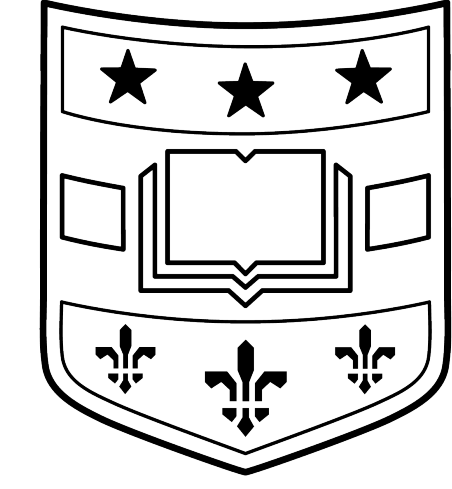


ALLOCATING SERVICING RIGHTS AMIDST AGENCY CONFLICTS: THE MICRO EFFECTS OF MACROPRUDENTIAL REGULATION

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Institutional Background

- Mortgage Servicing Right (MSR):** The right to service mortgage loans (i.e. collecting payments and handling borrower distress via granting forbearance or modifications or foreclosing on a loan). The owners of the MSR are the mortgage servicers. The servicer charges a monthly fee for servicing the loan. The MSR's value equals the discounted present value of future servicing fees.
- Timeline of Increased Regulatory Costs:** Following the 2007-2008 Global Financial Crisis, Basel III set stricter capital requirements that increased cost of holding MSRs for banks. The Federal Reserve followed the following timeline:
 - 2012Q2: Fed proposed adopting stricter MSR regulation
 - 2013Q2: Fed adopted stricter MSR regulation

Stylized Facts

Key Facts:

- Fact 1:** Rising non-bank servicing.
- Fact 2:** Higher third party assignment to banks pre-Basel III.
- Fact 3:** Increase in MSR transfers post-2012Q2.
- Fact 4:** Non-bank growth disproportionately increases in subprime market.
- Fact 5:** Higher foreclosure rates by non-banks.

- Servicing Right Transfers:** We document a spike in MSR transfers to non-banks after Basel III.

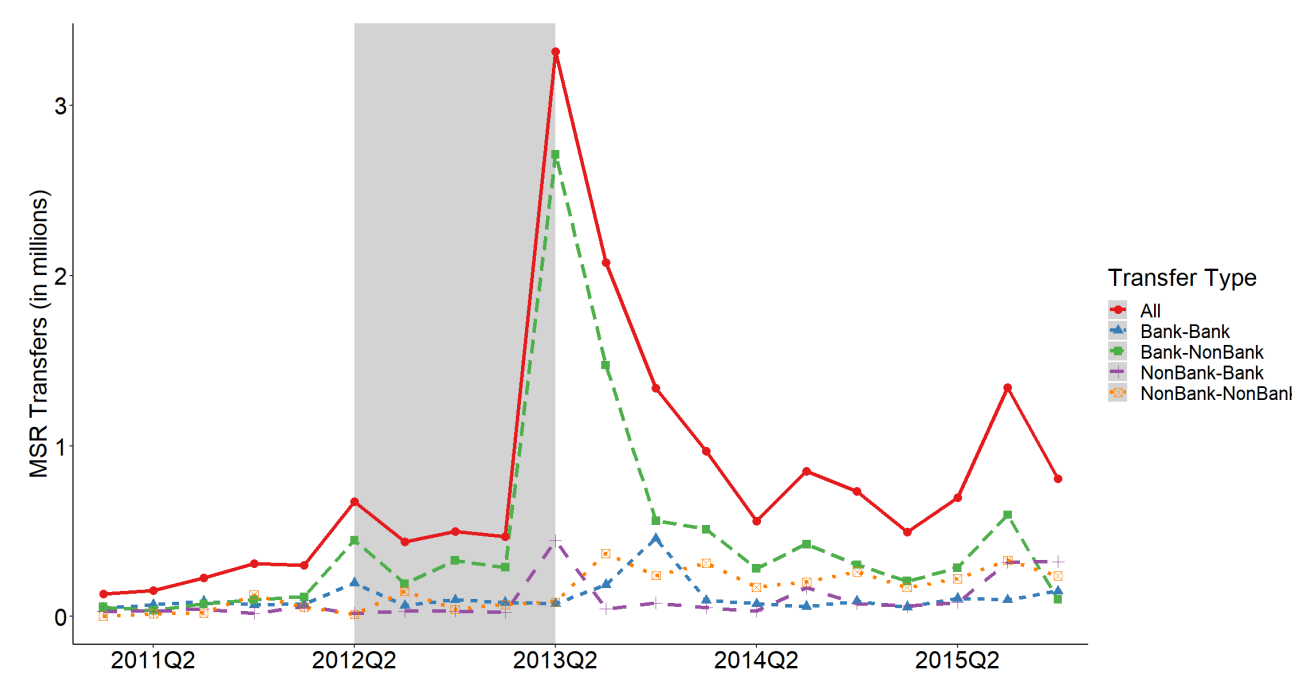


Fig. 1: Aggregate MSR Transfers Around Basel III MSR Rule Change

Model: Private Allocation of MSRs

Servicer Expected Profit:

$$(1-d) \times \text{fee} + \underbrace{(1-f) \times p \times (\delta_s \text{fee} - \text{advance}(1-\delta_s))}_{\text{recoverable default}} - \underbrace{(1-f) \times (d-p) \times \text{advance}}_{\text{unrecoverable default}}$$

- No default: servicer gets NPV of servicing fee (fee)
- Default: servicers choose foreclosure rule (f)
 - Foreclosure avoids making payment advances - normalized to return 0
 - If not foreclose, fraction p of loans recover but it costs servicer one period of advances ($\text{advance}(1-\delta_s)$)
 - Fraction $d-p$ never recover and lose full NPV of advances
 - Discount rate δ_s varies by servicer - non-banks are less patient ($\downarrow \delta_s$)

Investor Expected Profit:

$$\underbrace{(1-d) \text{MtgPayment}}_{\text{no default}} + \underbrace{(1-f) p \text{MtgPayment}}_{\text{recoverable default}} + \underbrace{(1-f)(d-p)\delta A_f}_{\text{unrecoverable default}} + \underbrace{f d_i A_f}_{\text{foreclosure in default}}$$

- Cares about different variables: Mortgage payments, Foreclosed value of asset (A_f) \rightarrow misaligned w/ servicer

Causal Effect of Regulation on MSR Allocation

- MSR Regulation and Incentive to Transfer:** To test whether Basel III caused banks to sell MSR disproportionately relative to non-banks, we estimate the following Difference-in-Differences specification.

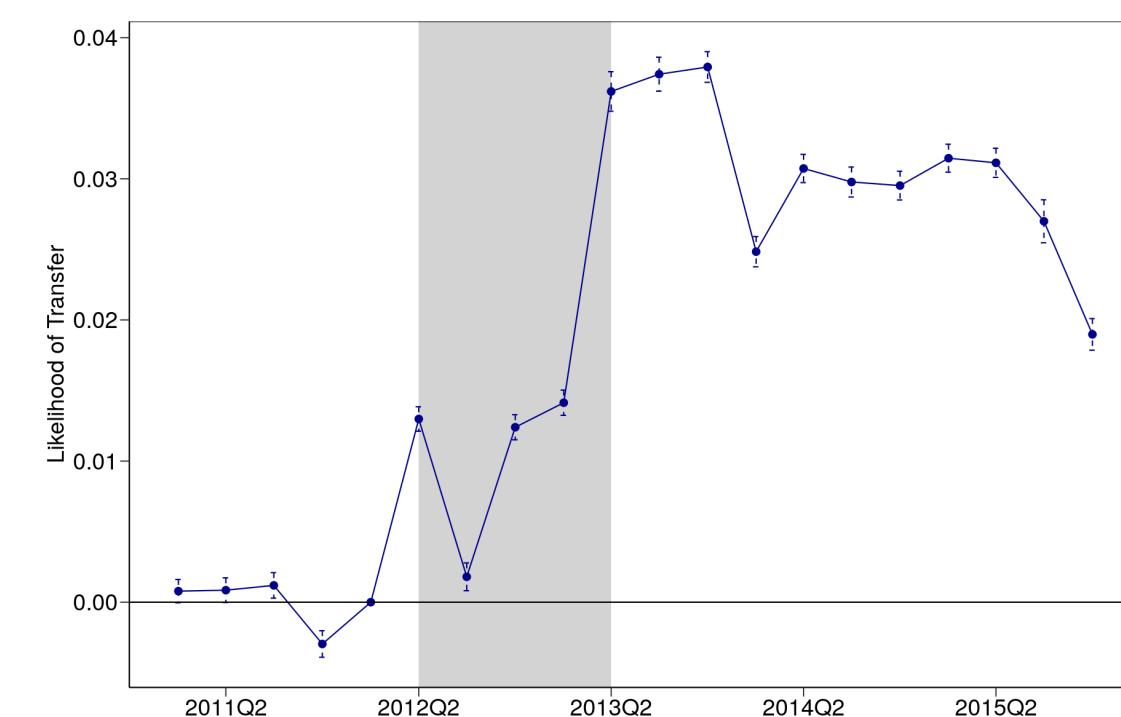


Fig. 2: MSR Regulation and Bank Incentive to Transfer

$$\text{Transfer}_{i,j,t} = \sum_{k \neq 2012Q1} \beta_k \mathbb{1}_{k \text{Bank}_{i,j,t-1}} + \gamma \text{Bank}_{i,j,t-1} + \mu_i + \theta_t + \varepsilon_{i,j,t}$$

Where $\text{Transfer}_{i,j,t}$ indicates whether the servicing right on loan i was sold in quarter t . $\text{Bank}_{i,j,t-1}$ is a binary indicator reflecting whether the servicer of loan i is a bank in the quarter before the transfer. If a loan was not transferred during our sample period, we consider the servicer type of the only servicer of the loan. The terms μ_i and θ_t represent loan and quarter fixed effects, respectively.

- Post-Basel III Effect (Q2 2013):** Banks' likelihood of selling MSRs \uparrow by 4% relative to non-banks.
- Persistence:** Higher propensity for banks to sell MSRs persisted, staying $>2\%$ above non-banks until end of 2015.
- No Pre-Trend:** Before Basel III proposal, no significant difference in bank vs. non-bank MSR transfer likelihood.

- Rise of Non-Bank Servicing:** To document whether banks were more likely to sell MSRs to non-banks, we estimate the following regression.

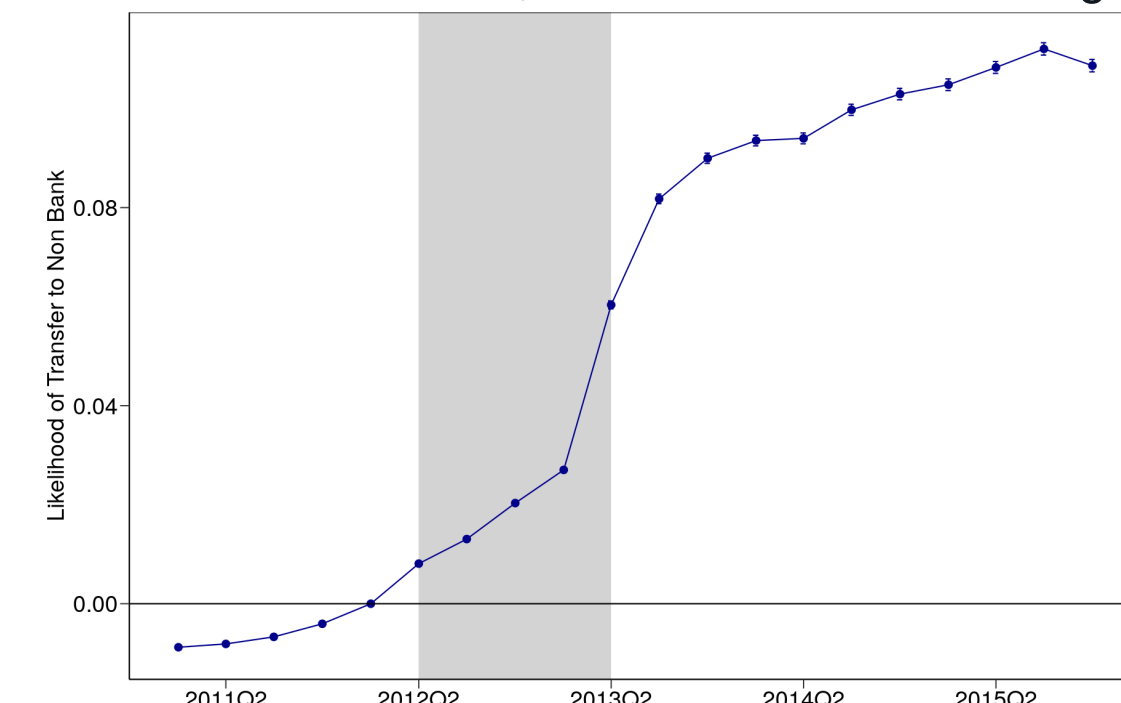


Fig. 3: Cumulative Servicing by Non-Banks

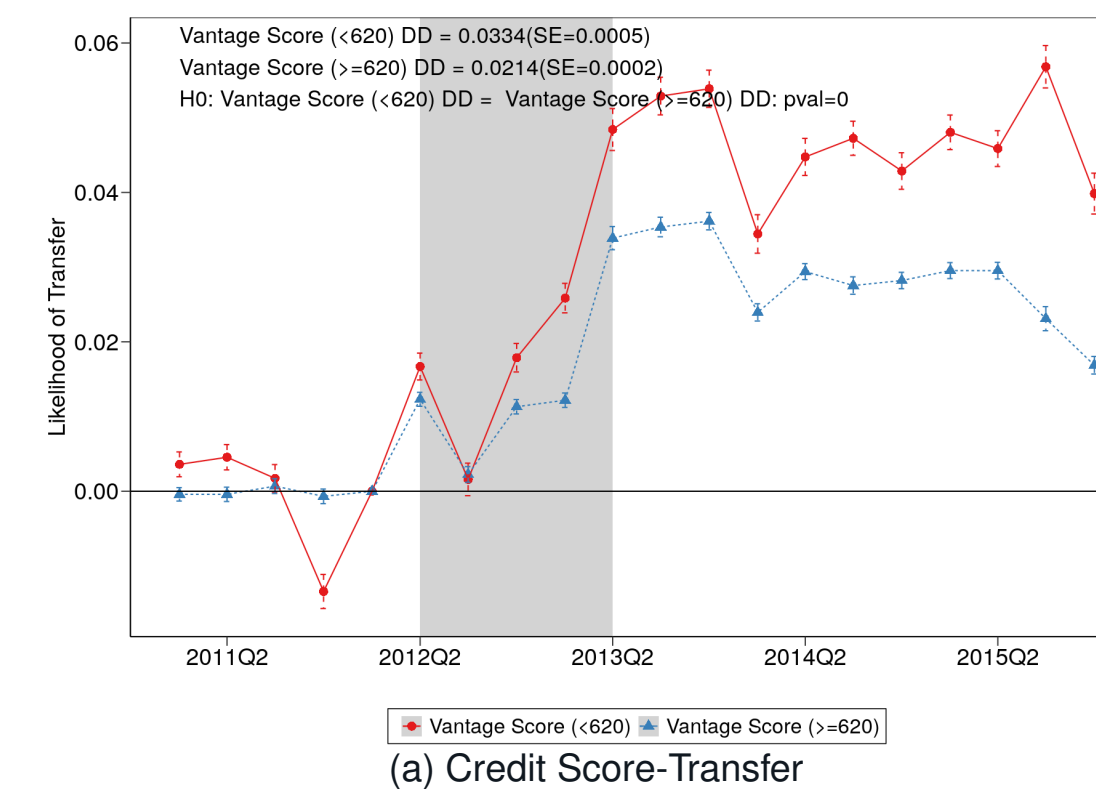
$$\text{NonBank}_{i,j,t} = \sum_{k \neq 2012Q1} \beta_k \mathbb{1}_k + \mu_i + \varepsilon_{i,j,t}$$

Where $\text{NonBank}_{i,j,t}$ is an indicator variable signifying whether loan i is being serviced by a non-bank servicer in quarter t . The term $\mathbb{1}_k$ is a binary indicator for quarter k with the value 1 if the current quarter is k and 0 otherwise. The fixed effects for the loan are denoted by μ_i . The confidence interval for each point estimate is constructed at a 95% confidence level, and standard errors are clustered at the zip code level.

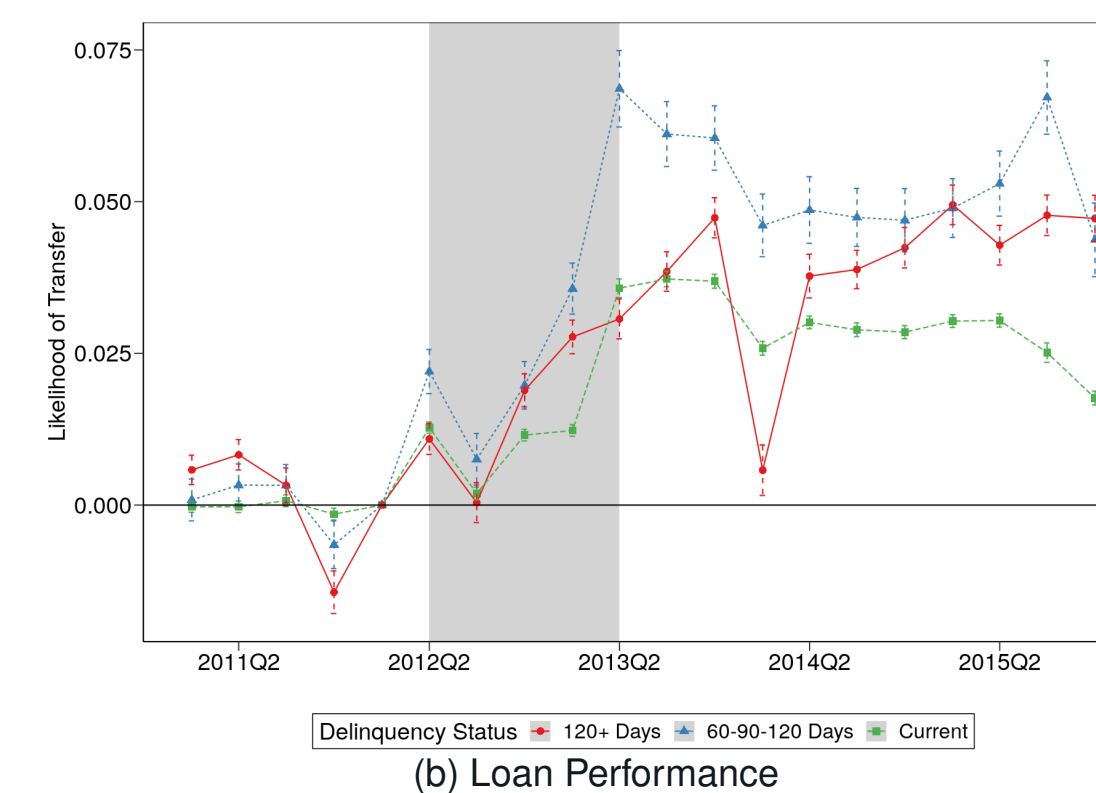
- Rapid Increase Post-Regulation:** A significant rise in non-banks receiving MSRs starts in 2012Q2, spikes in 2013Q2 with Basel III adoption, and persists at high levels.
- Non-Bank Servicing Rise:** Non-banks are 9.7% more likely to acquire MSRs post-2013Q2.

Bank vs. Non-Bank Servicing High-risk vs. Low-risk Loans

- Selective Transfer of MSRs:** Banks are more likely to transfer MSRs of high-risk loans to non-banks.



(a) Credit Score-Transfer

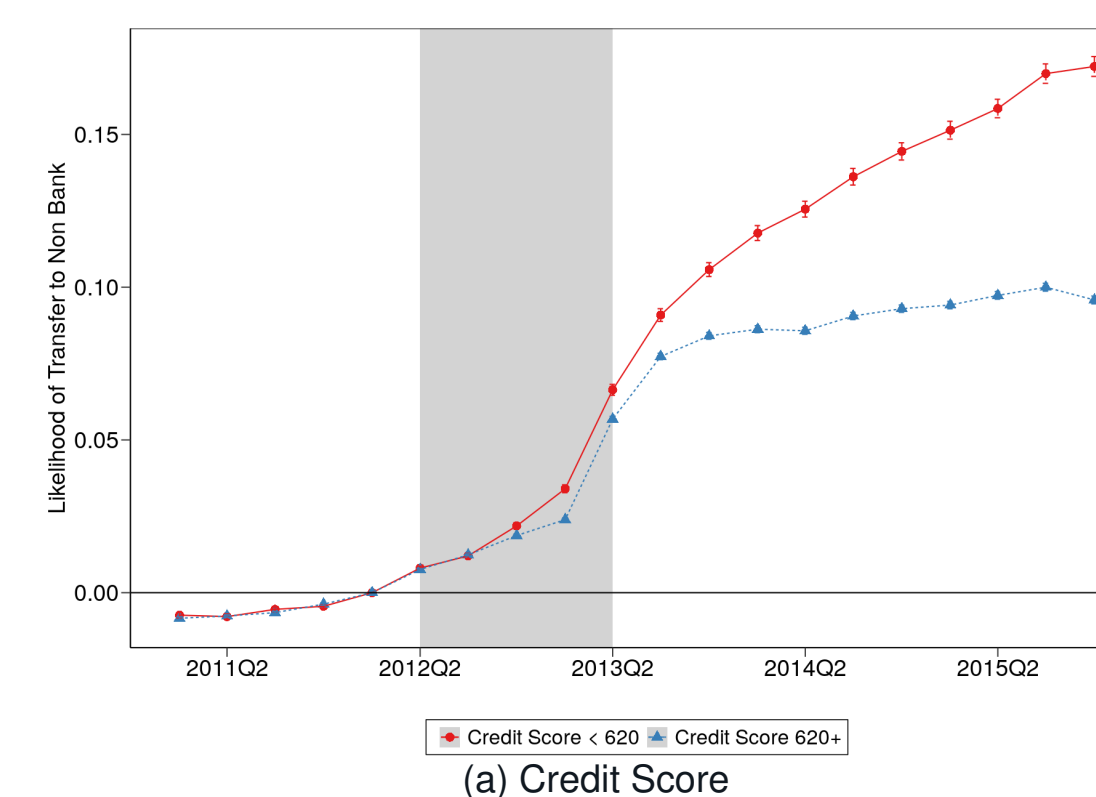


(b) Loan Performance

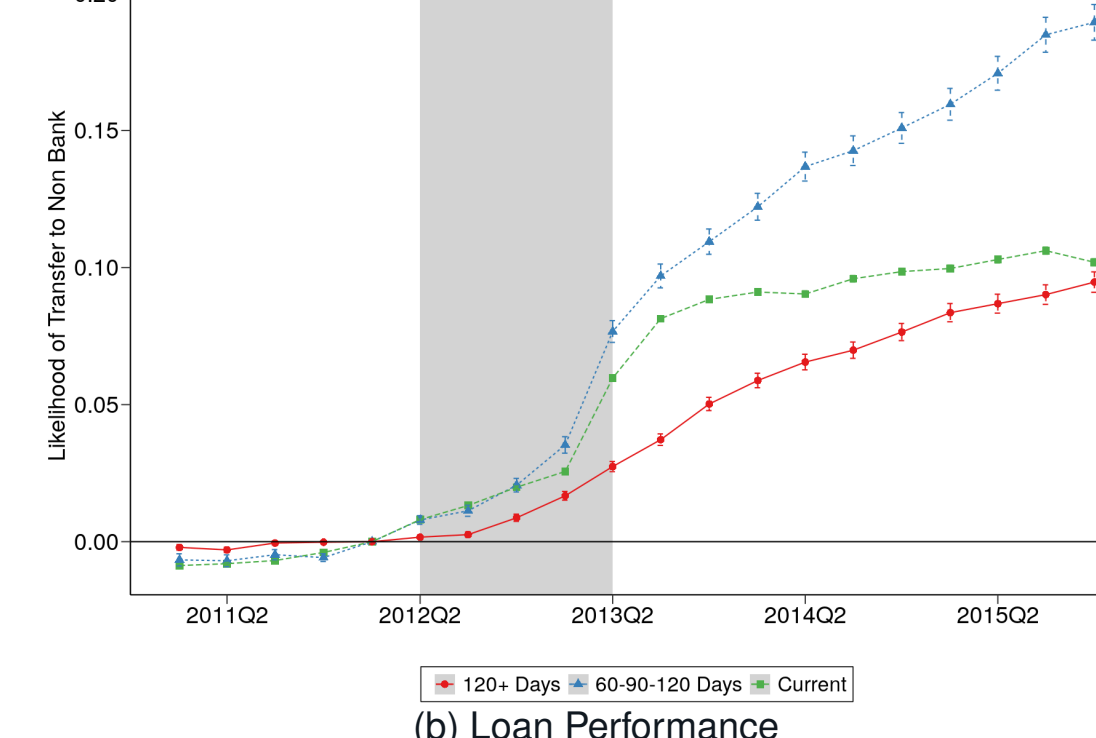
Fig. 4: Transfer Heterogeneity Across Loan Types

- Credit Score Impact:** Transfer Probability: 2% higher for subprime vs. prime loans
- Delinquency Status Influence:** Transfer Probability: 2.5% higher for delinquent loans post-regulation

- Non-Bank MSR Holding by Loan Type:** The event study provides compelling evidence that non-banks were purchasing the riskier MSRs that banks sold following Basel III.



(a) Credit Score



(b) Loan Performance

Fig. 5: Bank versus Non-Bank Foreclosures

Welfare Implications

- Borrowers Welfare:** To test whether Basel III leads to higher foreclosure rates, particularly among subprime loans, we estimate the following Intent-to-Treat like regression specification.

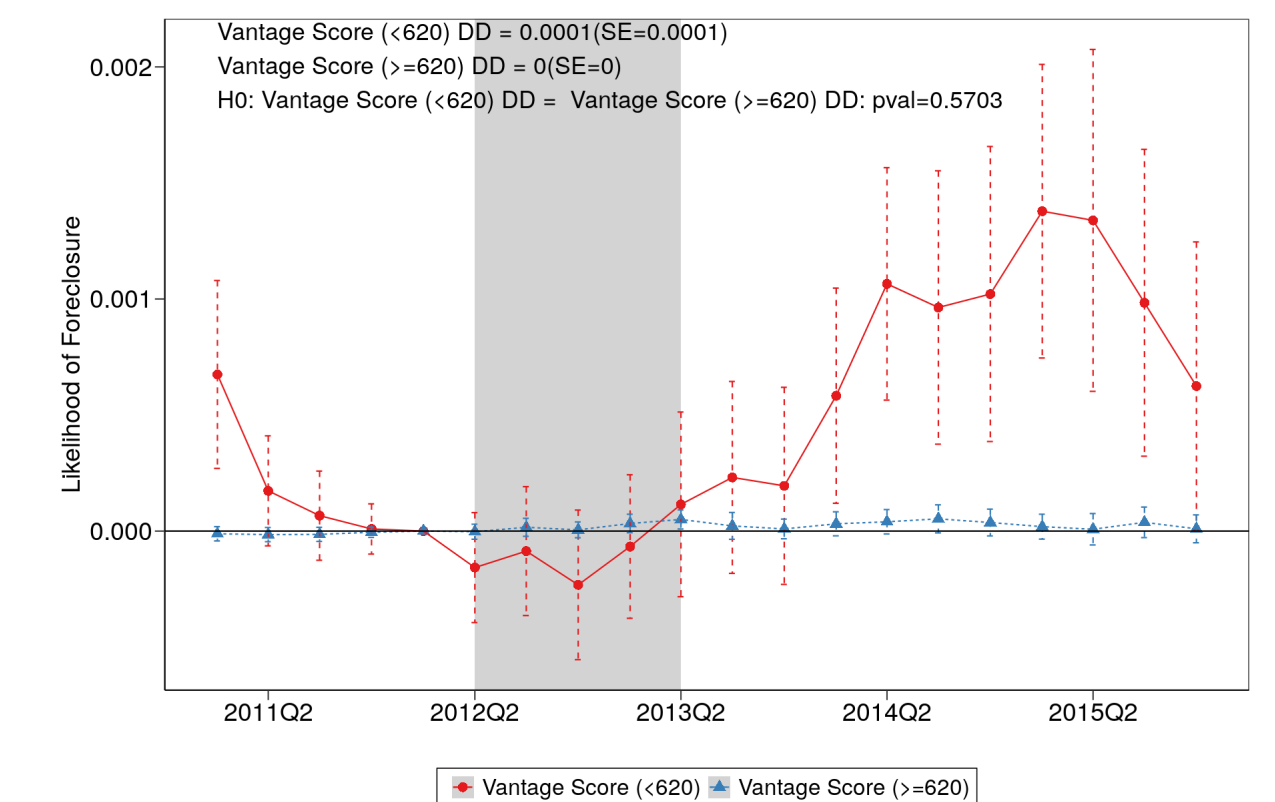
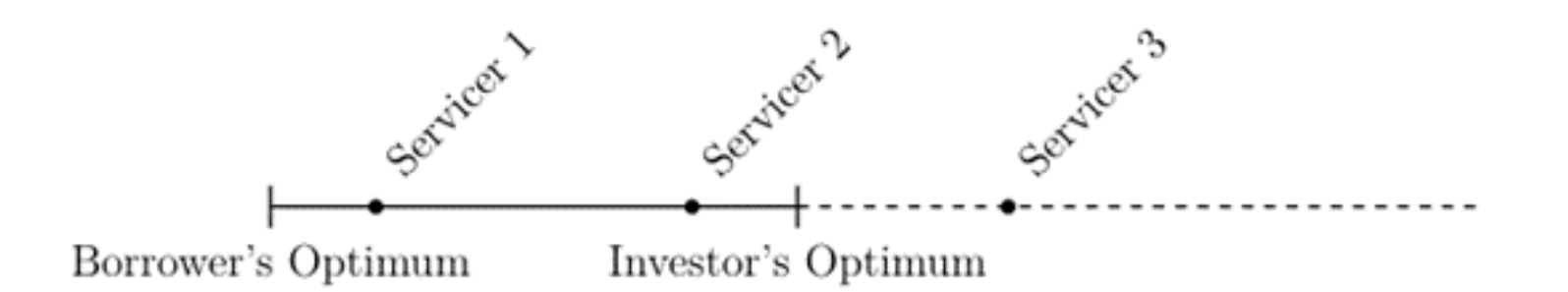


Fig. 6: Bank versus Non-Bank Foreclosures

$$Y_{i,j,t} = \sum_{k \neq 2012Q1} \beta_k \mathbb{1}_{k \text{Bank}_{i,j,t-1}} + \mu_i + \theta_t + \gamma \text{LoanAge}_{i,t} + \varepsilon_{i,j,t}$$

- Investors Welfare:** The shift of MSRs from banks to non-banks does not necessarily enhance investors welfare.
- The allocation of MSR assets impacts both borrower and investor welfare.



- Servicer 1 (S_1) & Servicer 2 (S_2):**
 - Each optimal depending on how social welfare function (SWF) weights borrowers and investors.
 - $S_1 \rightarrow$ Optimal when SWF weights borrowers $>$ investors.
 - $S_2 \rightarrow$ Optimal when SWF weights borrowers $<$ investors.
 - Choice depends on externalities from foreclosure rates.
 - High foreclosure \rightarrow negative externalities for borrowers' communities.
 - Low foreclosure \rightarrow negative impact on credit access and liquidity.
 - \Rightarrow Both S_1 and S_2 lie on the frontier.
- Servicer 3 (S_3):**
 - S_3 : Optimal foreclosure rate higher than both borrowers' & investors'.
 - \Rightarrow Should not hold MSRs under any SWF that only weights borrowers & investors
 - Non-banks buying servicing rights are often of type S_3 .
 - \Rightarrow Allocation to S_1 and S_2 Pareto-dominates S_3 .
- Regulations & Re-allocation:**
 - Redirecting MSRs towards banks and servicers with lower foreclosure rates \Rightarrow increases social welfare.
 - Even with no weight on borrowers, aligning foreclosure rates with investors' optimum enhances welfare.

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