

INTEGRATED INTERMEDIATION IN LOAN PRODUCTION

The Micro and Macro of Financial Intermediation Workshop

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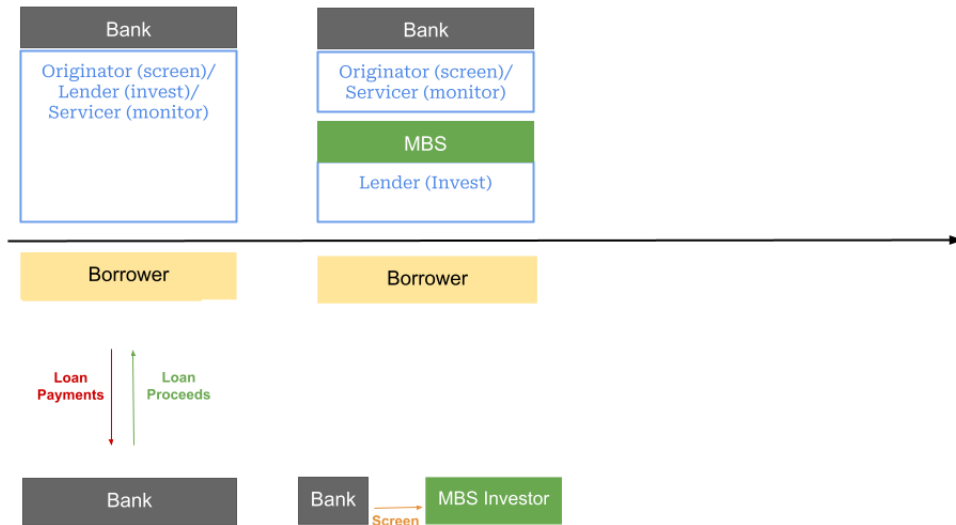
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- What is the impact on firm function $\implies$ borrower outcomes?

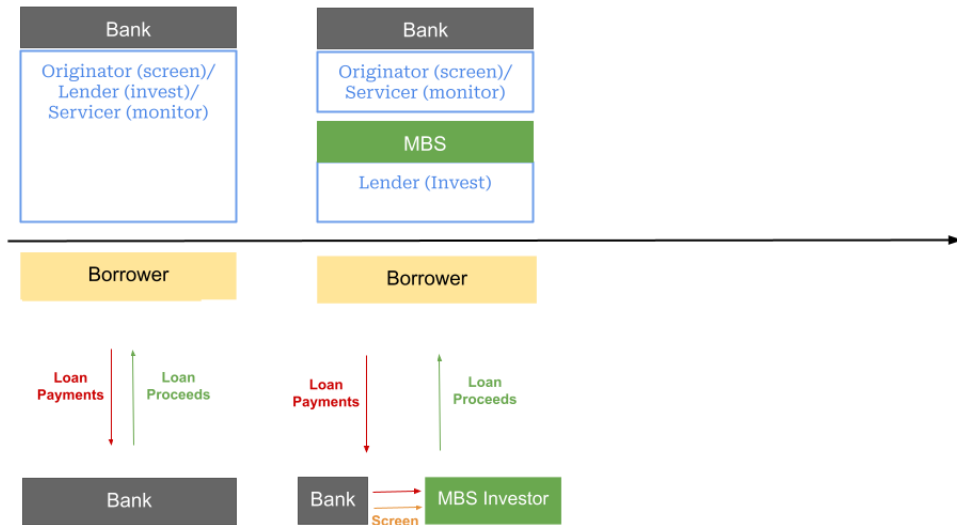
WHAT IS A MORTGAGE SERVICING RIGHT (“MSR”)?



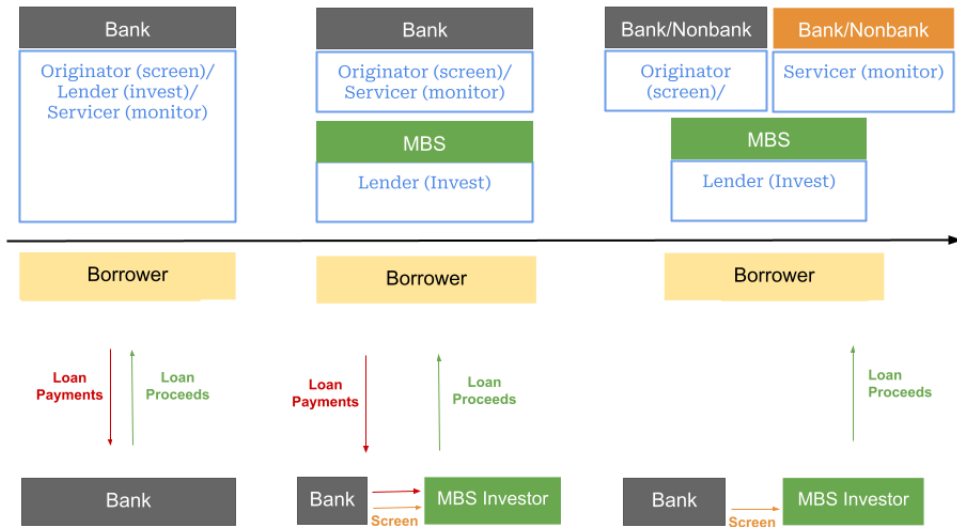
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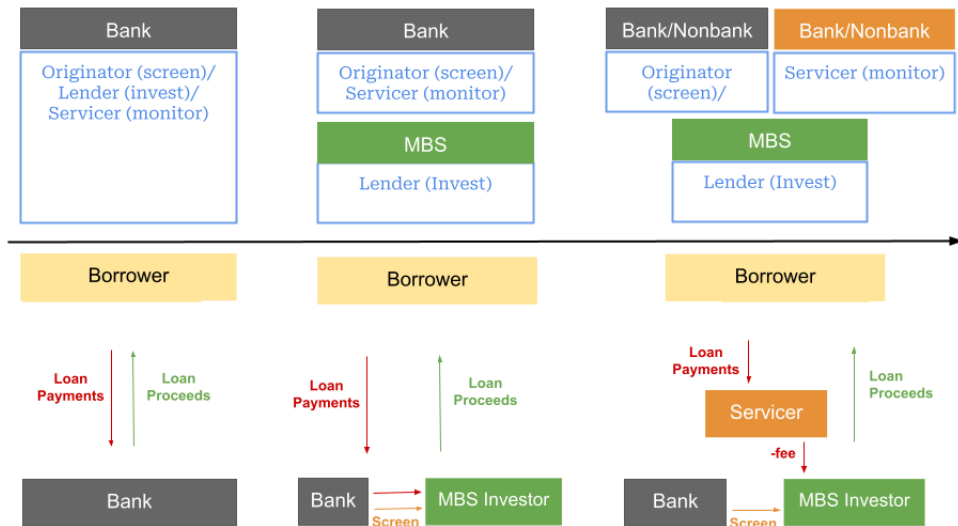
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Differences-in-differences Specification:

$$Y_{it} = \beta \widehat{Integrated}_{it} + \gamma' X_{it} + \gamma_{lz} + \gamma_{zt} + \epsilon_{it}$$

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- Banks 32% less likely to retain $\implies$ Integrated loans 6% more likely to refinance (16% $\uparrow$ from 38% baseline)

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- Dynamic model $\implies$ Treatment (borrower preference & cost advantage) channel $>>$
Selection (offload high default loans)

REDUCED FORM EVIDENCE

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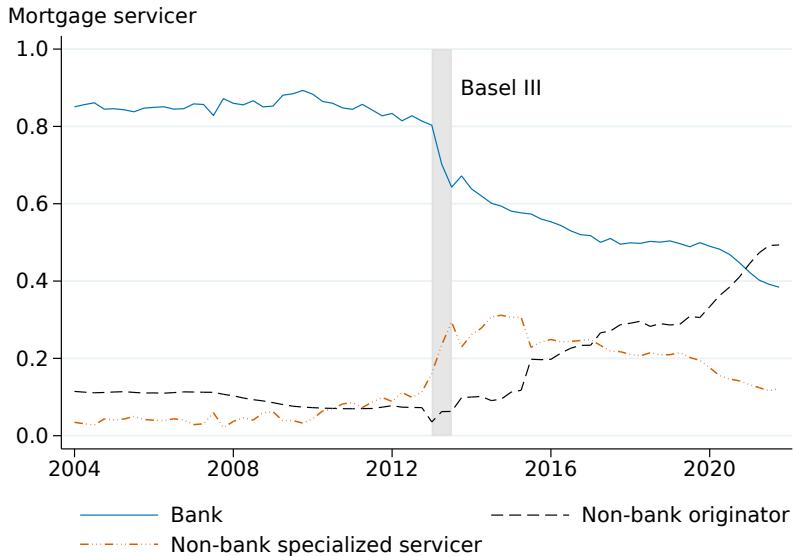
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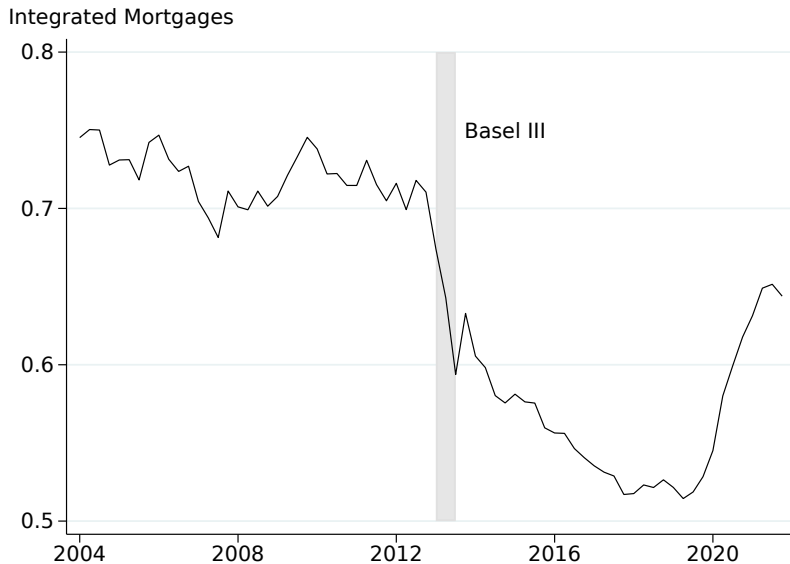
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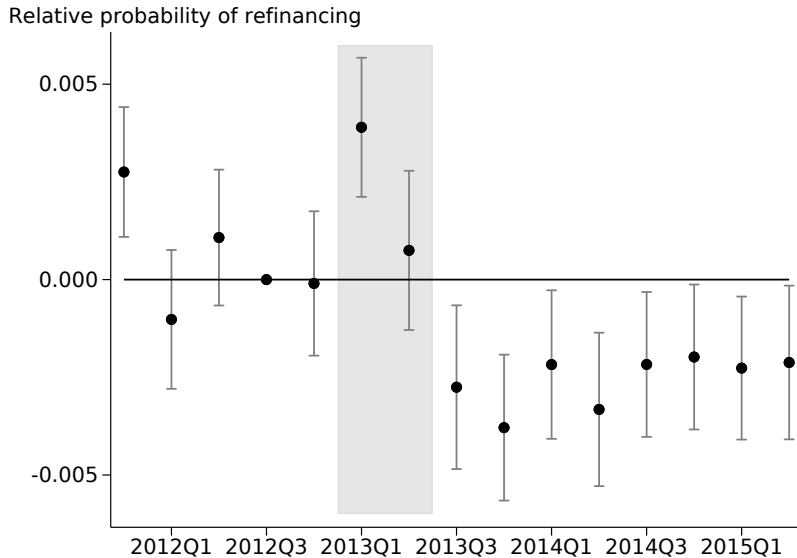
3 NEW FACTS (1): RISE OF NONBANK LENDERS



3 NEW FACTS (2): INTEGRATION FELL, THEN REBOUNDED



3 NEW FACTS (3): INTEGRATED LOANS PERFORM DIFFERENTLY



MAIN RESULT: BASEL III SHOCK

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	OLS		IV		RF
	(1)	(2)	(3)	(4)	(5)
	Refinanced	Refinanced	Integrated	Refinanced	Refinanced
Integrated	0.085*** (0.003)	0.128*** (0.005)		0.060*** (0.005)	
Bank × Post			-0.324*** (0.015)		-0.019*** (0.002)
E[Y]	0.380	0.380	0.687	0.380	0.380
Loan characteristics	✓	✓	✓	✓	✓
Loan risk FE	✓	✓	✓	✓	✓
Lender X ZIP FE	✓		✓	✓	✓
Quarter X ZIP FE	✓		✓	✓	✓
Lender X Quarter X ZIP FE		✓			
N	8,909,498	8,836,395	8,909,498	8,909,498	8,909,498

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$$MarketShare_{l z t s} = \beta Integrated_{l z t s} + \alpha_l + \theta_{z t s} + \epsilon_{l z t s}$$

	Dependent variable:		
	Originator market share		
	(1)	(2)	(3)
Integrated	0.164*** (0.044)	0.104*** (0.033)	0.163*** (0.048)
E[Y]	0.48	0.48	0.48
Year X ZIP X Servicer (Market) FE	✓	✓	✓
Lender FE		✓	
Lender X Year X ZIP FE			✓
N	333,457	333,457	156,480

- Unit of observation: $lender_l \times \underbrace{Zip_z \times quarter_t \times Servicer}_{\text{Market}}$
- Market Share $_{l z t s}$: Market share of lender l in market (z, t, s)

$$MarketShare_{lzt} = \beta Integrated_{lzt} + \alpha_l + \theta_{zt} + \epsilon_{lzt}$$

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- $\beta > 0 \implies$ lenders more likely to win back their own borrowers

$$Y_{ilzt} = \beta_1 Integrated_{ilzt} + \beta_2 Recaptured_{ilzt} \\ + \beta_3 (Integrated \times Recaptured)_{ilzt} + \gamma' Z_{ilzt} + \lambda_{lzt} + \epsilon_{ilzt}$$

	Dependent variable:						
	Recaptured	Interest rate			Upfront fees		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Integrated	0.047*** (0.002)	-0.061*** (0.003)		-0.066*** (0.003)	0.007 (0.009)		-0.072*** (0.010)
Recaptured			0.009*** (0.002)	-0.017*** (0.003)		0.054*** (0.014)	-0.146*** (0.012)
Integrated X Recaptured				0.035*** (0.003)			0.318*** (0.016)
E[Y]	0.15	0.15	0.15	0.15	0.92	0.92	0.92
Loan characteristics	✓	✓	✓	✓	✓	✓	✓
Loan risk	✓	✓	✓	✓	✓	✓	✓
Lender X Quarter X ZIP FE	✓	✓	✓	✓	✓	✓	✓
N	994,011	994,011	994,011	994,011	255,457	255,457	255,457

PRICING OF RECAPTURE

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1. 3 New facts

Servicing shifted from banks → nonbanks

Integration varies across lenders/time, not borrowers

Integrated loans refi more, not just selection []

2. **Main Causal effect:** Basel III

Integrated (Instrumented by Banks $\times$ Post) refi 6pp more (38% baseline)

3. Mechanism

Recapture share higher for integrated

Recapture borrowers pay higher rates and fees

ECONOMIC MECHANISM

Borrowers

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- Retention, refinancing, recapture jointly determined

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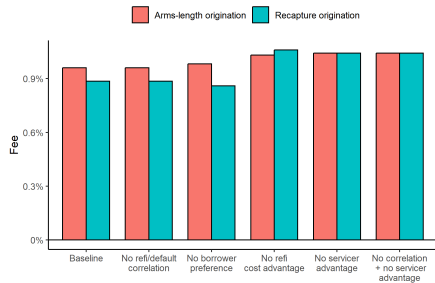
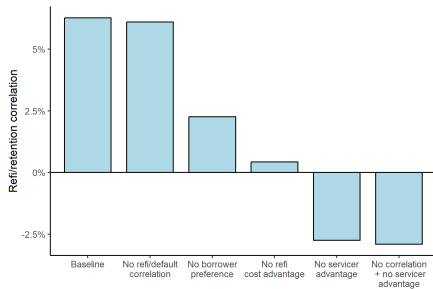
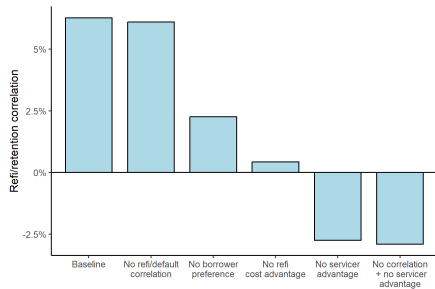
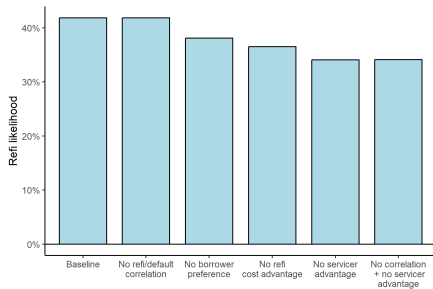
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“Borrowers more likely to refi because retained **not** Borrowers retained because low default (& more refi)”

COUNTERFACTUAL ANALYSIS



CONCLUDING THOUGHTS

- Integration $\implies$ higher refi probability

OVERVIEW OF RESULTS & POLICY IMPLICATIONS

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- Effect comes from recapture mechanism

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- Monetary policy $\implies$ interest rate changes $\implies$ bank/nonbank integration choice?

APPENDIX

LOAN-MONTH PANEL RESULTS

	OLS		1st stage	IV		Reduced Form	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Refinanced Delinquent		Integrated	Refinanced Delinquent		Refinanced Delinquent	
Integrated	0.007*** (0.000)	-0.013*** (0.001)		0.006*** (0.001)	0.002 (0.005)		
Bank × Post			-0.255*** (0.005)			-0.001*** (0.000)	-0.000 (0.001)
E[Y]	0.02	0.06	0.53	0.02	0.06	0.02	0.06
Current rate spread	✓	✓	✓	✓	✓	✓	✓
Loan FE	✓	✓	✓	✓	✓	✓	✓
Month X ZIP FE	✓	✓	✓	✓	✓	✓	✓
N	7,394,905	7,394,905	7,394,905	7,394,905	7,394,905	7,394,905	7,394,905
Adjusted R ²	0.07	0.68	0.84	-0.00	0.08	0.07	0.68
F-stat			2,565				

Standard errors in parentheses

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

SUMMARY STATS

	N	Mean	Std. dev.	10%-tile	90%-tile
Loan amount (\$)	47,250,374	235,580	130,797	96,000	415,000
Interest rate (percent)	47,250,372	5.08	1.41	3.20	6.88
Combined loan-to-value ratio (pct.)	47,067,060	75	17	51	95
Debt-to-income ratio (pct.)	45,404,403	35	11	20	48
FICO score	47,133,264	740	52	665	800
Integrated servicing	47,250,374	0.70	0.46	0.00	1.00
Months until refinanced	34,777,606	47	39	10	102
Refinanced within 2 years	47,250,374	0.26	0.44	0.00	1.00
Refinanced within 4 years	47,250,374	0.46	0.50	0.00	1.00
Refinanced within 6 years	47,250,374	0.56	0.50	0.00	1.00
60+ days delinquent wi. 2 years	47,123,928	0.03	0.16	0.00	0.00
60+ days delinquent wi. 4 years	47,197,149	0.05	0.21	0.00	0.00
60+ days delinquent wi. 6 years	47,238,026	0.06	0.23	0.00	0.00

SUMMARY STATS: FORWARD MATCHED

	N	Mean	Std. dev.	10%-tile	90%-tile
Loan amount - OLD (\$)	1,295,506	222,889	122,946	87,000	390,000
Loan amount - NEW (\$)	1,295,506	221,204	122,654	86,000	386,000
Interest rate - OLD (percent)	1,295,506	5.41	1.28	3.88	7.00
Interest rate - NEW (pct.)	1,295,506	4.67	1.26	2.99	6.50
Interest rate spread - NEW (pct.)	1,295,506	0.15	0.43	-0.33	0.67
Lender fees - NEW (pct.)	365,285	0.92	1.05	-0.10	2.46
Combined loan-to-value ratio - OLD (pct.)	1,291,036	77	17	53	95
Debt-to-income ratio - OLD (pct.)	1,217,444	35	11	20	48
FICO score - OLD	1,292,843	737	53	662	797
MSR retained - OLD	1,295,506	0.65	0.48	0.00	1.00
Recaptured - NEW	1,295,506	0.15	0.36	0.00	1.00