Regulation, Technology and Shadow Banks

A Decade after Lehman

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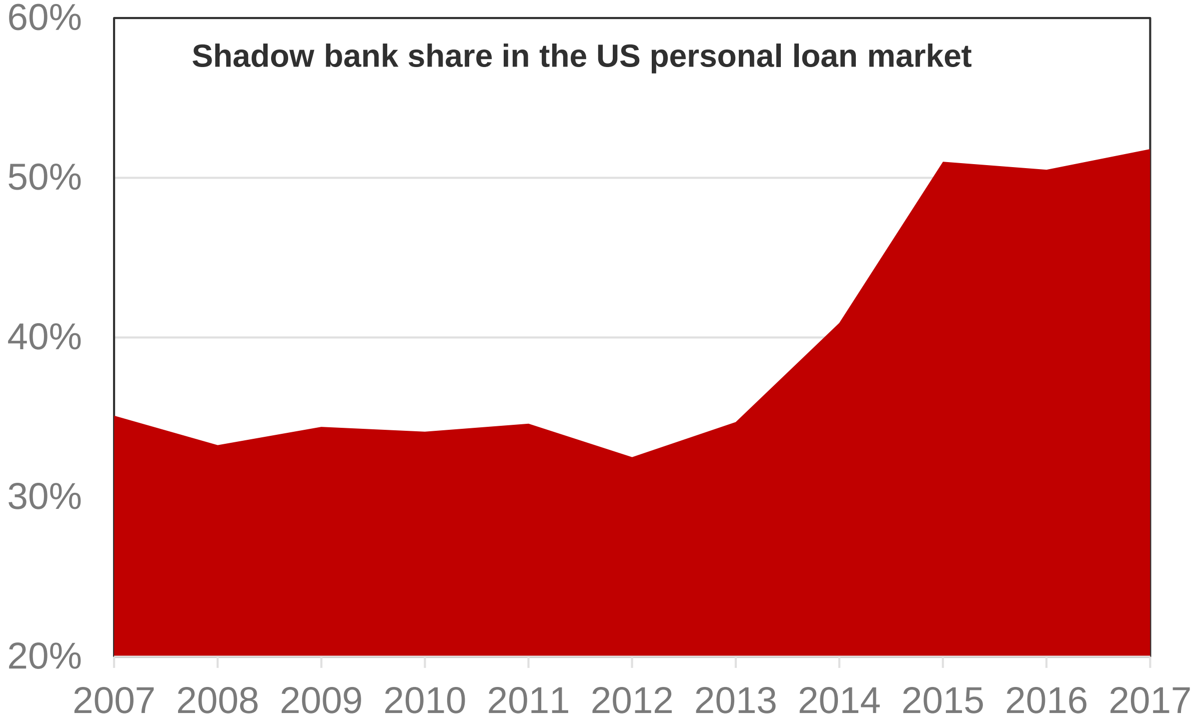
Based on 1) "Fintech, Regulatory Arbitrage and the Rise of Shadow Banks" in *Journal of Financial Economics* and 2) "The Limits of Shadow Banks". Coauthored with Buchak, Matvos and Piskorski

Dramatic Change in Lending over last Decade

- ❑ Regulatory framework and research: Banks are key suppliers of loans to household & firms
  - ❍ Raise capital requirements → reduced bank lending including fewer loans, higher rates

- ❑ Overlooks entry of shadow banks and FinTech lenders

FIGURE 1A: RISE OF SHADOW BANKS



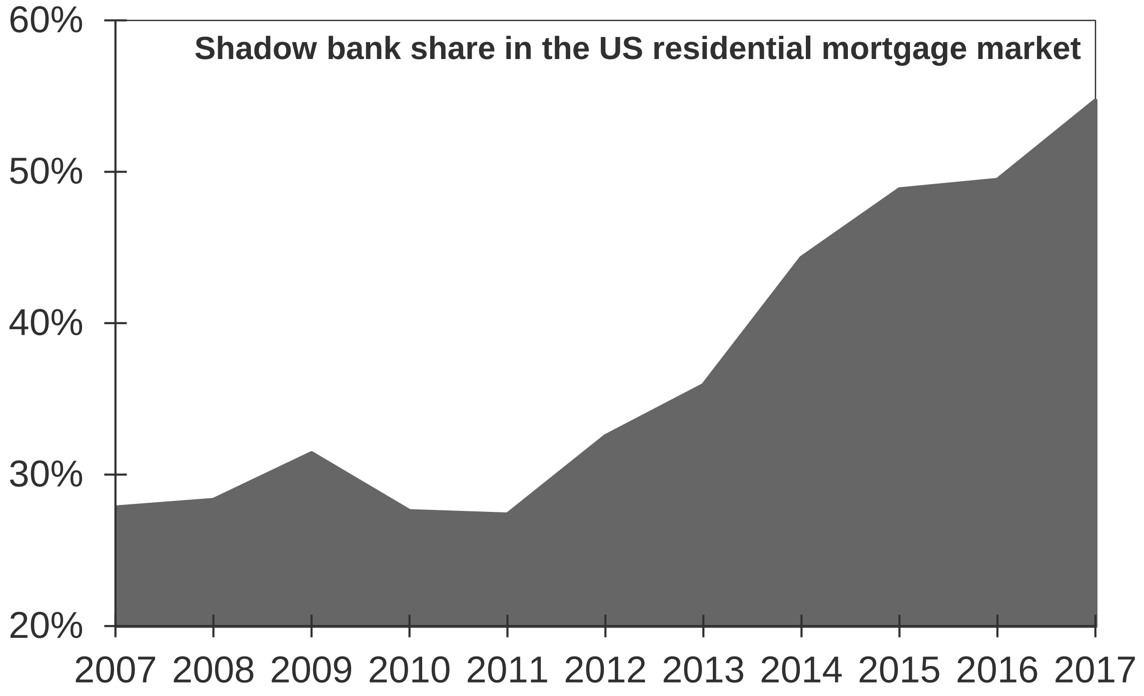


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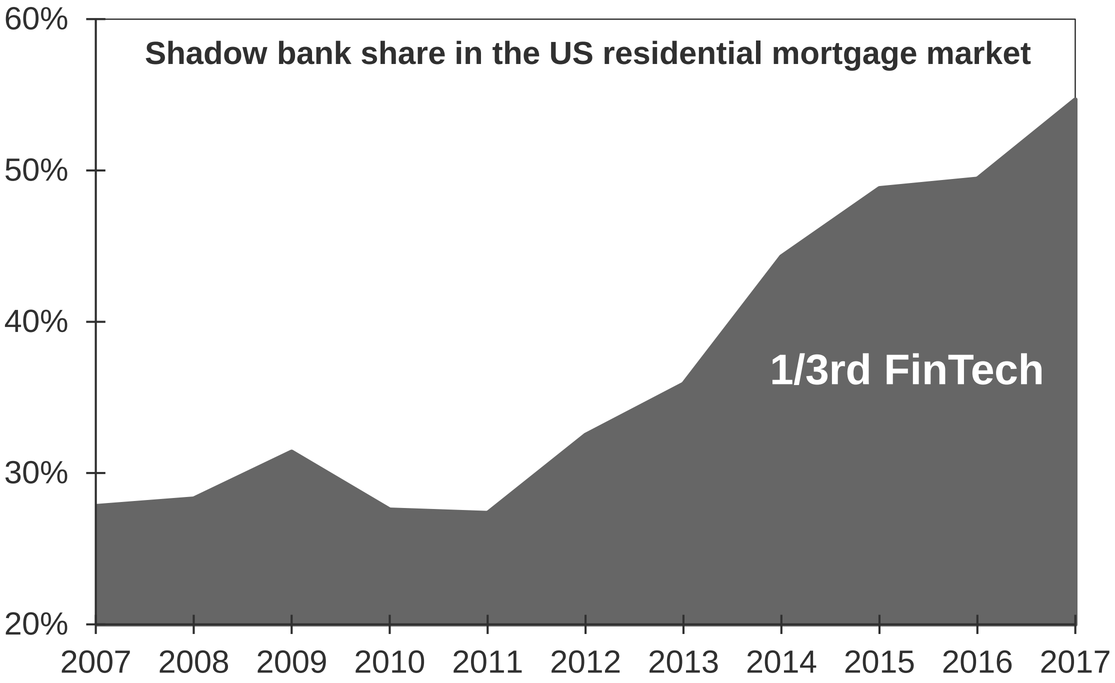
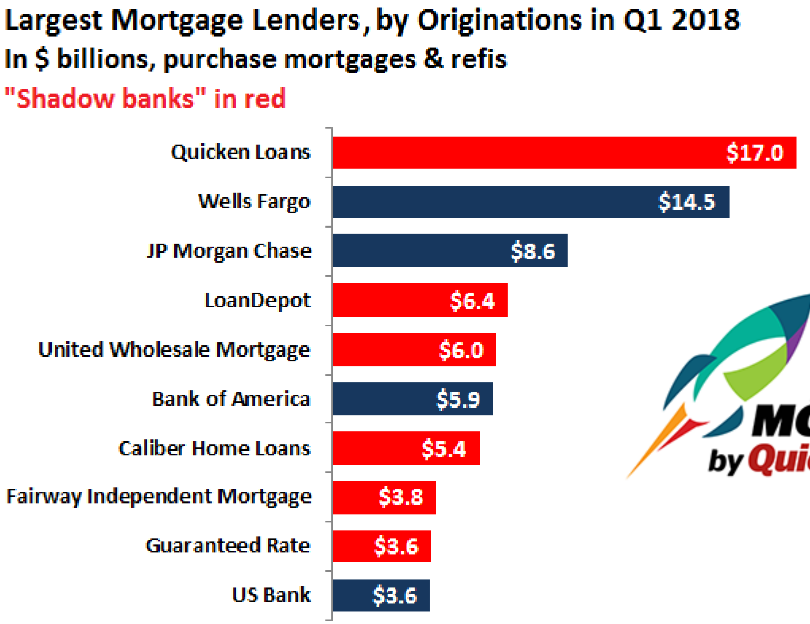
FIGURE 1B: SHADOW BANKS IN MORTGAGE SECTOR





Mechanisms

- How much of the growth driven by Regulation? And how much by Technology?
  - Regulation: capital costs, scrutiny/supervision burden, legal costs
  - Technology: lower costs, better/higher quality products, better models

FIGURE 2A: INCREASED REGULATION?

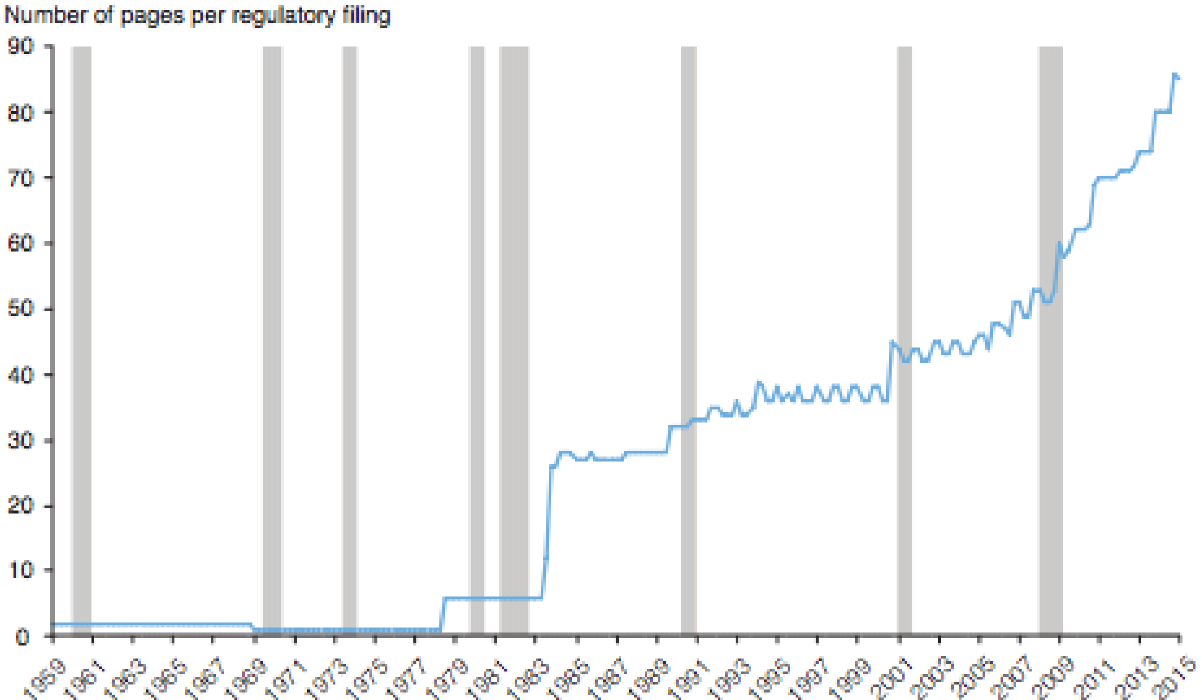


FIGURE 2B: BETTER TECHNOLOGY?

ROCKET MORTGAGE by Quicken Loans

Regulation?

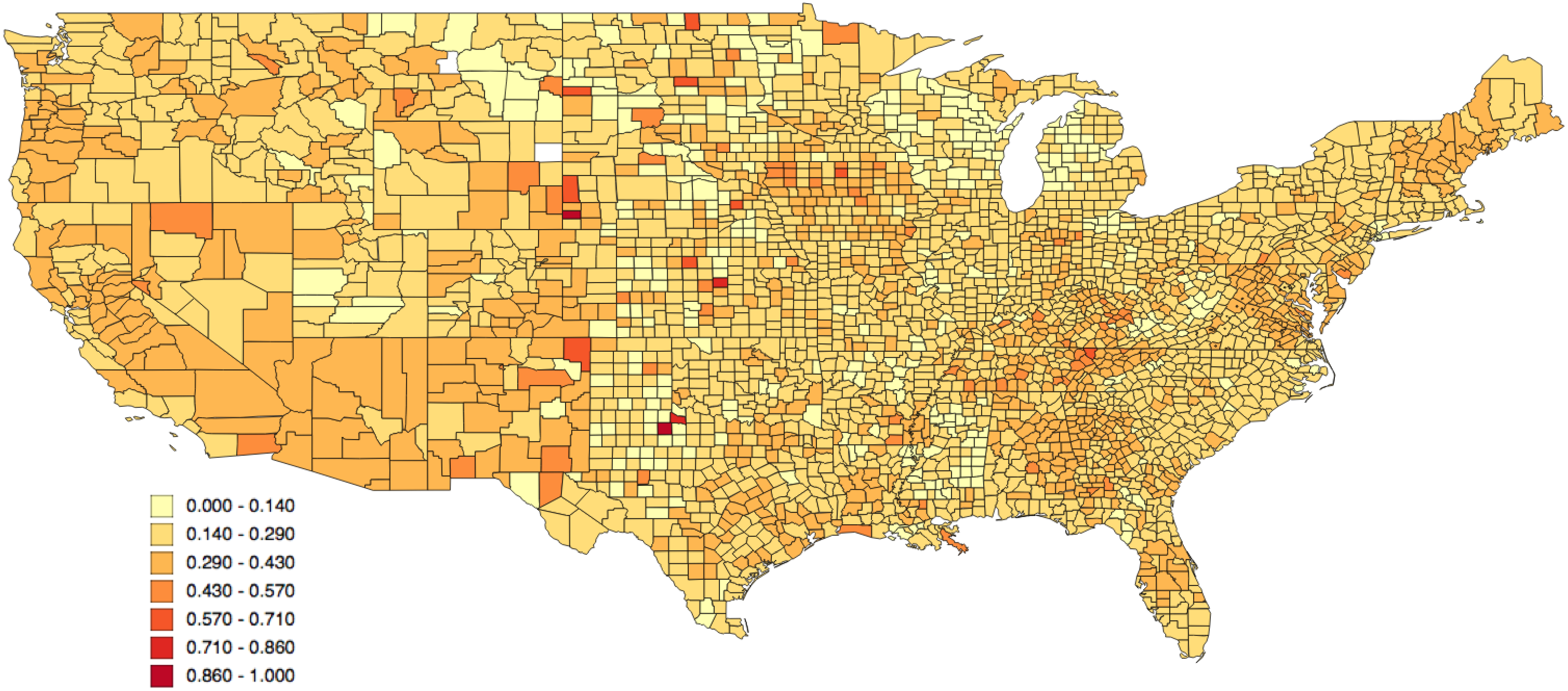
Regulation?

- ❑ Extensive regulation of banks after crisis
  - Dodd Frank
  - Basel III
  - Changes in regulators, enforcement, …

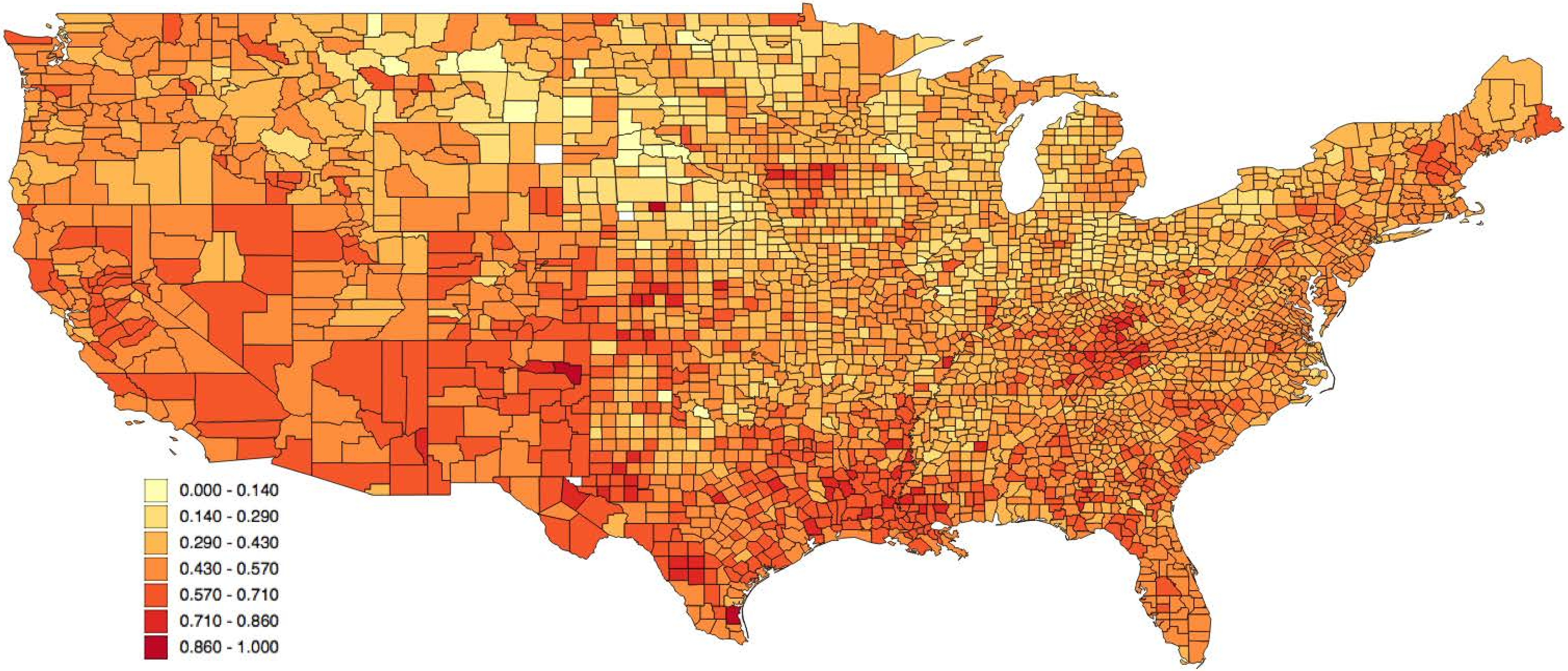
- ❑ Evidence reveals that regulation dampens bank lending
  - Traditional banks face rising capital costs
  - Traditional banks face greater capital constraints
  - Traditional banks face greater regulatory scrutiny

- ❑ Shadow banks fill regulatory gaps

County Level Shadow Bank Share: 2008



County Level Shadow Bank Share: 2015



Regulation?

❑ Source of Variation

- Banks are exposed to national-level regulatory shocks
- Counties exposed through 2008 bank lending market share
- County-level variation from differential exposure to differentially shocked banks

❑ Regulatory Changes

1. Higher Capital Requirements
   Bank Capitalization: Banks rebuilding capital → Lend less
2. Basel III
   Mortgage Servicing Rights: Banks with more MSR → Lend less
3. Enforcement / Legal Risk
   Lawsuits: Banks exposed to more mortgage-related lawsuits → Lend less
4. Tighter regulatory supervision:
   OTS Closure: Banks supervised by OTS → Lend Less

❑ Outcome

- Find changes in shadow bank market share from 2008 *positively related* with regulatory changes

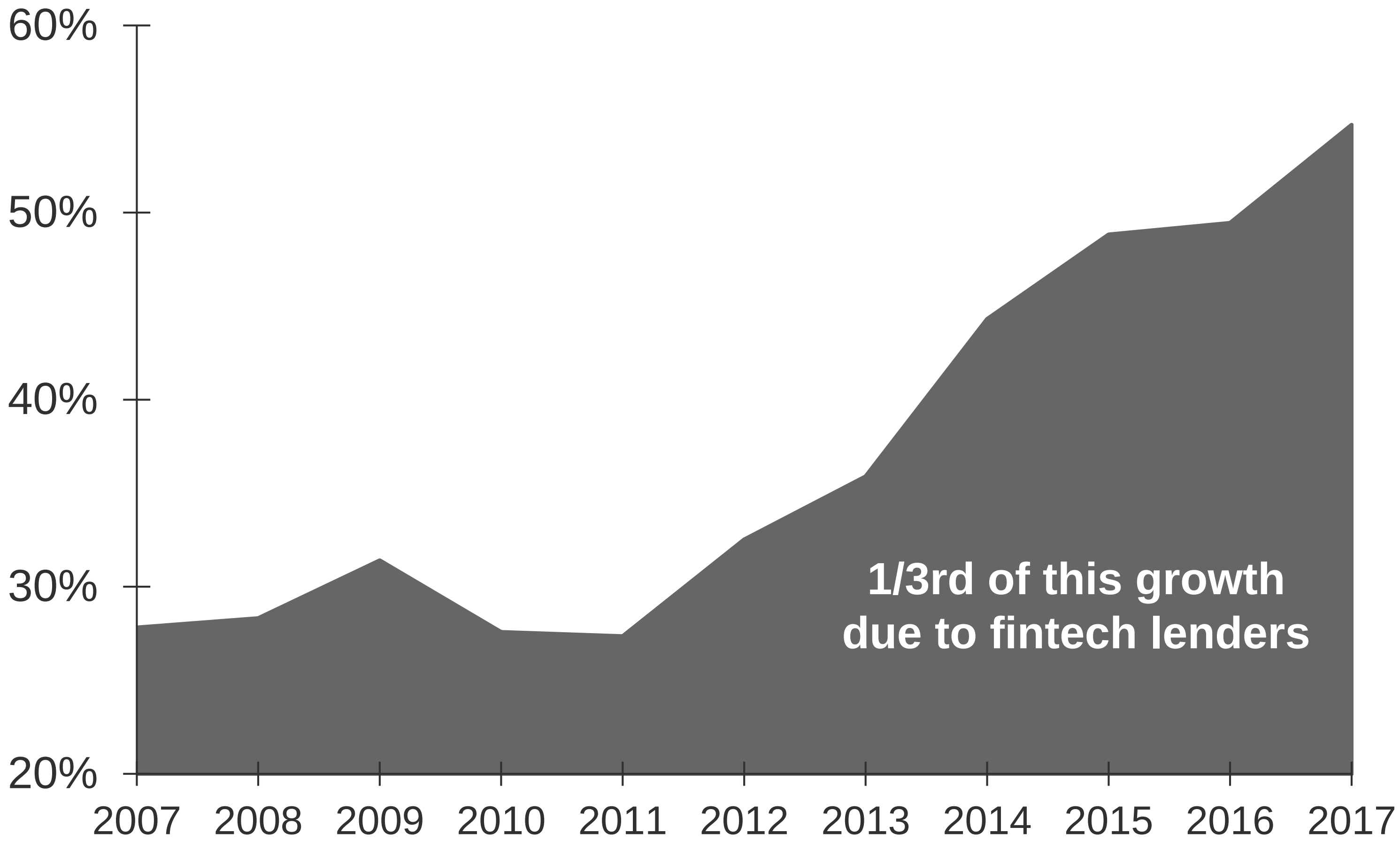
Where are the loans?

- What do banks and shadow banks do with their loans?
  - Banks: Retention on balance-sheet (30-50%)
  - Shadow Banks: Sell primarily to GSEs (~90%)

Technology?

Technology?

FIGURE: FINTECH SHADOW BANK SHARE



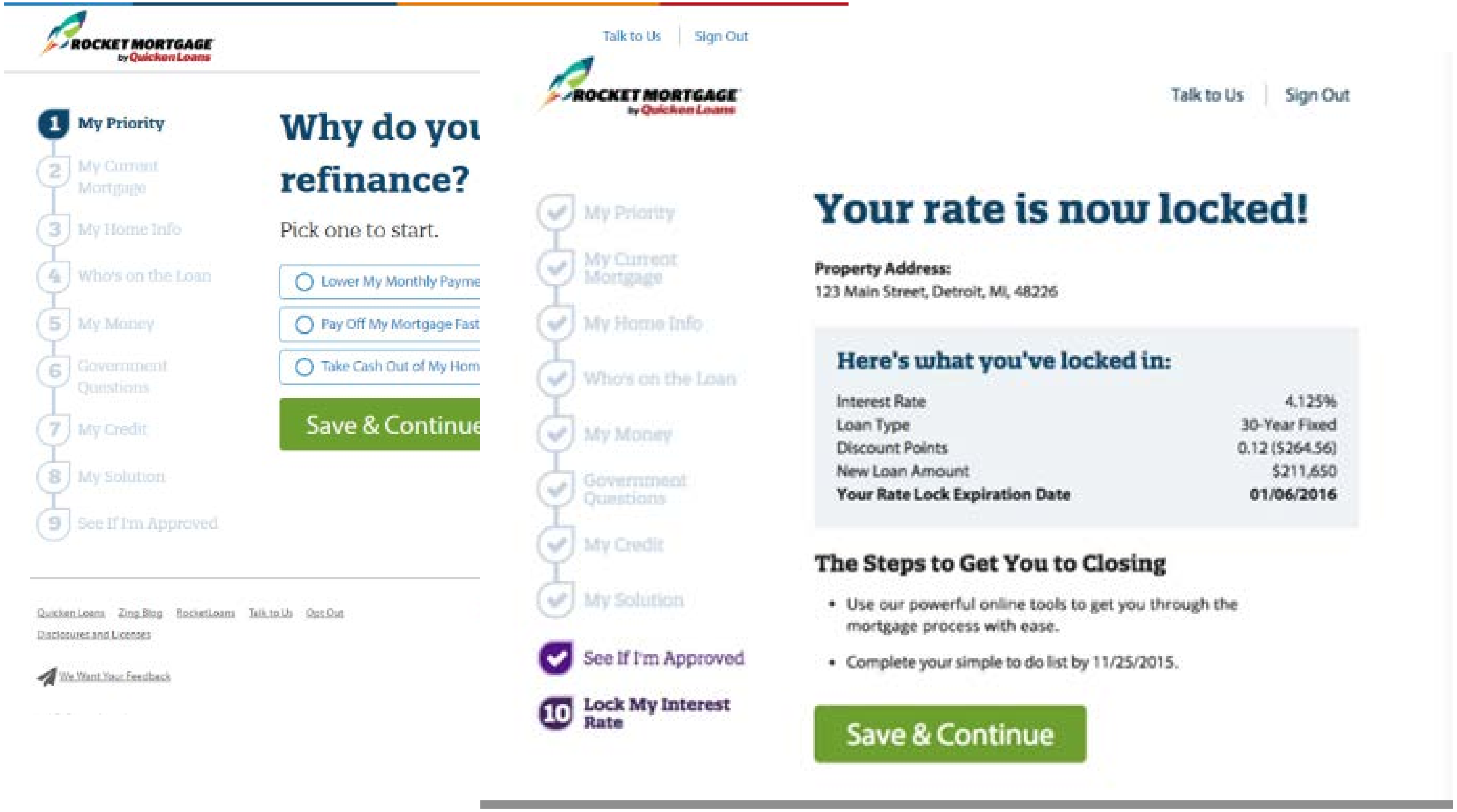
Technology?

- Technology allows for several novel aspects that banks may find difficult to copy
    - Lower costs of reaching the customer
    - Offer better/convenient/higher quality products,
    - Use big data and better models to profile risk or price discriminate (better back out WTP)

Technology?

ROCKET MORTGAGE®
by Quicken Loans®

Quicken Loans



Aside: Non Fintech Shadow Bank

Home / Home Refinance / Refinance Process / **Getting Approved For A Refinance**

What to expect.

Understand the refinance process from application through closing.

Here is a quick overview of the approval process. A Home Loan Specialist can answer any questions you may have.

Initial review

You are assigned a loan processor who works with you through your closing – organizing your paperwork and making sure your documentation is complete prior to the final review.

Underwriting

Once we have your documentation, an underwriter reviews your loan package to make sure it fits loan guidelines, evaluates your loan application, and then makes a credit decision. In some cases, we may request additional information before making a decision. Your loan processor can assist you with this.

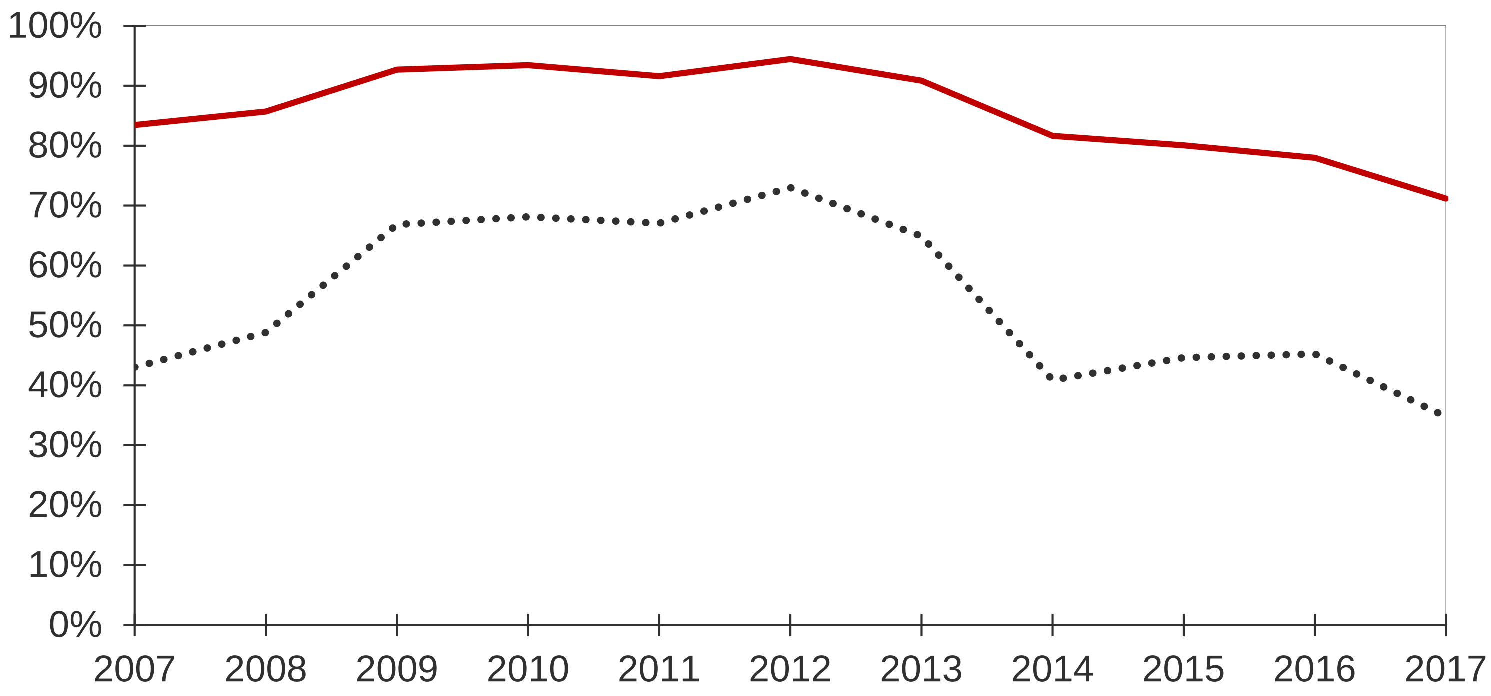
Approval decision

Once your loan is approved, a closing date will be set. At least three business days before your closing date, we will

Technology? Refinancing

- Fintech lenders operate in a different manner
  - Target refinancing where they have comparative advantage

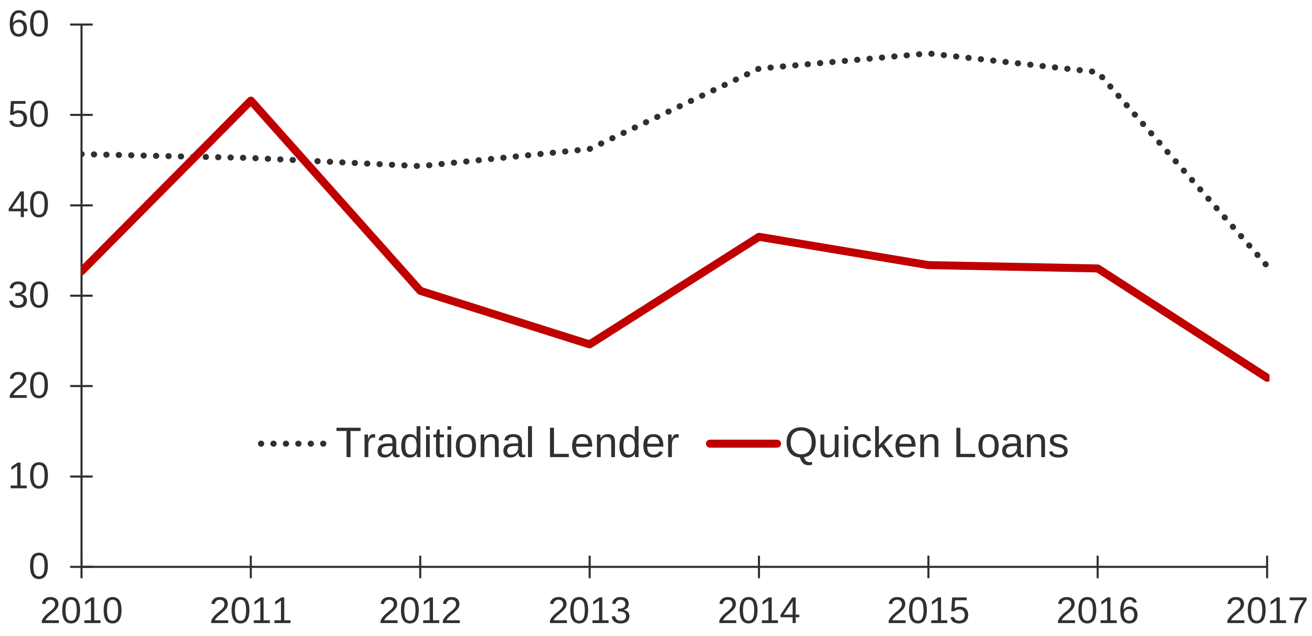
FIGURE: BUSINESS FOCUS



Technology? Loan Processing

- ❑ Fintech lenders operate in a different manner
  - ❍ Target refinancing where they have comparative advantage
  - ❍ Leverage and process consumer data faster

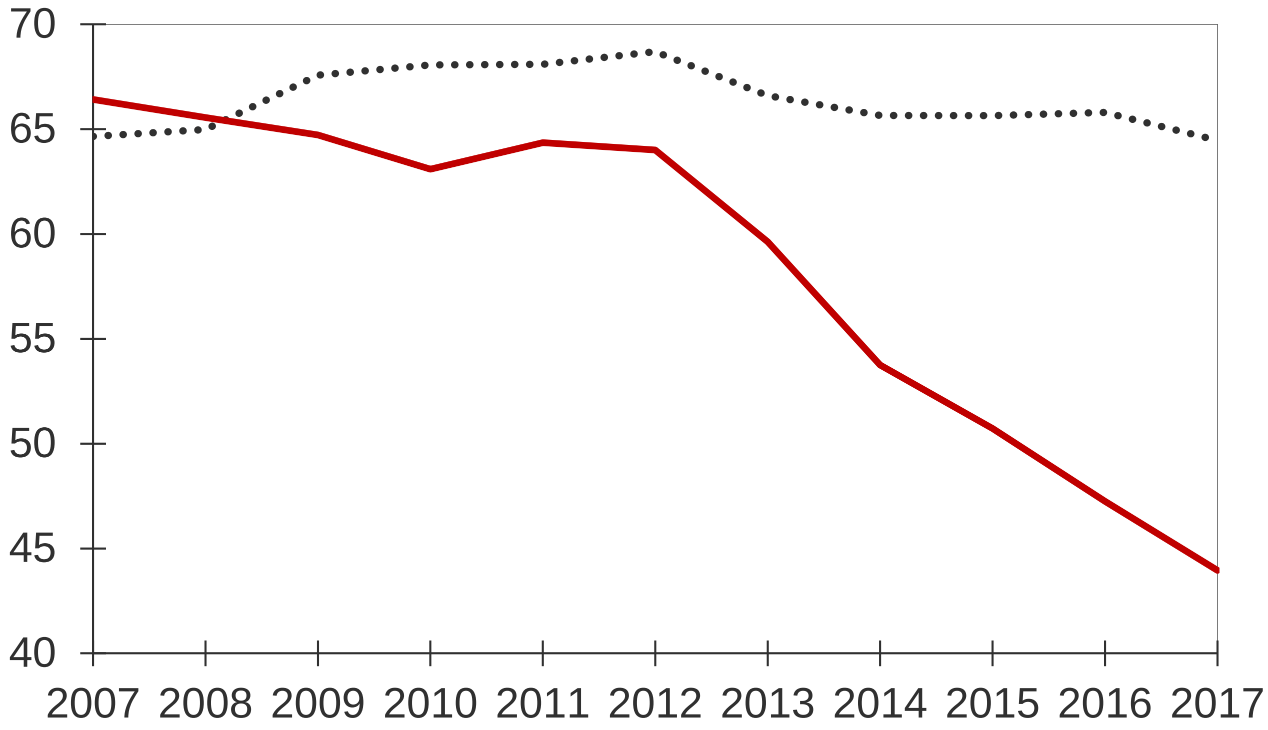
FIGURE: TIME TO SELL



Technology? Other Data?

- ❑ Fintech lenders operate in a different manner
  - ❍ Target refinancing where they have comparative advantage
  - ❍ Leverage and process consumer data faster

FIGURE: % WITH DECLARED WHITE



Technology? Quality

Mortgage Customer
Satisfaction Increases as
Lenders Adopt New Technology,
Improve Efficiency

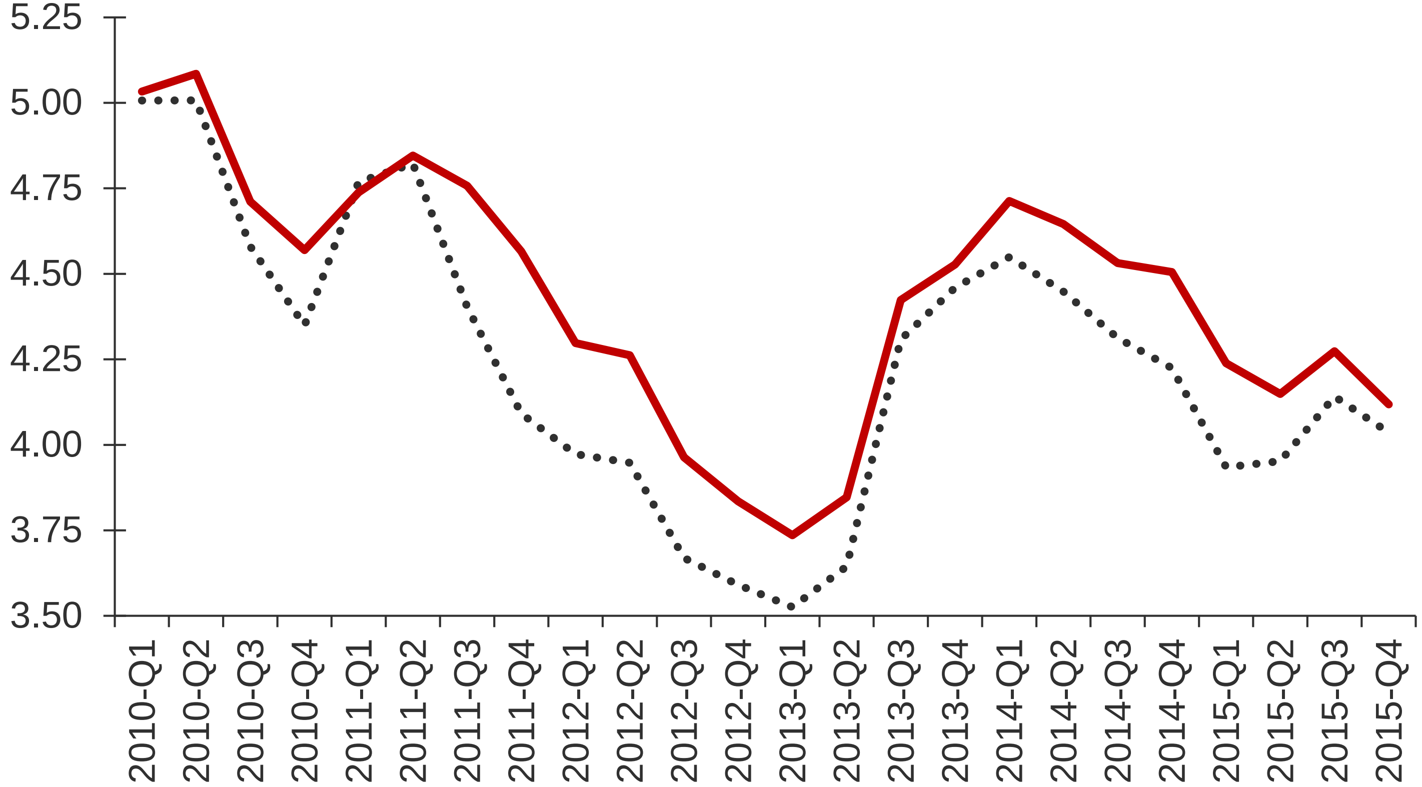
2015 U.S. Primary Mortgage Origination Satisfaction Study | J.D. Power

Technology? Quality

Technology? Willingness to Pay

- ❑ Fintech lenders operate in a different manner…and charge more!
  - ❍ Target refinancing where they have comparative advantage
  - ❍ Leverage and process consumer data faster

FIGURE: PRICE DISCRIMINATION



Market Segments, Interest Rates & Performance

- Markets Targeted and Funding
  - Shadow banks specialize in high risk segments (including FHA)
  - Fintech shadow banks specialize in refinancing market, target unreported race

- Interest Rates
  - Overall shadow banks and banks charge similar rates relative to traditional banks
  - Fintech shadow banks are 14-16 bp more expensive

- Performance/Models
  - Defaults similar across lenders…

  …Yet…
  - Shadow and fintech bank borrowers more likely to Prepay → higher turnover and fees for lenders

Quantitative Assessment

Model

- What we know so far:
  - Shadow banks gain market share in areas where banks are subject to more regulatory oversight.
  - Within shadow banks, fintech commands rate premium and appears to process/sell loans faster

- Model objectives:
  - Combine regulatory and technology effects
  - Decomposition: how much in technology and how much is regulation
  - Informed by the data (market shares, prices)

- Estimate that 60-70% of shadow bank growth due to regulation and rest due to technology

Model Ingredients

- Borrowers
  - Utility depends on interest rate and non-price attributes (quality/convenience)
  - Choose among traditional banks, non fintech shadow banks and fintech shadow banks

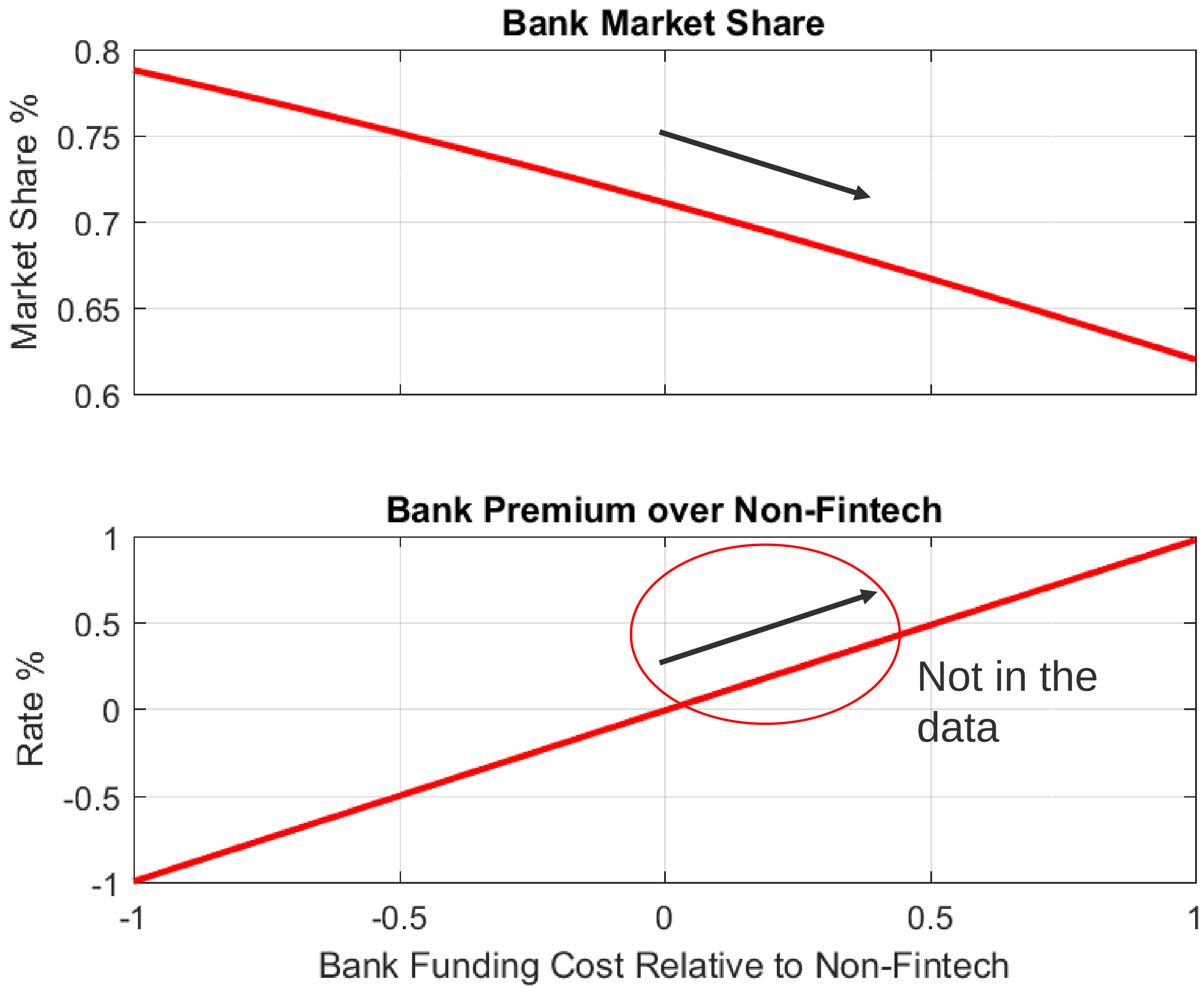
- Lenders
  - Differ in costs, quality and regulatory burden
  - Choose whether to enter and if they do, interest rate to charge

- Equilibrium and calibration
  - Lenders chose entry and rate to maximize profits
  - Free entry → zero profit condition
  - Calibrate model to observed data in zip-year

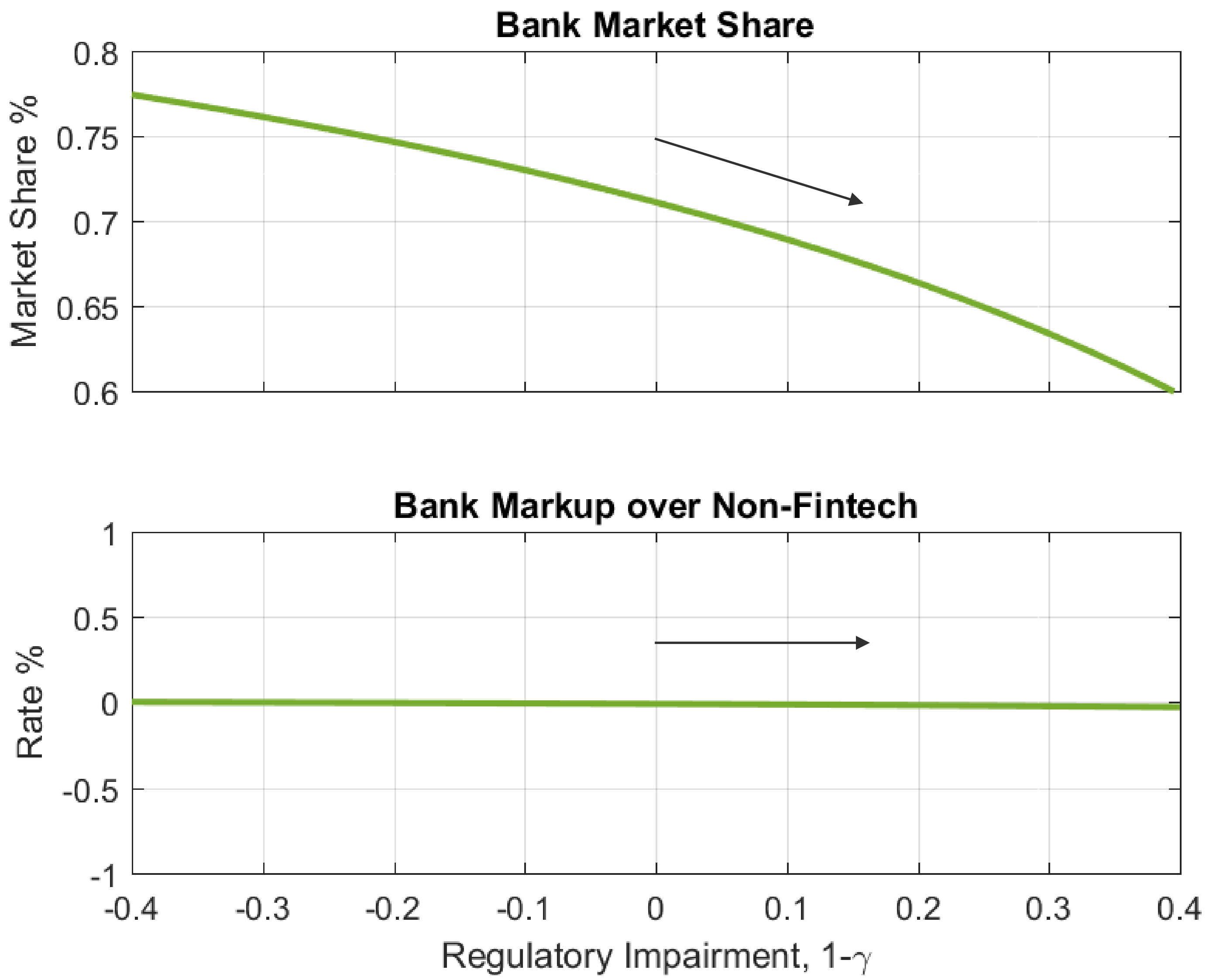
- Key Patterns
  - Bank vs Shadow bank: Banks losing mkt share due to higher regulatory costs or interest rates?
  - Fintech vs Non Fintech: Fintech gain mkt share despite higher interest rates?

Banks Lose Market Share

Funding Costs?

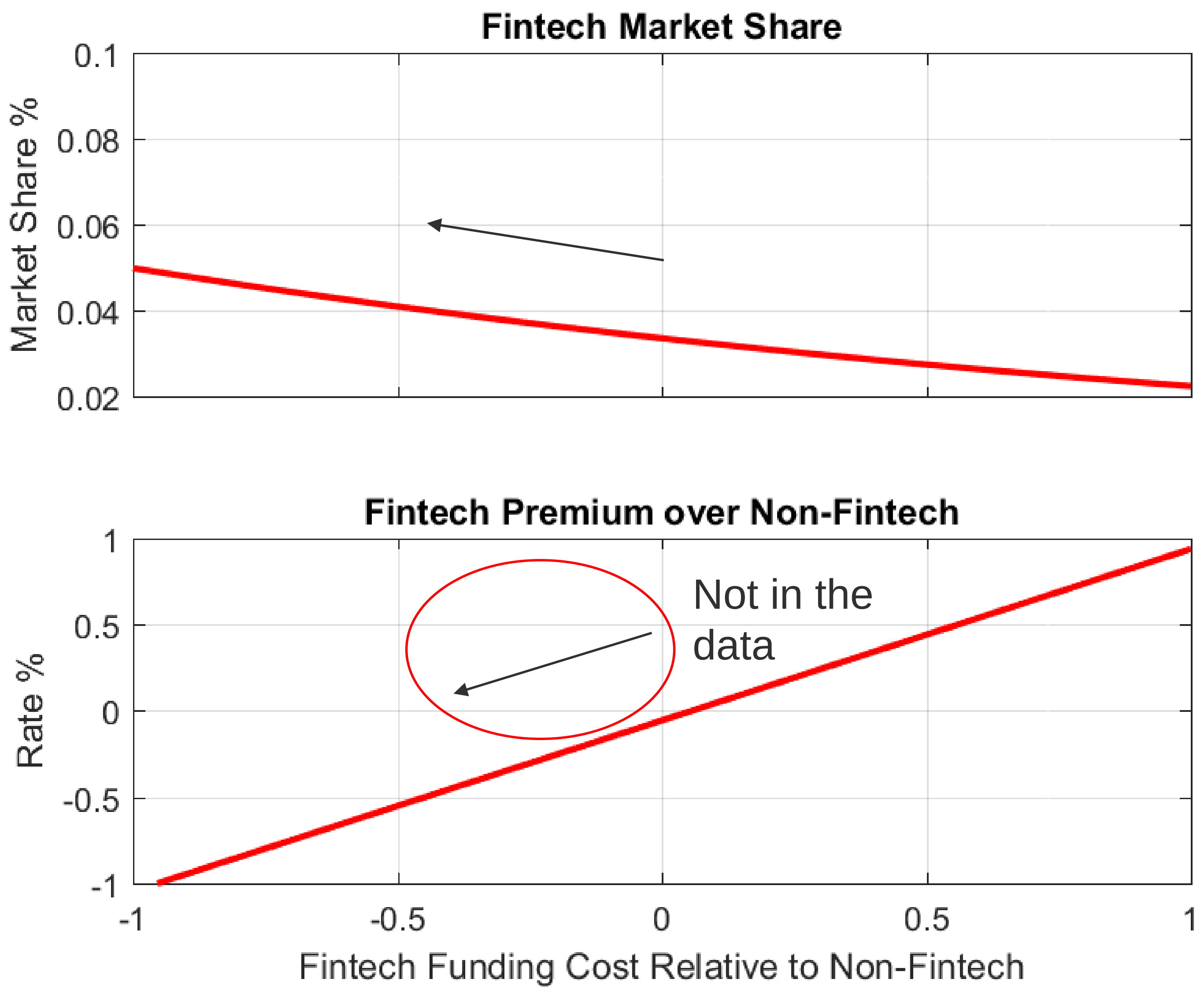


Regulation?


Bank Market Share
Market Share %
0.8
0.75
0.7
0.65
0.6
Bank Markup over Non-Fintech
Rate %
1
0.5
0
-0.5
-1
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
Regulatory Impairment, 1-γ

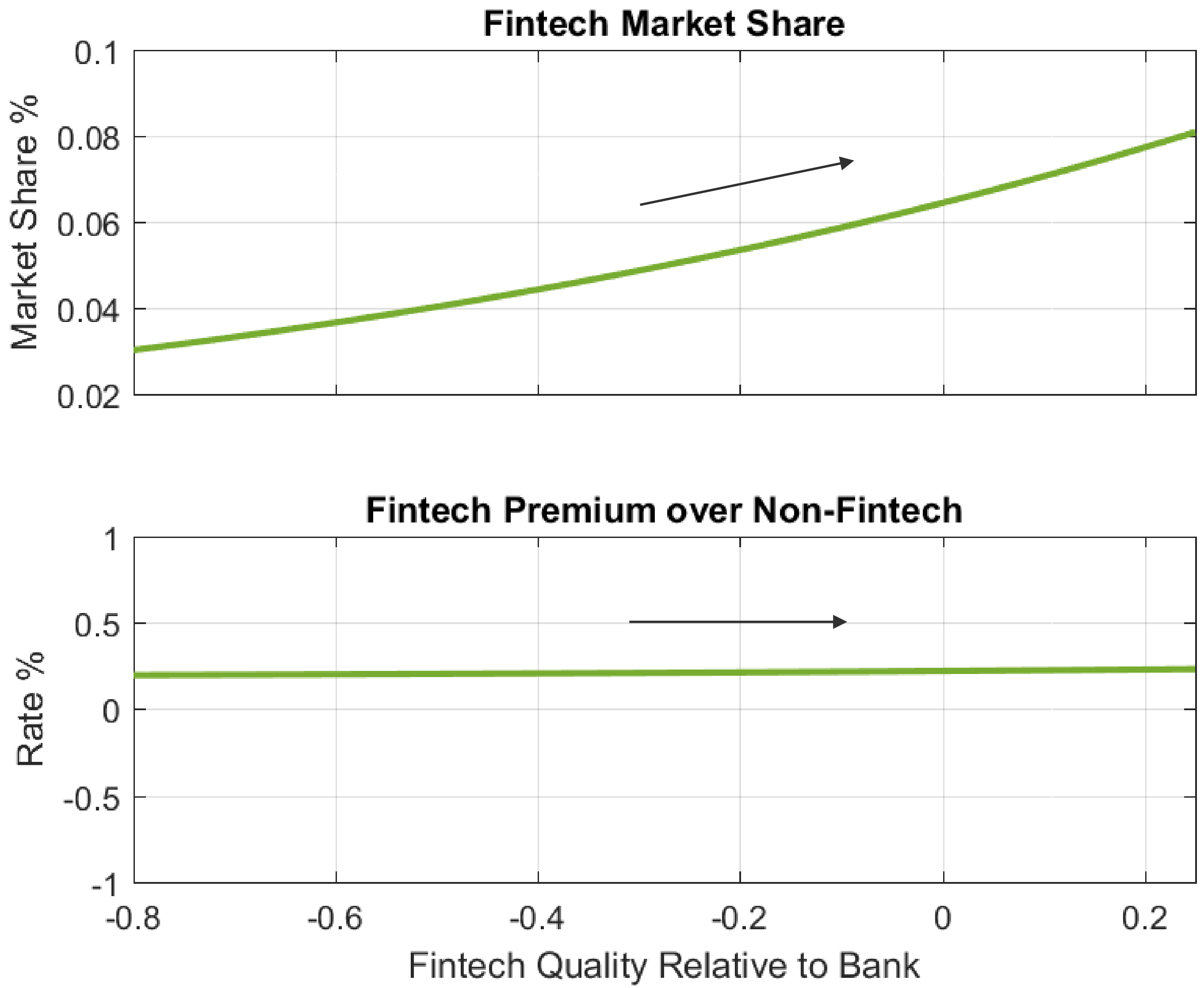
FinTech Gain Market Share

Funding Costs?



FinTech Gain Market Share

Quality?



Counterfactuals

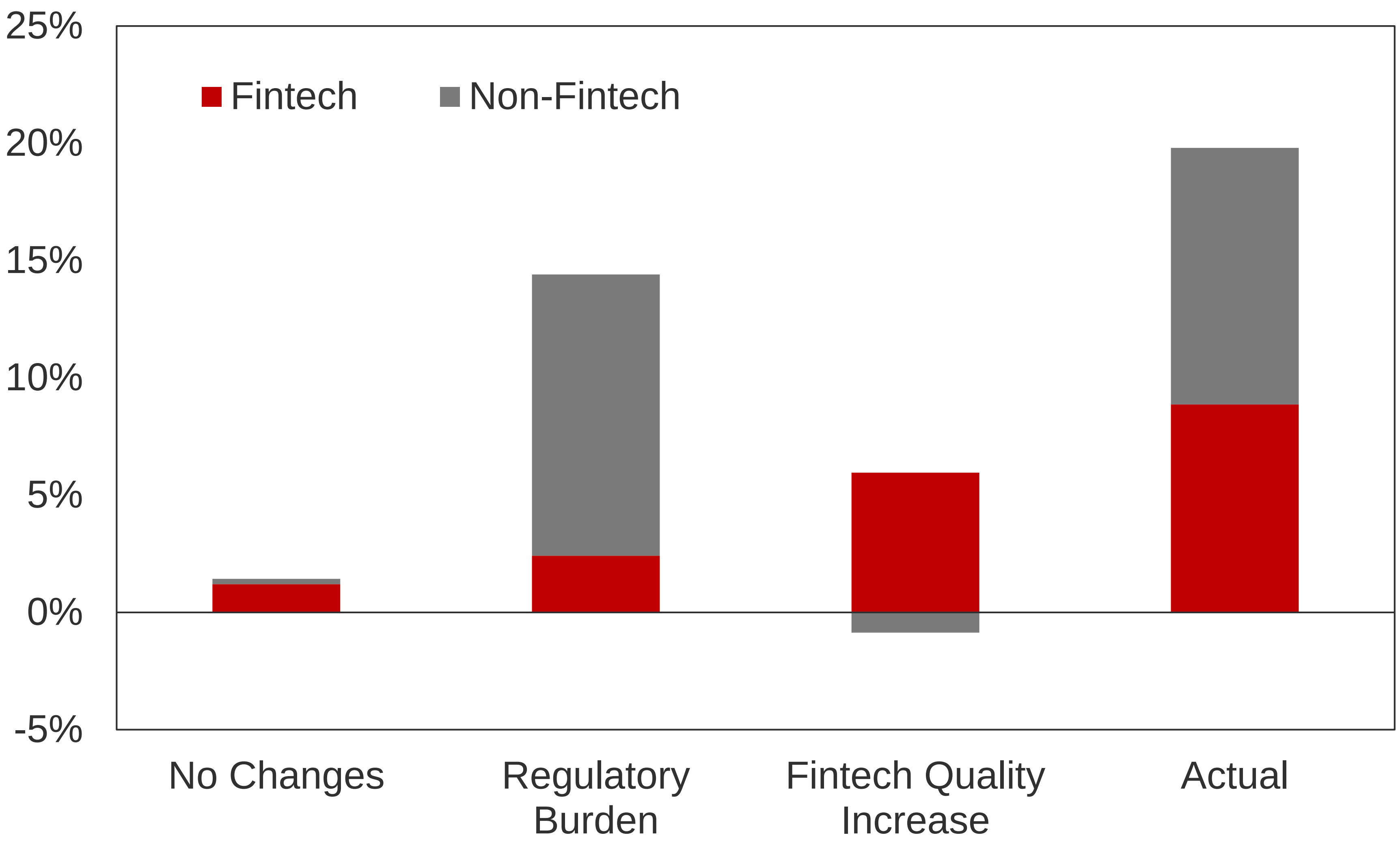
- No changes in fintech quality and regulations

- No changes in fintech quality, changes in regulations

- Changes in fintech quality, no changes in regulation

- Under each scenario compute changes in market shares for
  - Fintech lenders
  - Non-fintech lenders

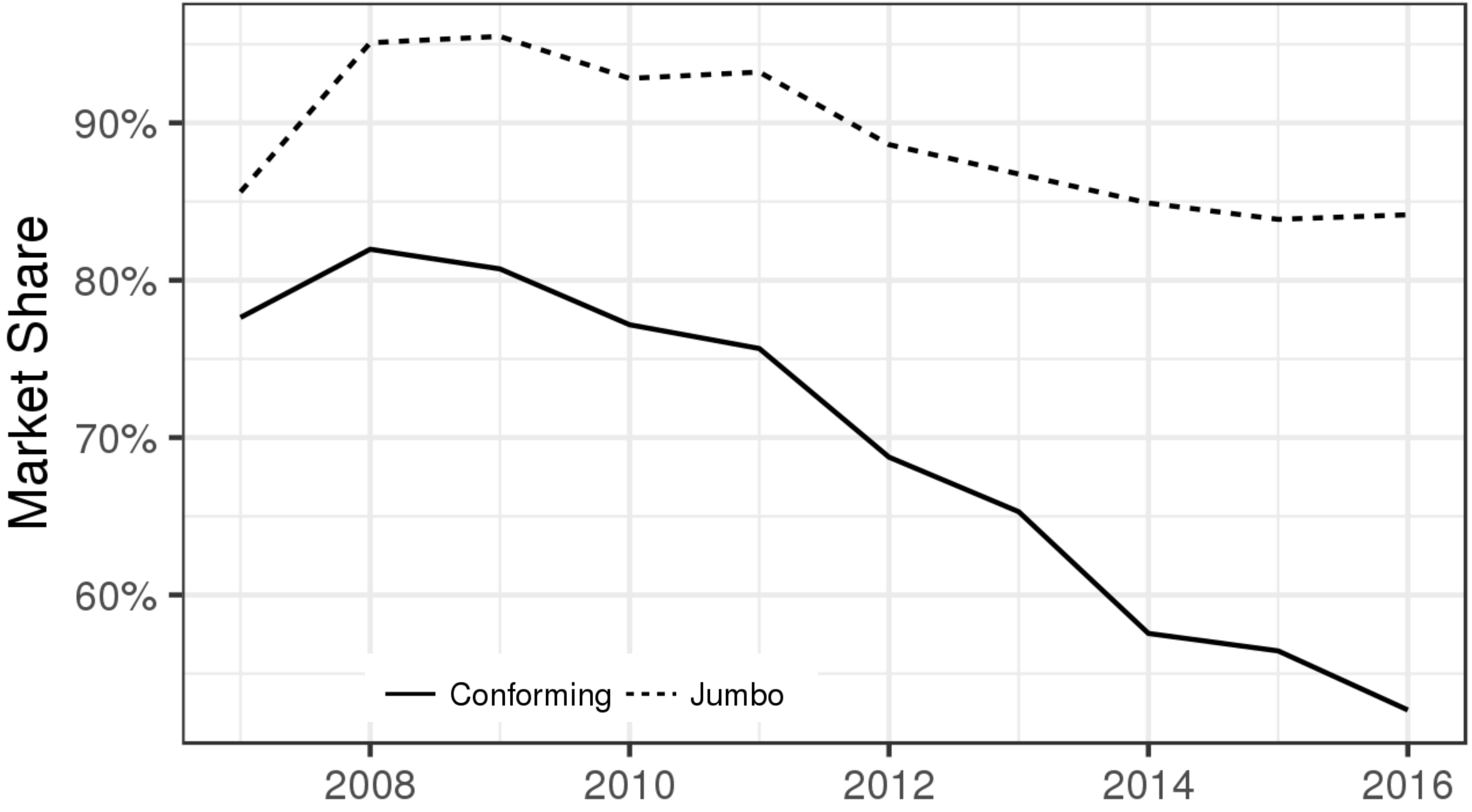
Counterfactuals: Shadow Bank Growth



Integrated Intermediation

Penetration of Shadow Banks Not Uniform

FIGURE: BANK MARKET SHARE



Bigger Questions

- Which type of activities migrate to shadow banks and which do not?

- Why?

- How much? (quantitative importance)

Bigger Questions

- Traditional Banks
  - Balance sheet capacity → dominate portfolio lending (Low capitalization → low portfolio lending)
  - Can shift their business model (jumbo vs conforming, % retained) with their capitalization

- Shadow banks
  - Lower regulatory burden
  - Originate-to-distribute market

Quantitative Assessment

Integrated view of Financial Intermediation

- Credit market framework needs to recognize importance of shadow banks and alternative bank business models
  - Equilibrium interaction between traditional and shadow banks
  - Bank choice of business model

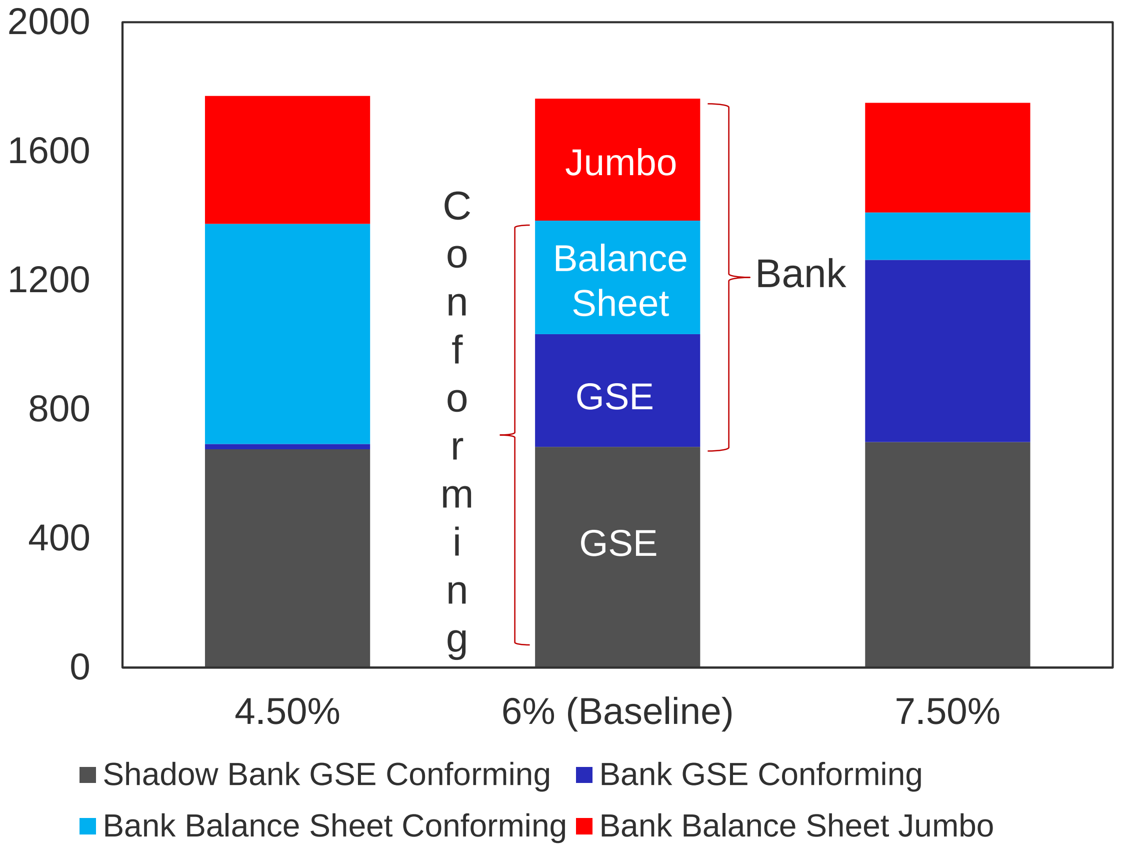
- Why do we care?
  - Impact on aggregate lending amplified or dampened depending on the policy shock
  - Bank stability: Who bears risk and what is bank's business model?
  - Redistribution: Who gets credit and at what price?

Counterfactuals: Capital Ratios

Capital Requirements 6% → 7.5%

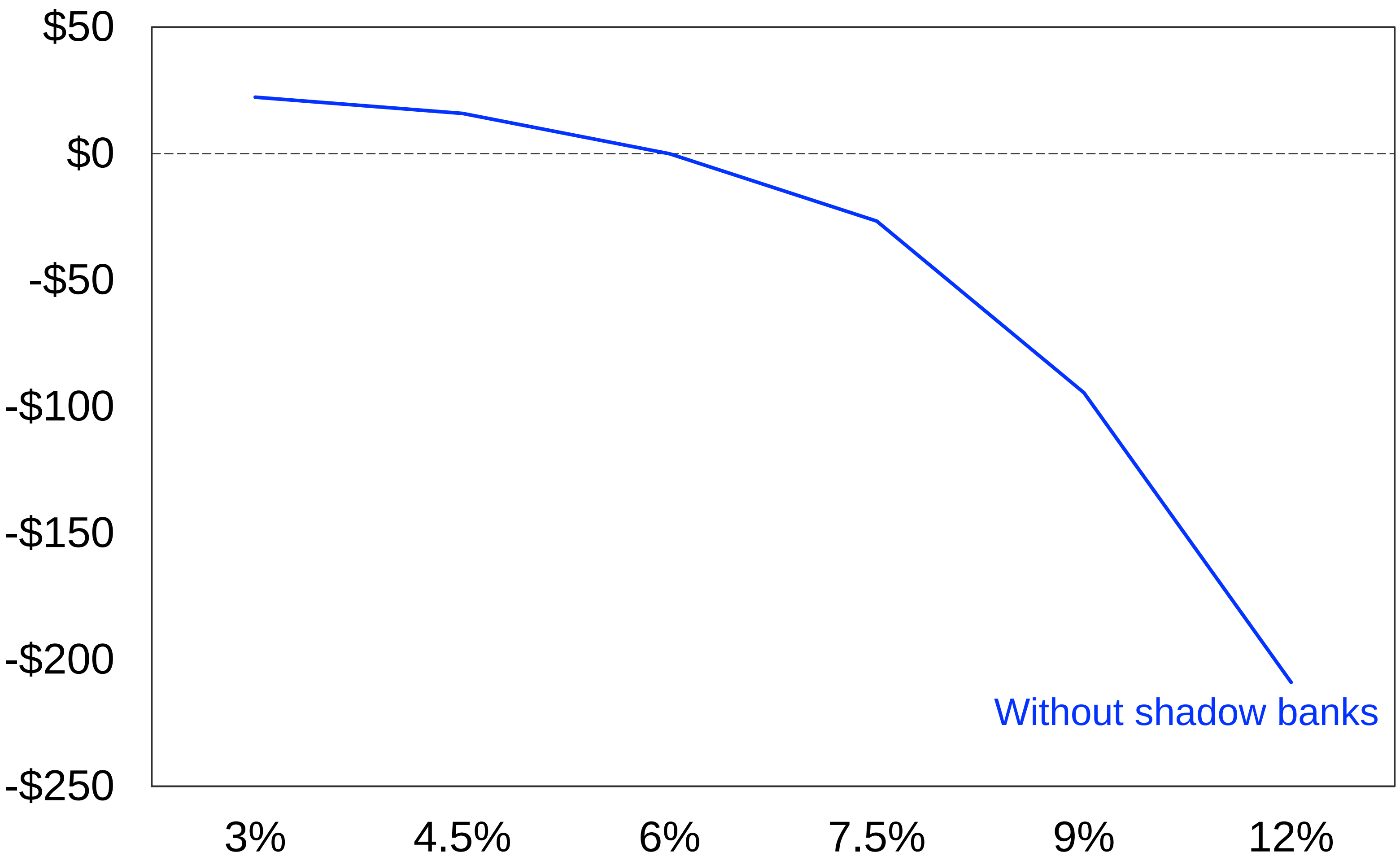
Lender	Loan Type	Financing Source	Change
Total	-	-	-$13b
Bank	Jumbo	Portfolio	-$38b
Bank	Conforming	Portfolio	-$204b
Bank	Conforming	GSE	+$215b
Shadow Bank	Conforming	GSE	+$b

Figure: Lending Volumes ($b) and Capital Requirements



Counterfactuals: Capital Ratios

FIGURE: LENDING VOLUME CHANGES ($B)



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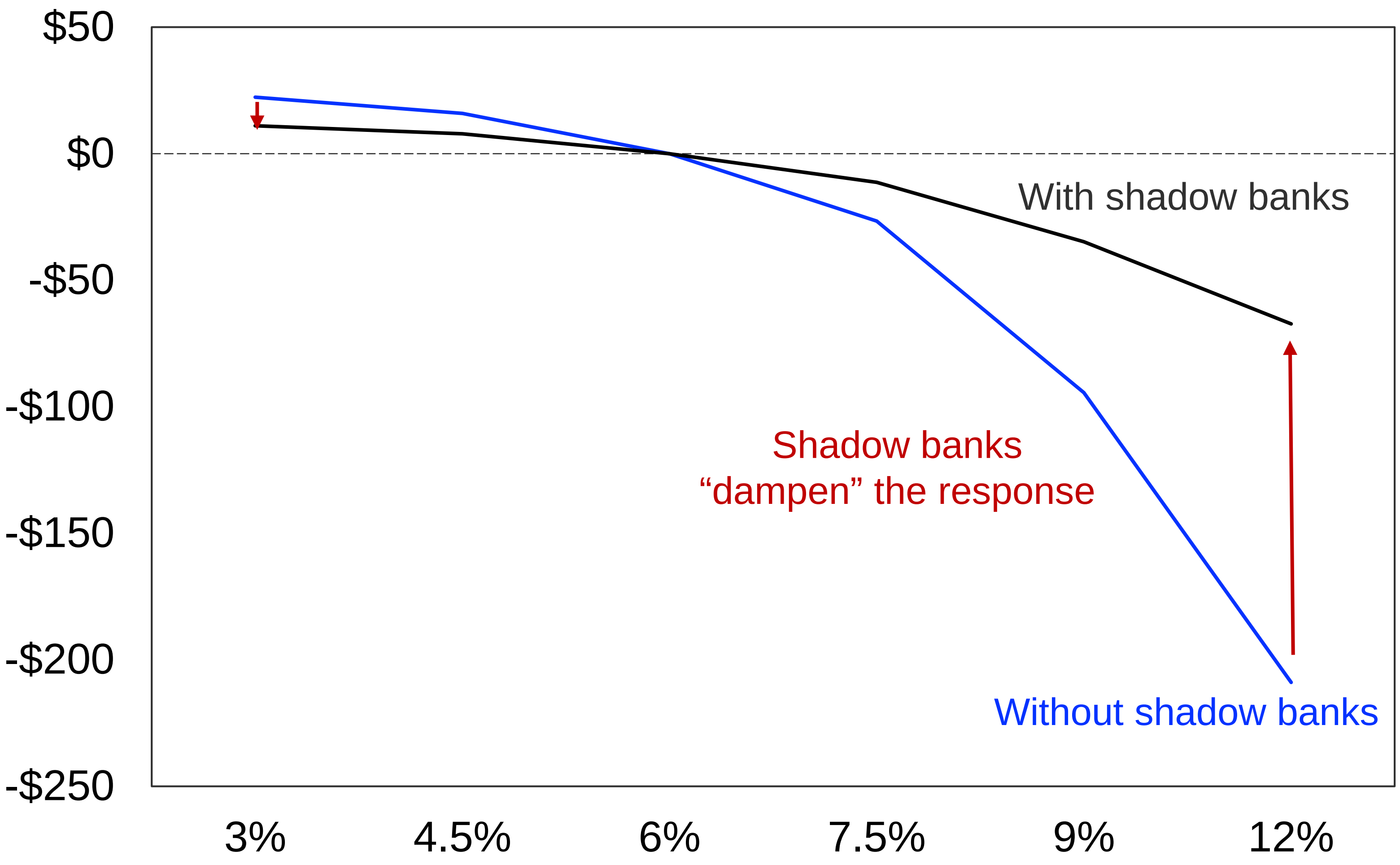
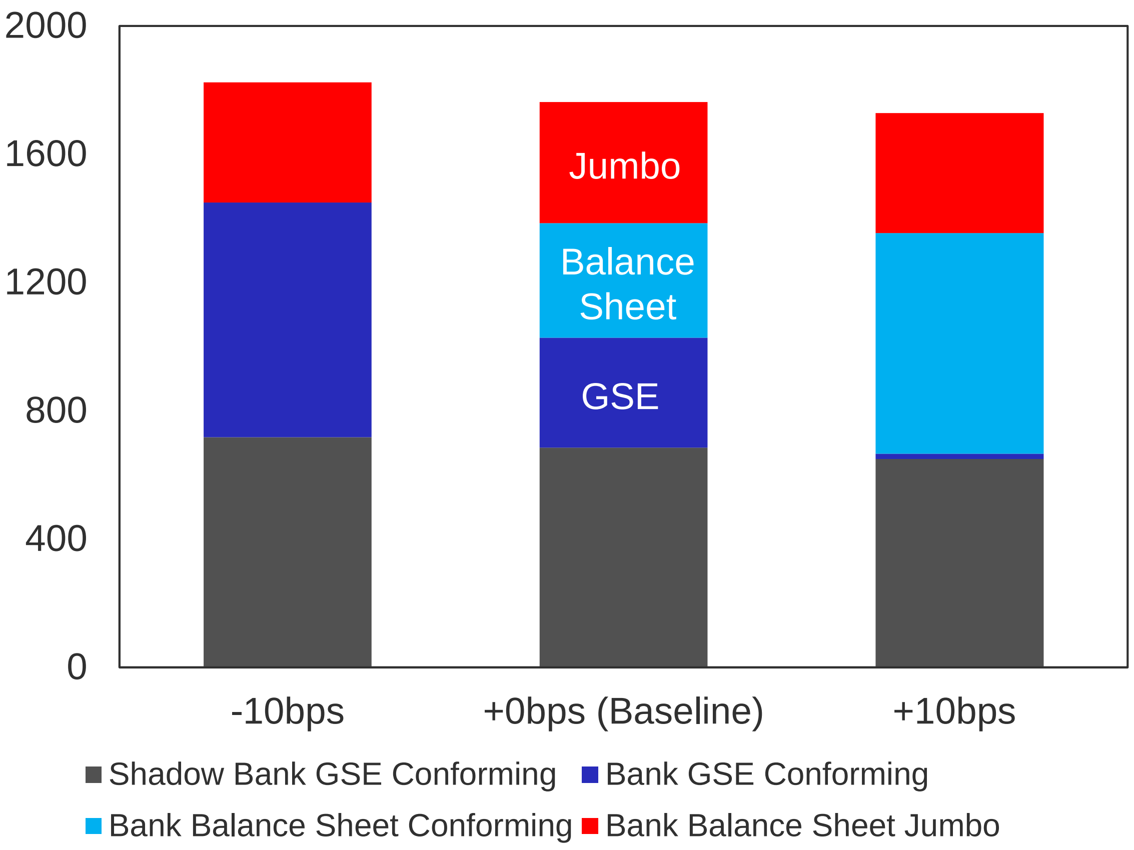


Counterfactuals: QE and GSE Market Intervention

GSE Financing Cost -10bps

Lender	Loan Type	Financing Source	Change
Total	-	-	+$61b
Bank	Jumbo	Balance Sheet	-$4b
Bank	Conforming	Balance Sheet	-$357b
Bank	Conforming	GSE	+$389b
Shadow Bank	Conforming	GSE	+$33b

Figure: Lending Volumes ($b)



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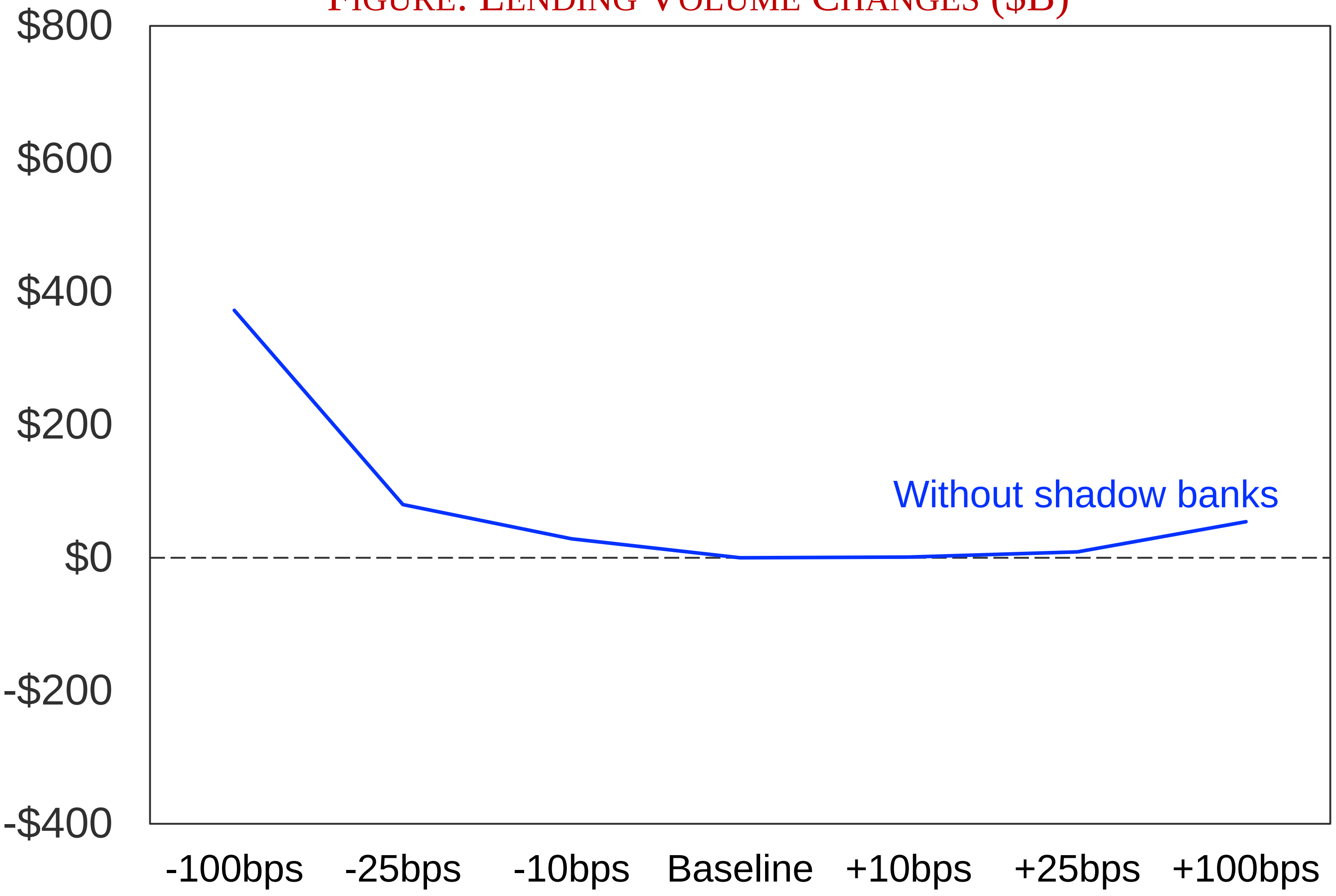

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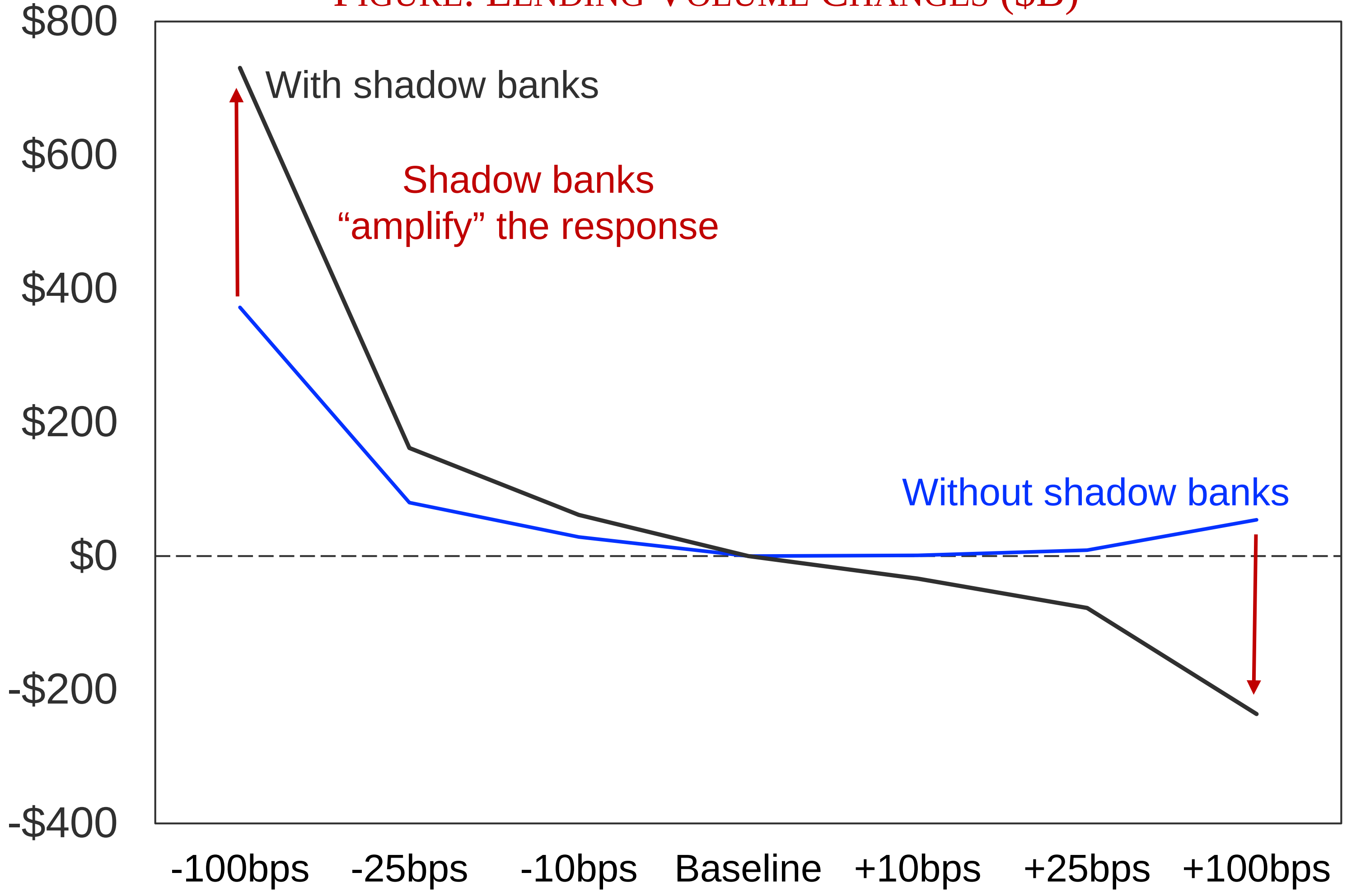

IMPLICATIONS

Discussion

- Regulatory and technological forces have contributed to tremendous growth of shadow banks

- Relative comparative advantage of traditional banks (TB) and shadow banks (SB)
  - TB benefit from greater balance sheet capacity, dominate balance sheet based lending
  - SB benefit from lower regulatory burden, specialize in originate to distribute
  - Aggregate bank capitalization closely commoves with relative prices and market volumes

- Current financial regulation framework mainly focused on TB
  - Tighter bank regulation can push lending into shadows with little regulatory oversight
  - Tighter securitization market can lead to potentially bigger contraction in overall lending
  - Critical to account for SB response in considering polices/regulations

Broader Implications

- SB lack balance sheet capacity
  - Very dependent on securitization market (e.g., GSEs) and short-term warehouse financing
  - Can shutdown in face of problems (like in 2007)
  - Can lead to price pressure induced contagion due to fire sales

- SB issue hundred billions of loans per year guaranteed by US taxpayers (risk with GSEs)
  - They do so in a lightly regulated way, can potentially increase taxpayers' liability in the crisis
  - Shocks in SB sector can ripple back into banking sector since financed entirely by banks