed privately, either held in banks' portfolios or sold through PLS $\rightarrow$ exposed to deposits channel (use GSE loan growth as control)

County-level analysis: empirical strategy

1. Identification challenge: local exposure to deposits channel correlated with loan demand over 2003–2006

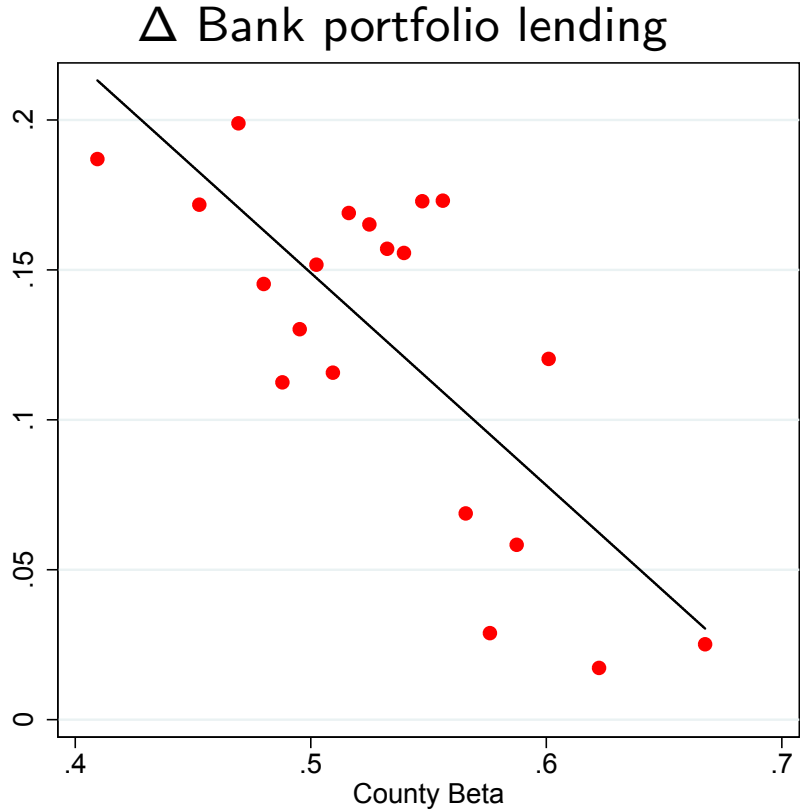
2. Use county and market structure characteristics as controls
   - county: lending, employment, income in 2002
   - market structure: top-4 lender share (Scharfstein and Sunderam 2016), 2002 PLS share (Mian and Sufi 2018), *deposit-weighted county beta* (uses deposit weights to construct beta)

3. Control for proxies of loan demand
   - Δ income, employment over 2003–2006
   - Δ GSE lending over 2003-2006 (since GSE segment is not exposed to deposits channel)

4. Look at change in PLS and non-bank *share* over 2003-2006 - controls for total loan demand by scaling by total lending

Bank portfolio lending, 2003–2006

$$\Delta \text{Log(Bank portfolio lending)}_{county,2003-2006} = \alpha + \gamma \textit{CountyBeta} + \varepsilon$$



⇒ As Fed tightened, counties more exposed to deposits channel saw less bank portfolio mortgage lending

Drechsler, Savov, and Schnabl (2018)

Bank portfolio lending, 2003–2006

$$\Delta y_{county,2003-2006} = \alpha + \gamma CountyBeta + \delta X_{county} + \varepsilon$$

	Δ Bank portfolio lending	
	(3)	(4)
County beta	−0.436***	−0.486***
	(0.162)	(0.163)
County controls	Y	Y
ΔDemand controls	N	Y
Obs.	2,998	2,750
R^2	0.138	0.176

1. Portfolio lending is 48.6% lower in a county with beta of 1 (maximally exposed) than in a county with beta of 0 (unexposed)

$\Rightarrow$ Aggregate reduction due to deposits channel: $-0.486 \times 0.532 = -25.9\%$

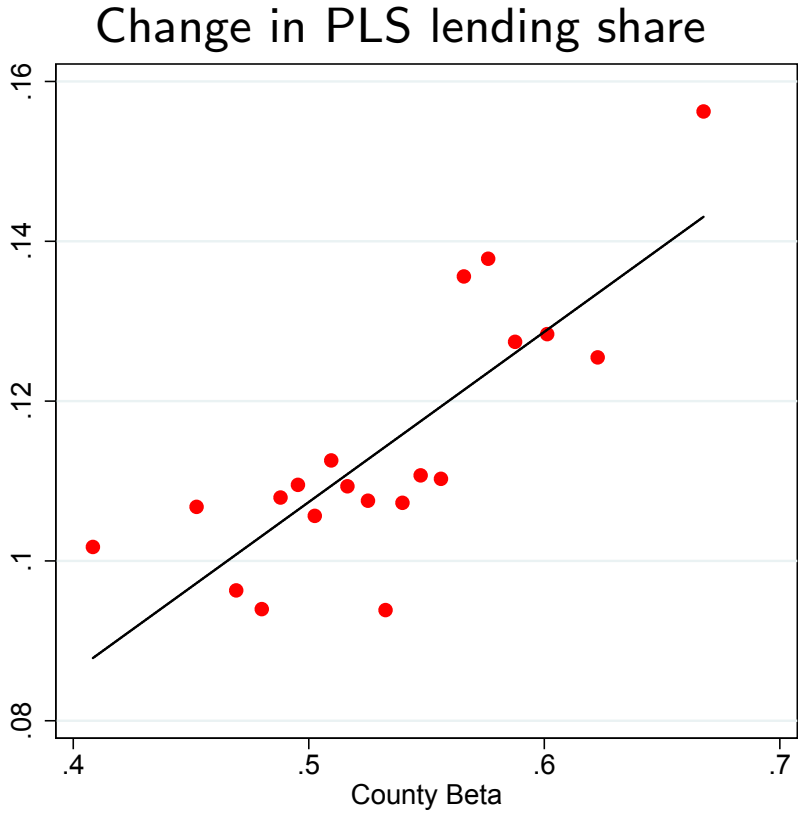
2. Robust to controls for characteristics (lending, employment, income), market structure (local deposit-weighted beta, PLS share, top-4 lender share), loan demand 2003–06 (ΔGSE lending, ΔIncome, ΔEmployment)

Drechsler, Savov, and Schnabl (2018)

Change in PLS share, 2003–2006

1. Look at market *share* to control for total loan demand

$$\Delta \text{PLS share}_{county,2003-2006} = \alpha + \gamma \, CountyBeta + \varepsilon$$



2. As Fed tightens and bank portfolio mortgage lending contracts $\rightarrow$ market shifts strongly towards private-label securitization
   - intercept $\approx 0 \rightarrow$ no growth in PLS share in unexposed counties

Drechsler, Savov, and Schnabl (2018)

Change in PLS share, 2003–2006

$$\Delta y_{county,2003-2006} = \alpha + \gamma CountyBeta + \delta X_{county} + \varepsilon$$

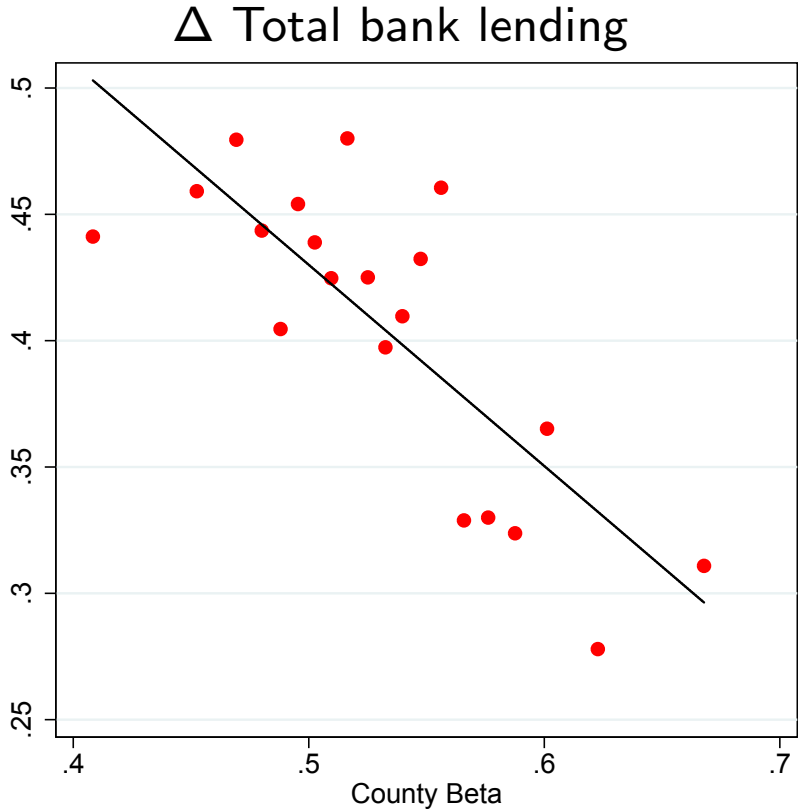
	Δ PLS lending share	
	(1)	(2)
County beta	0.141***	0.192***
	(0.046)	(0.043)
County controls	Y	Y
ΔDemand controls	N	Y
Obs.	3,026	2,754
R^2	0.120	0.189

1. PLS lending share rises by 19.2% in a county with beta of 1 (maximally exposed) relative to a county with beta of 0 (unexposed)
2. Aggregate impact: deposits channel can account for a 10.2% increase in PLS share vs. 11.4% actual increase

Drechsler, Savov, and Schnabl (2018)

Total bank lending, 2003–2006

$$\Delta \text{Log(Total bank lending)}_{county,2003-2006} = \alpha + \gamma \textit{CountyBeta} + \varepsilon$$



⇒ As Fed tightened, counties more exposed to the deposits channel saw less bank portfolio and total bank mortgage lending

Drechsler, Savov, and Schnabl (2018)

Total bank lending, 2003–2006

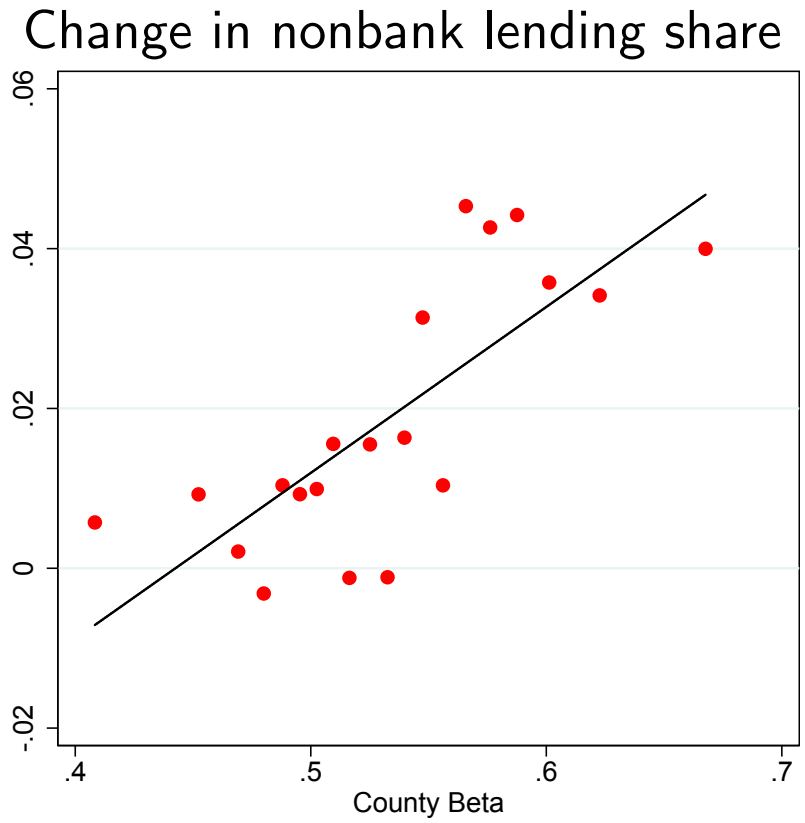
$$\Delta y_{county,2003-2006} = \alpha + \gamma CountyBeta + \delta X_{county} + \varepsilon$$

	Δ Bank lending	
	(1)	(2)
County beta	−0.368***	−0.267***
	(0.132)	(0.132)
County controls	Y	Y
ΔDemand controls	N	Y
Obs.	3,018	2,753
R^2	0.176	0.238

1. Total bank lending declines by less than portfolio lending ⇒ composition of bank lending shifts to PLS

Change in non-bank share, 2003–2006

$$\Delta\text{Non-bank share}_{county,2002-2006} = \alpha + \gamma \mathit{CountyBeta} + \varepsilon$$



$\Rightarrow$ Non-banks led the shift to PLS, gaining market share

Drechsler, Savov, and Schnabl (2018)

Change in non-bank share, 2003–2006

$$\Delta y_{county,2003-2006} = \alpha + \gamma CountyBeta + \delta X_{county} + \varepsilon$$

	Δ Nonbank lending share	
	(1)	(1)
County beta	0.094**	0.124***
	(0.041)	(0.040)
County controls	Y	Y
ΔDemand controls	N	Y
Obs.	3,026	2,754
R^2	0.123	0.159

⇒ Non-bank share rose 12.4% more in a county with beta of 1 (maximally exposed) than in a county with beta of 0 (unexposed).

Total mortgage lending (non-GSE), 2003–2006

$$\Delta y_{county,2003-2006} = \alpha + \gamma CountyBeta + \delta X_{county} + \varepsilon$$

	Δ Total lending	
	(1)	(2)
County beta	−0.206*	−0.085
	(0.116)	(0.114)
County controls	Y	Y
ΔDemand controls	N	Y
Obs.	3,026	2,754
R^2	0.122	0.184

1. Total lending is 8.5% lower (with controls) in a county with beta of 1 (maximally exposed) relative to a county with beta of 0 (unexposed)
   - controls for loan demand matter more for total lending

⇒ Implied aggregate contraction in total lending is only 4.52%
   - due to substitution from bank portfolio lending to PLS lending

Drechsler, Savov, and Schnabl (2018)

Substitution and aggregate impact

1. Use the cross-sectional coefficients to estimate the substitution between bank portfolio (BP) and PLS lending.

   Total lending TL = BP + PLS $\Rightarrow$

$$-\frac{dPLS}{dBP} = -\frac{dTL - dBP}{dBP} = \left(\frac{dTL/TL}{dBP/BP} \times \frac{TL}{BP} - 1\right)$$

$$= -\left(\frac{-0.085}{-0.486} \times \frac{1}{1 - 0.497} - 1\right) = 0.652$$

   $\Rightarrow$ PLS offsets 65.2% of the contraction in bank portfolio lending

2. Similarly, non-bank lending substitutes 56.8% of the contraction in bank lending.

$\Rightarrow$ Impact of Fed tightening was substantially offset by PLS lending, led by non-banks:

i. bank portfolio lending fell by 25.9%

ii. but total lending fell by only 4.52%

iii. due to +16.8% PLS lending, led by +18.8% in non-bank lending

Drechsler, Savov, and Schnabl (2018)

Financial fragility

1. Fed tightening induced shift from deposit-funded lending to wholesale-funded PLS lending

2. PLS market has no government support, in contrast to GSE market and bank portfolio mortgages
   - GSE mortgages: (quasi-) government guarantee
   - bank portfolio mortgages: funded by government-insured deposits

$\Rightarrow$ PLS-funded mortgage market is much more exposed to runs/freezes
   - such a run/freeze began in 2007 and only ended with government intervention

Takeaways

1. We analyze the impact of Fed tightening on mortgage lending during the housing boom through the lens of the deposits channel

2. We find that Fed tightening induced outflows of deposits and a contraction in bank portfolio mortgage lending

3. This contraction accelerated the shift to private-label securitization (PLS), led by non-banks, which largely undid the contractionary impact of Fed tightening
   - investors' newfound willingness to supply funding for PLS was ultimate driver of boom

4. Results closer to Bernanke's (2010) view that tighter supervision would have been more effective than further raising rates