Banks, Nonbanks Mortgage Companies, and Systemic Risk

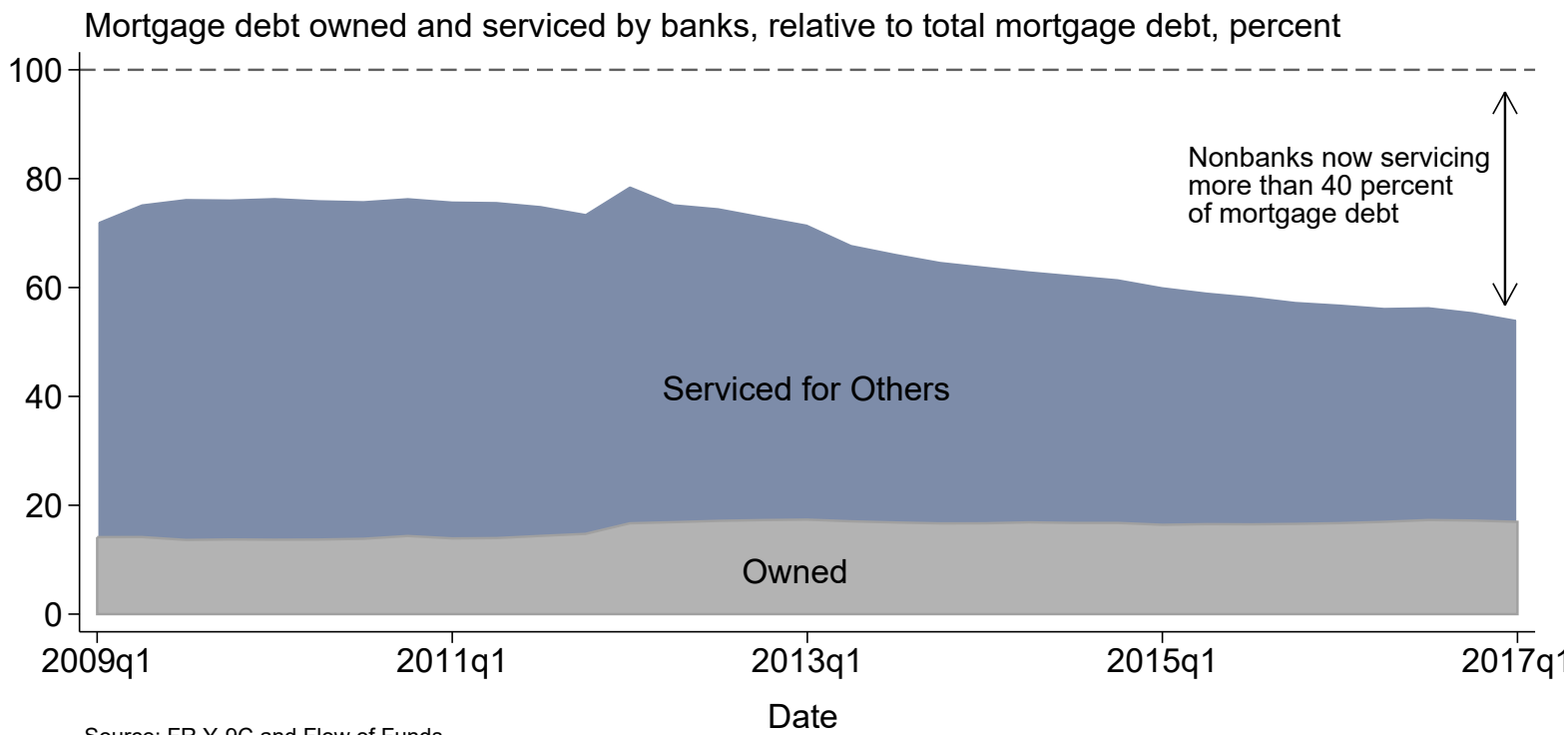
David Rappoport Robert Sarama

Federal Reserve Board

3rd Conference on Banking Development, Stability, and Sustainability
November 3, 2017

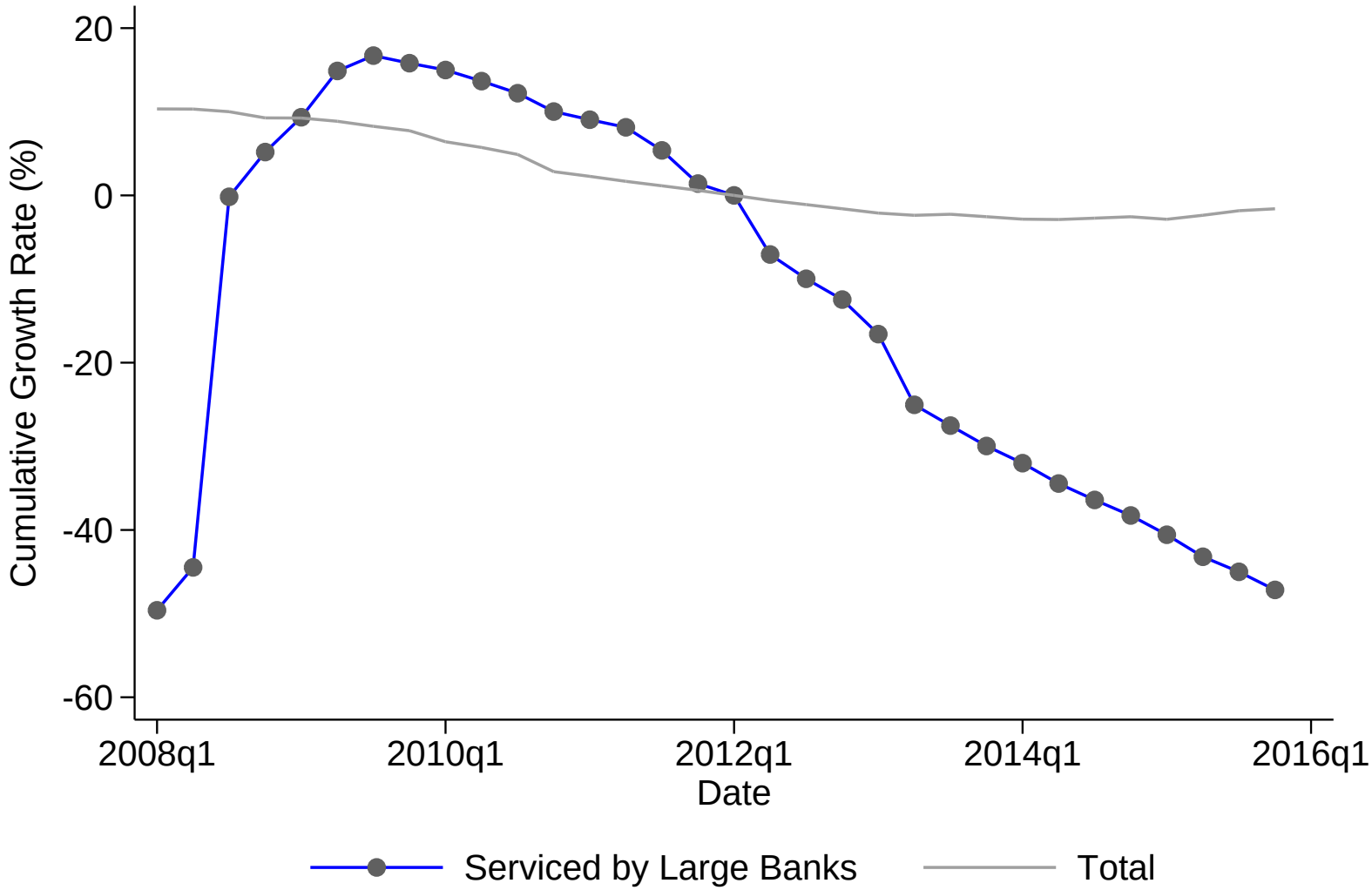
1. Introduction

- Banks have cut back on their mortgage servicing businesses
- Lots of potential reasons for this – reason is not the subject of the talk today



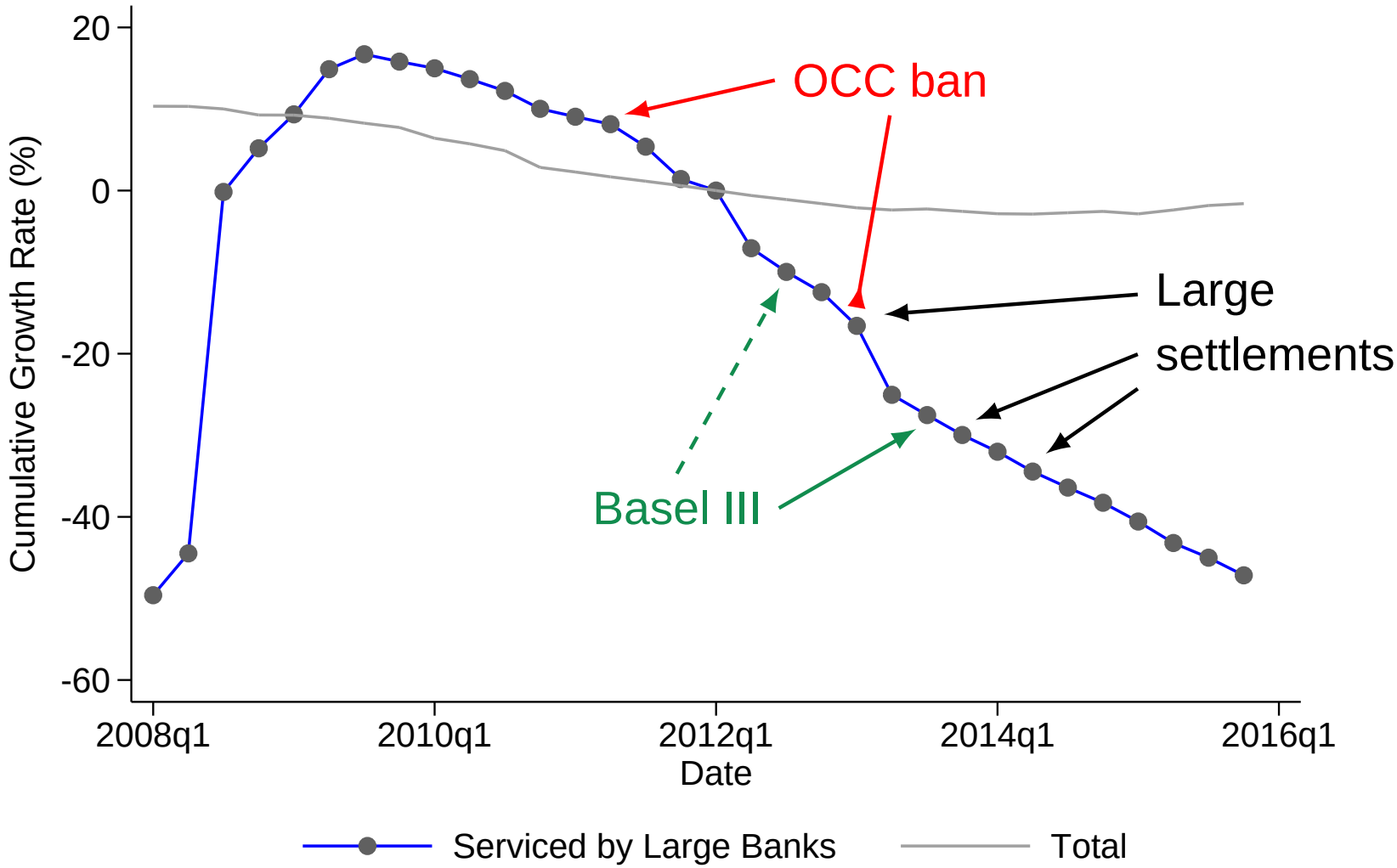
Source: FR Y-9C and Flow of Funds

Mortgage Servicing Assets (MSAs)



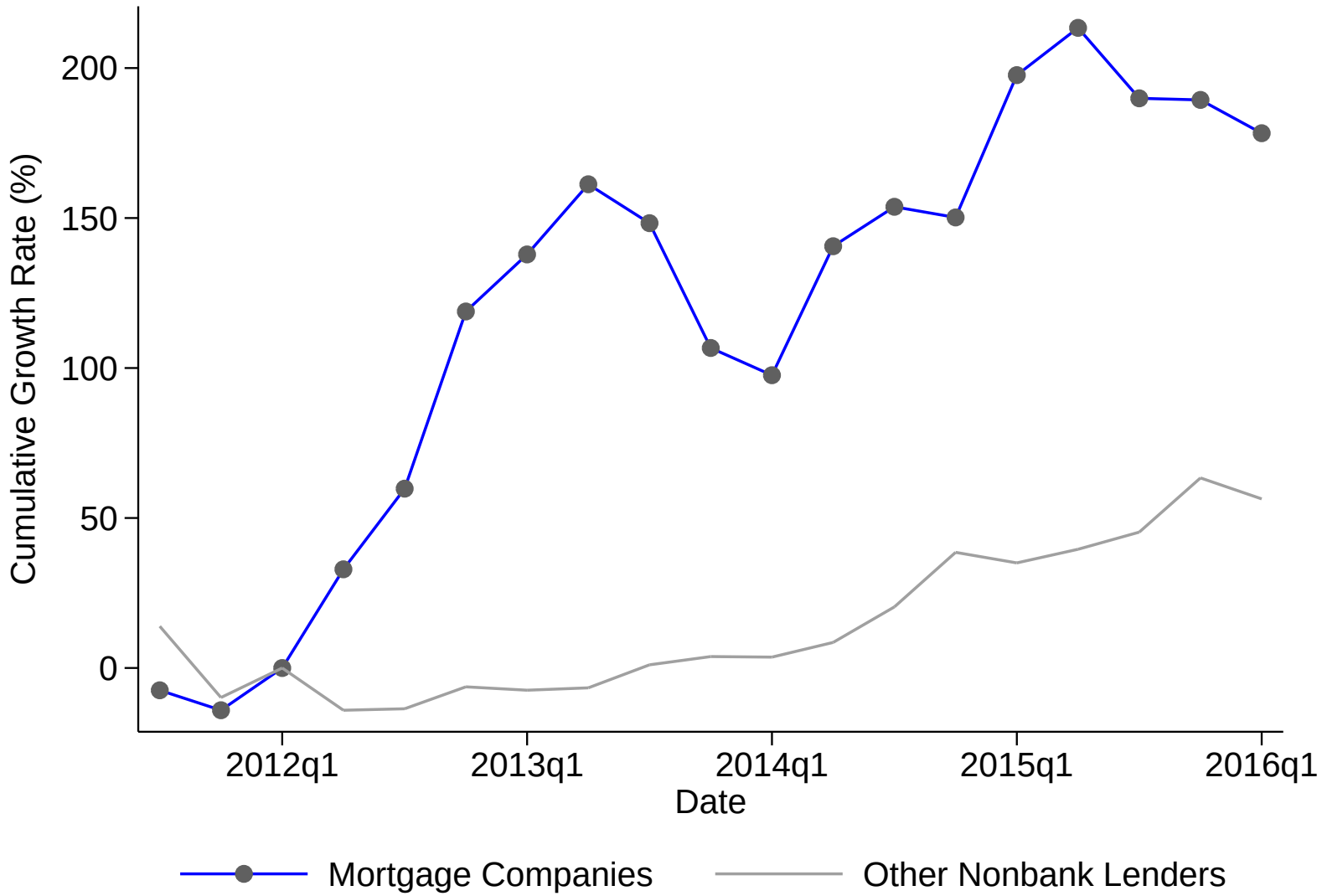
Source: FR Y-9C and Flow of Funds

Mortgage Servicing Assets (MSAs)



Source: FR Y-9C and Flow of Funds

Large Banks' Loans to Financial Companies



Our Paper

- We argue that recent adjustments are consistent with regulatory arbitrage
- We present a model to derive testable predictions for the pricing of loans to mortgage companies relative to other companies, depending on banks' exposure to mortgage intermediation risk
- Use FR Y-14 data to estimate spread between loans to nonbank mortgage companies (MC) and other financial firms (OF)
  - Banks price loans to MC lower than to OF
  - This spread is larger when banks' have reduced MSAs by more
  - Consistent with banks trying to recover mortgage-intermediation risk exposure, as predicted by the model

Related Literature

- Regulatory arbitrage

  Kane (1981 JF), Jones (2000 JBF), Acharya, Schnael, and Suarez (2013 JFE)

- Financial system adjustment post-crisis

  Calem, Correa, and Lee (2017), Morris-Levenson, Sarama, and Ungerer (2017), Chousalos and Gorton (2017), Sarin and Summers (2016)

- Industrial organization of mortgage market

  Purnanandam (2011 RFS), Echeverry, Stanton, and Wallace (2016), Demyanyk and Loutskina (2016 JFE)

Outline

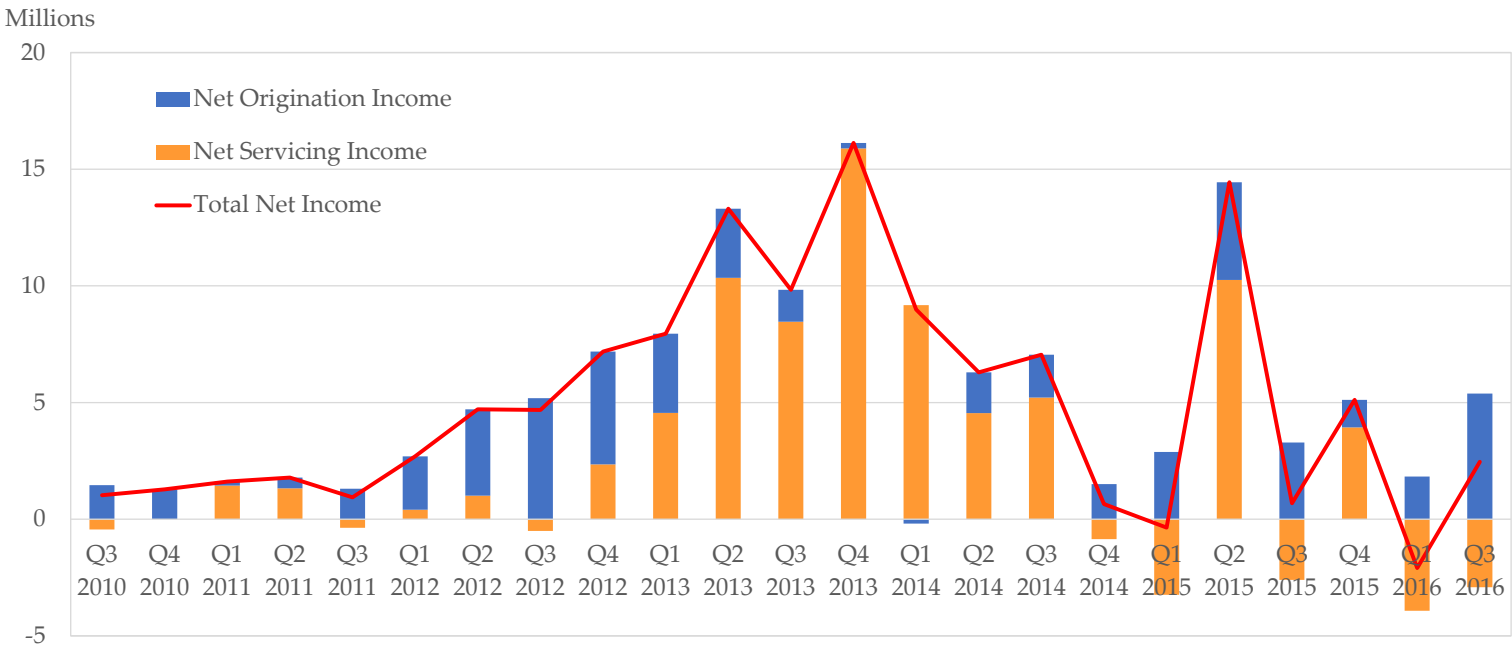
1. Introduction
2. Institutional Background on the Mortgage Business
3. Mortgage Credit Intermediation and Interest Rate Risk (Simple Framework)
4. Data
5. Testing Implications of our Framework

2. Institutional Background on the Mortgage Business

1. Banks' holdings of MSA have declined at a rapid clip since 2011Q4, when loans to MC started a sharp increase

2. Risk of mortgage business is servicing

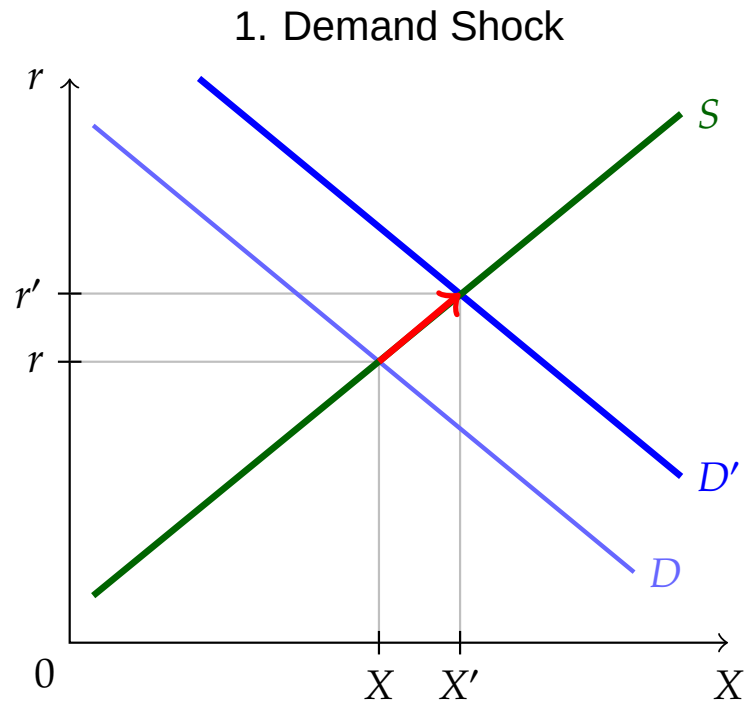
Risk of Mortgage Business is Servicing



Notes: Net income per business line corresponds to estimates of average firm earnings. Average net income from originations computed as 'Total Net Production Income ($ per loan)' times 'Average Total Loans Originated (# of loans)' from the table 'Residential Loan Production - by Company Type'. Average net income from servicing computed as 'Total Net Financial Income ($ per loan),' which includes both net operating income and changes in the valuation of mortgage servicing assets, times 'Average Servicing Portfolio (# of loans)' from table 'Residential Loan Servicing - By Company Type.'
Source: MBA reports from 2010Q3 to 2016Q3 and author calculations.

Potential Explanations for Increasing Loans

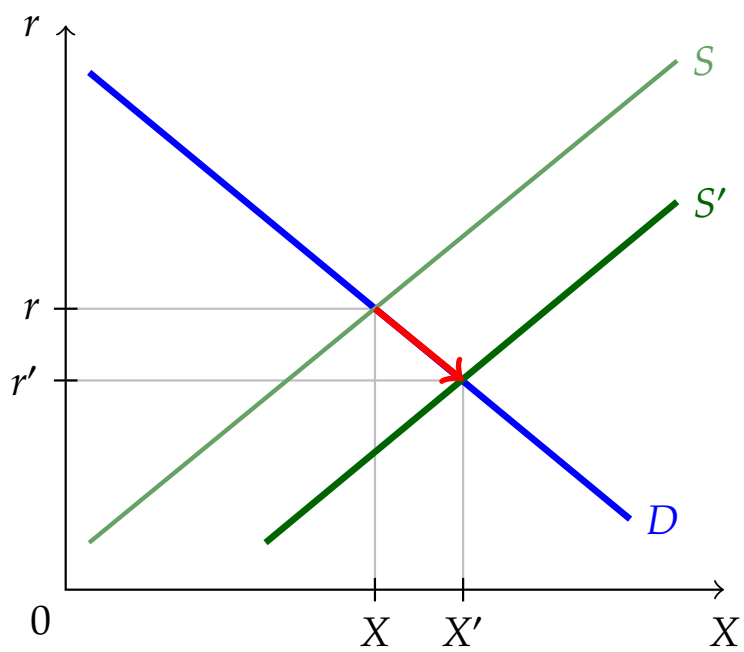
1. Demand driven
   - Growth of MC increases loan demand



Potential Explanations for Increasing Loans

1. Demand driven
   - Growth of MC increases loan demand
2. Supply driven
   - MSAs are a hedge for increase in interest rates
   - Banks naturally exposed to interest rate risk
   - Can replicate hedge through a loan to MC

2. Supply Shock



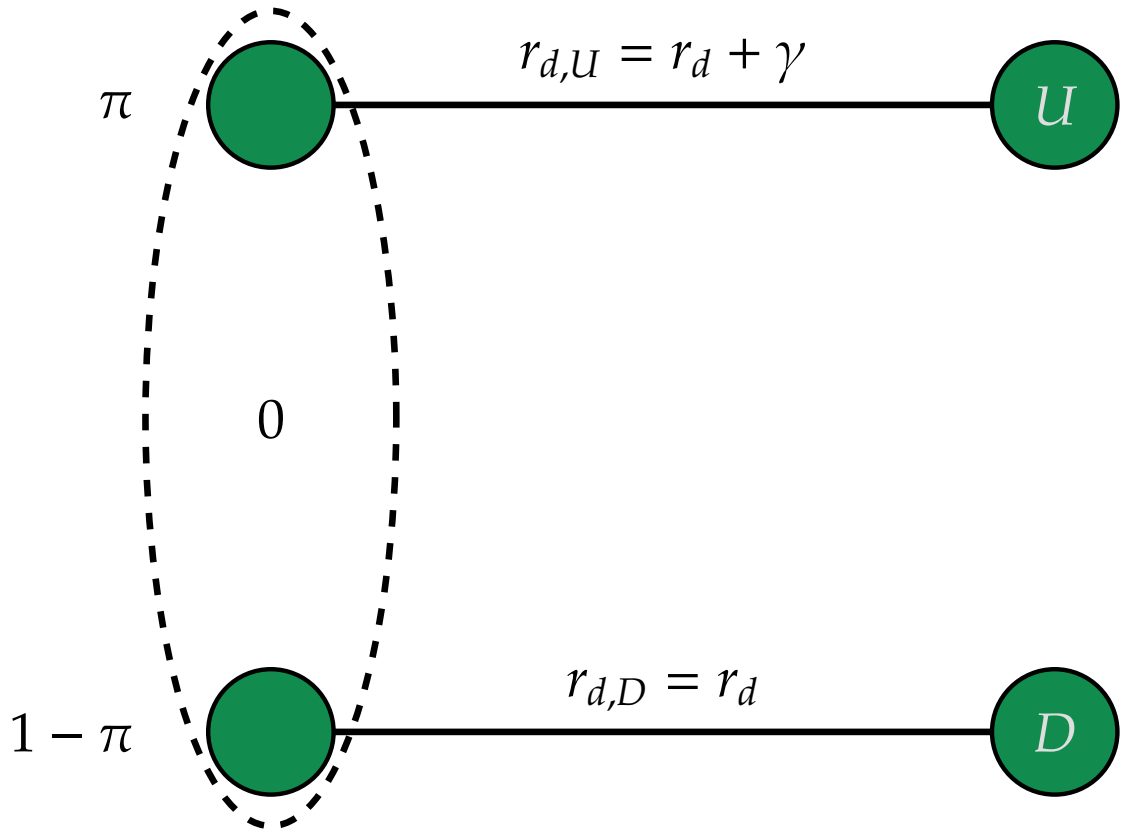
3. Mortgage Intermediation and Interest Rate Risk

Simple Framework

- Two periods $t = 0, 1$
- The banker can lend or acquire mortgage servicing rights by originating mortgages and selling them
- To match the data
  - Consider loans to MC and OF
  - Consider fixed and adjustable rate loans
- Aggregate uncertainty about level of interest rates, affects:

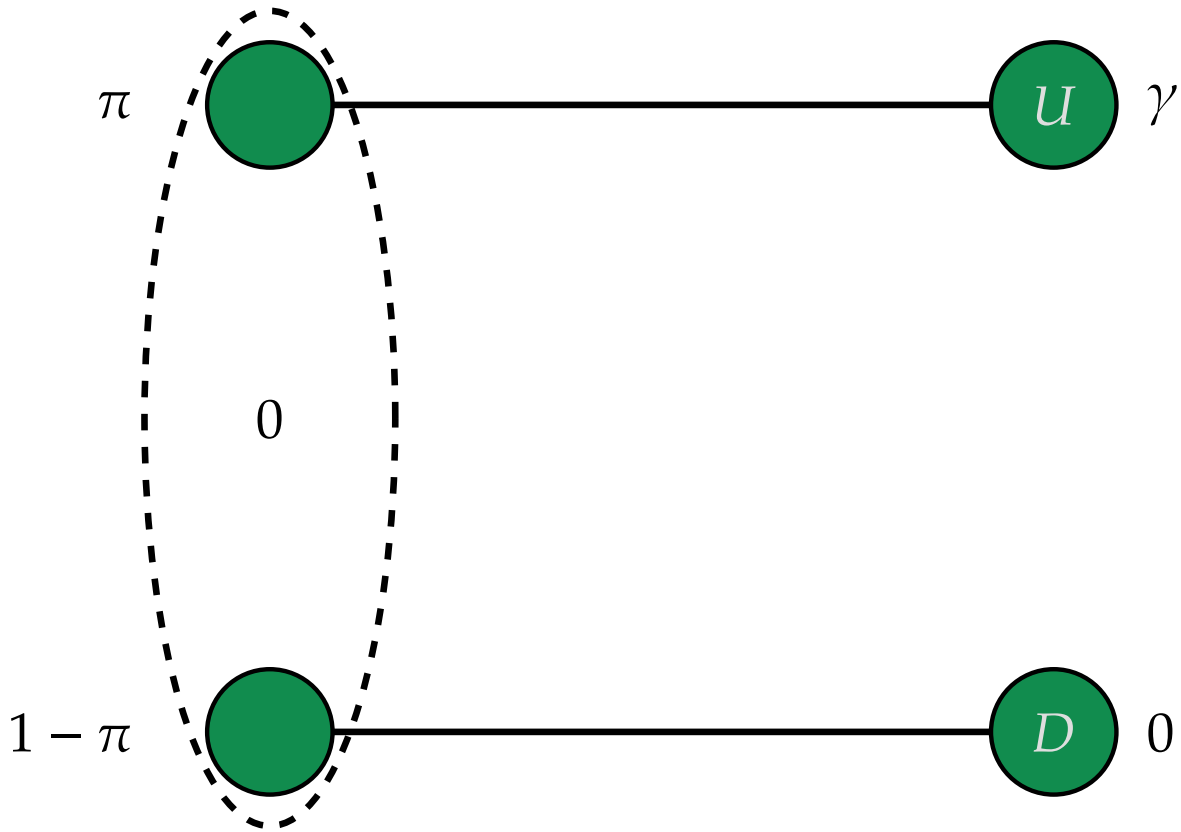
  cost of deposits, return on loans, and servicing payoffs

Uncertainty about Cost of Deposits



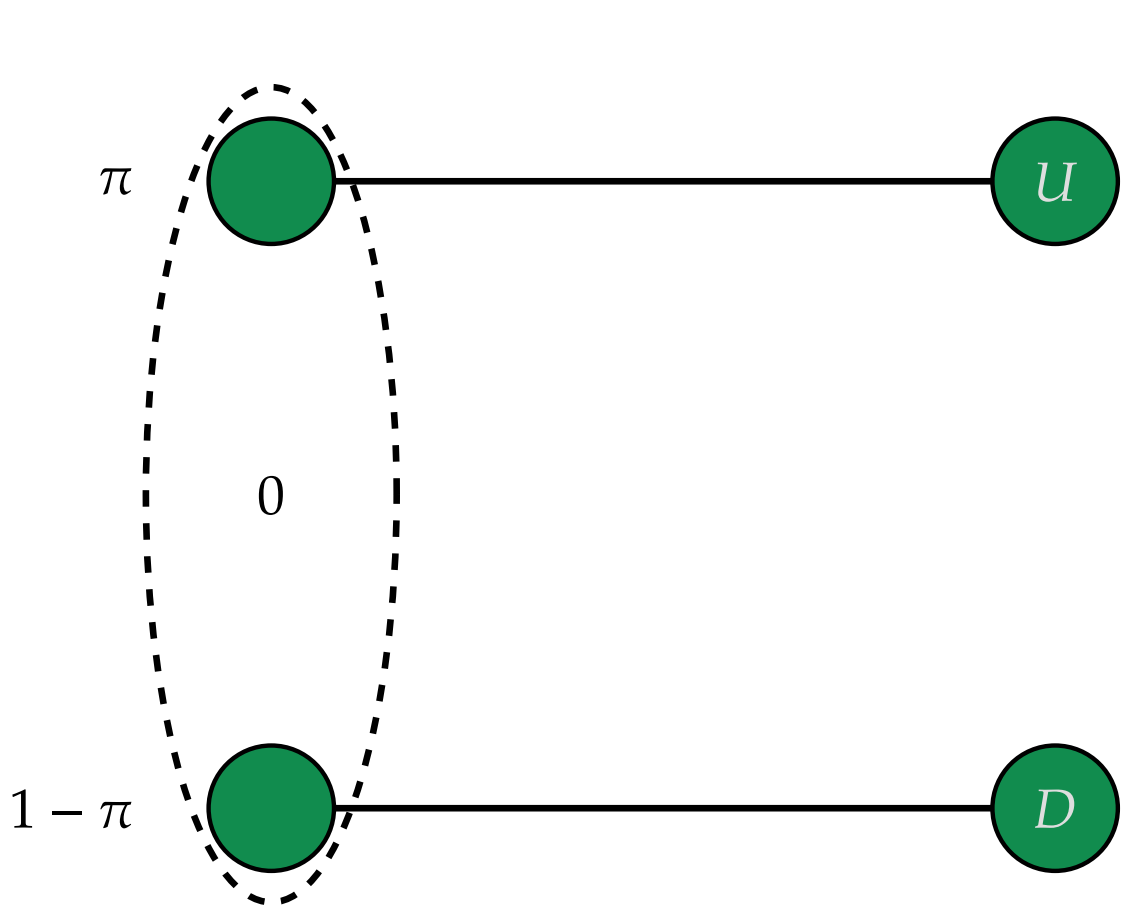
- The banker price loans before learning level of interest rates
- Tractable modeling of interest rate risk management problem

Payoffs of Mortgage Servicing Assets



- Prepayments (defaults) extinguish (offset) servicing fee in D
- MSAs pay (relatively) more in U, so can hedge interest rate risk

Loan Payoffs



OF: r_f

$r_d + \gamma + \phi_a$

MC: $r_{mf} + \gamma$

$r_d + \gamma + \phi_{ma} + \gamma$

OF: r_f

$r_d + \phi_a$

MC: r_{mf}

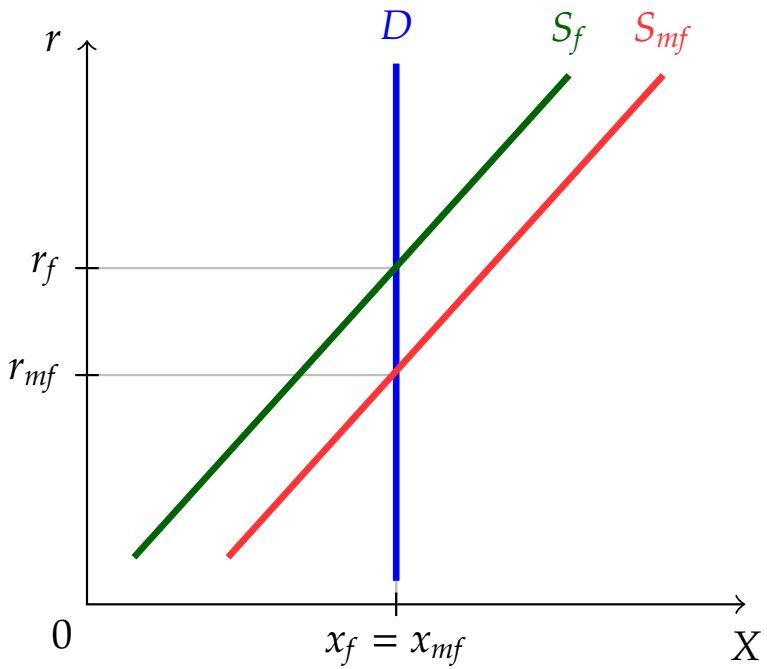
$r_d + \phi_{ma}$

- Premise of analysis: loans to MC have additional MSA-like payoff

Testable Predictions I

Proposition 1 (The pricing of loans to mortgage companies)

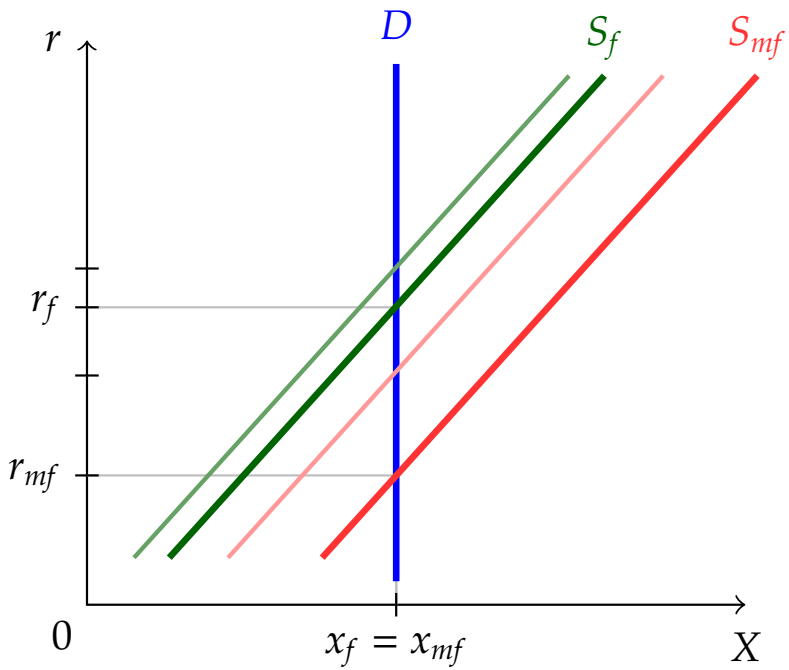
Under the maintained assumptions, the banker sets lower interest rates on loans to mortgage companies relative to the interest rate in similar loans. That is, $r_f > r_{mf}$.



Testable Predictions II

Proposition 2 (The pricing of loans to mortgage companies and the holdings of servicing assets)

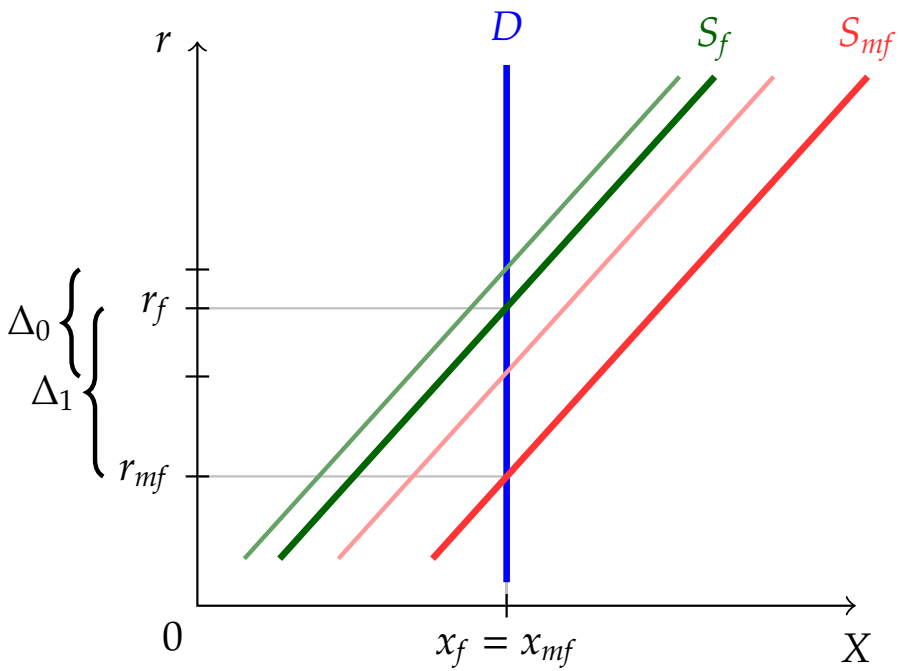
Under the maintained assumptions, as the holdings of mortgage servicing assets decline, the premium the banker pays for loans to mortgage companies increases. That is, $r_f - r_{mf}$ are decreasing in x_σ.



Testable Predictions II

Proposition 2 (The pricing of loans to mortgage companies and the holdings of servicing assets)

Under the maintained assumptions, as the holdings of mortgage servicing assets decline, the premium the banker pays for loans to mortgage companies increases. That is, $r_f - r_{mf}$ are decreasing in x_σ.



with $\Delta_0 < \Delta_1$

4. Data

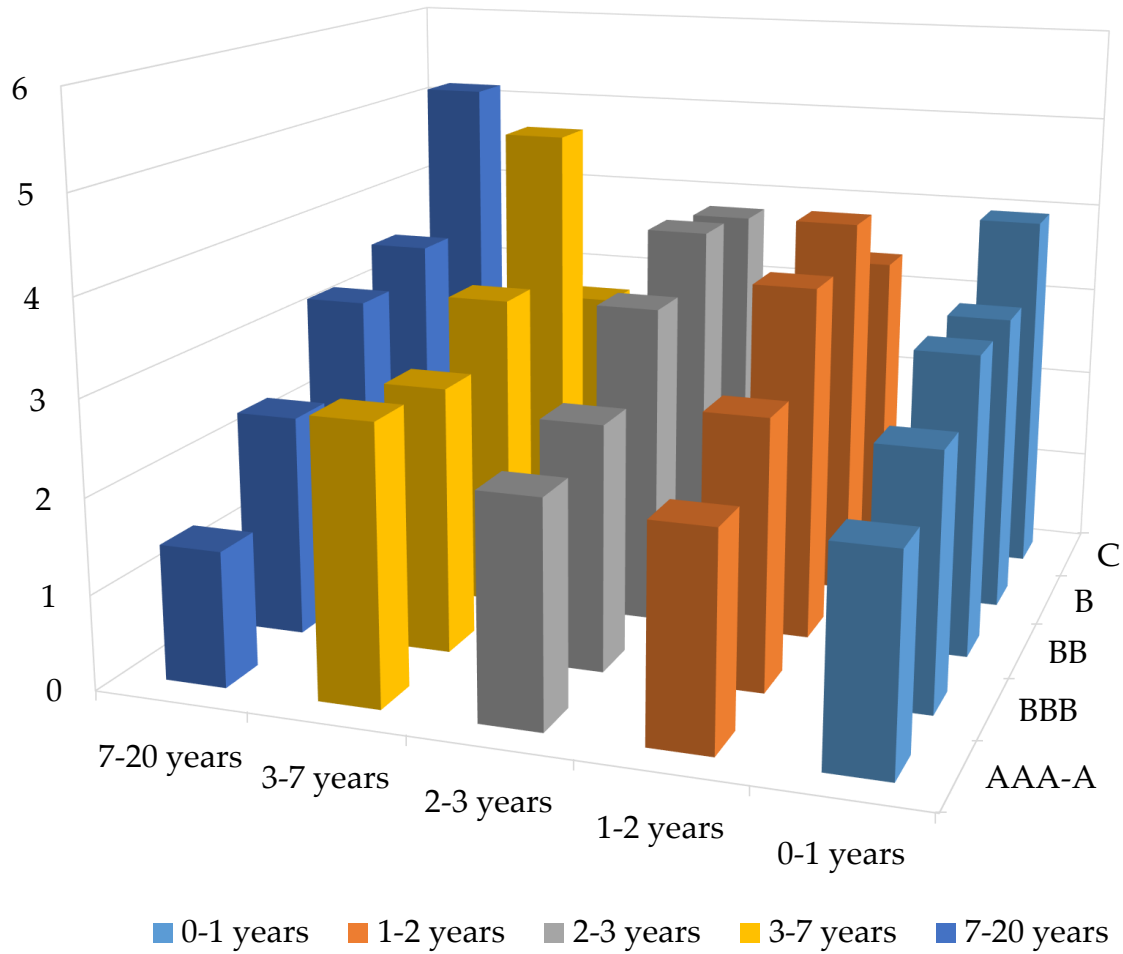
- FR Y-14Q Corporate Loan schedule.
- Loans originated between 2011Q3 and 2016Q4 by a balanced panel of banks
- Focus on loans to financial firms (MC + OF)
- Mortgage companies definition:
  - NAICS code filter...
  - PLUS obligor name search
- Drop fully undrawn lines (no interest rate info), loans with not risk rating or no obligor name

Descriptive Statistics

	Mortgage	Other Nonbank
Total Originations	367	2,627
Average Committed Balance, $ Millions	101.7	58.9
Average Interest Rate, Percentage Points	2.7	3.2
Term Shares, Percent		
Less than 1 year	71.4	34.0
Between 1 and 5 years	22.9	57.0
More than 5 years	5.7	9.0
Rating Shares, Percent		
AAA to A	13.4	11.9
BBB to B	83.9	85.2
CCC to D	2.7	2.9
Origination Year Shares, Percent		
2011	11.2	9.6
2012	16.3	18.6
2013	20.7	25.6
2014	23.4	20.8
2015	12.3	13.1
2016	16.1	12.3
Fixed Rate Share, Percent	12.5	21.2
Term Loan	19.3	17.0
Revolving Loan	58.9	65.1
Other	21.8	17.9
Utilization Rate, Percent	63.5	70.4

Source: FR Y-14Q corporate loan schedule and author calculations.

Interest Rate Pricing



Source: FR Y-14 and author calculations.

5. Testing Implications of our Framework

- Consider cross-sectional data of loan j originated by firm i in quarter t:

$$r_{itj} = \alpha_i + \alpha_t + \beta \times mc_j + MRT_j + \mathbf{L}_j\gamma + \epsilon_{itj} \quad (1)$$

  - r_{itj} is the interest rate on loan j by bank i in quarter t
  - α_i are bank fixed effects
  - α_t are origination vintage fixed effects
  - mc_j is nonbank mortgage company dummy
  - MRT_j is interaction of loan term, rating dummy variables (AAA-D), and a fixed rate dummy
  - L_j other loan characteristics (utilization rate at origination, type of facility, secured, etc.)

- Null hypothesis: $\hat{\beta} < 0$

Results I

$$r_{itj} = \alpha_i + \alpha_t + \beta \times mc_j + MRT_j + \mathbf{L}_j\gamma + \epsilon_{itj}$$

	Baseline Specifications		Sensitivity Tests ex Outliers	ex Int. Rate = 0
	(1)	(2)	(3)	(4)
MC Dum.	-0.3653*	-0.3916**	-0.3068*	-0.2590
	[0.1451]	[0.1452]	[0.1536]	[0.1543]
First Lien Dum.		-0.1089	-0.1756	-0.1891
		[0.1892]	[0.1957]	[0.1919]
Unsecured Dum.		-1.4092	-0.5427*	-0.4009
		[0.2099]	[0.2096]	[0.2059]
Revolving Loan Dum.		-0.0513	0.0264	-0.2365
		[0.1613]	[0.1704]	[0.1710]
Term Loan Dum.		0.2402	0.2777	0.0881
		[0.2016]	[0.2225]	[0.2173]
Utilization Rate, Percent		0.0059***	0.0053***	0.0031***
		[0.0010]	[0.0011]	[0.0009]
Loan to Bank Assets, Percent		-10.6965***	-17.3043***	-10.3612***
		[1.7799]	[2.7864]	[1.7005]
Pricing Grid	Included	Included	Included	Included
Bank Effects	Included	Included	Included	Included
Vintage Effects	Included	Included	Included	Included
Observations	2,858	2,846	2,579	2,710
Adjusted R-squared	0.27	0.31	0.31	0.30

Note: Standard errors in brackets clustered by maturity / rating bin / interest rate type.

Results II

$$r_{itj} = \alpha_i + \alpha_t + \beta_{resi} \times mc_j + MRT_j + \mathbf{L}_j\gamma$$
$$+ \beta_{resi \times decline} \times mc_j \times decline^k_{i,t-1} + \beta_{decline} \times decline^k_{i,t-1} + \epsilon_{itj}$$

	Full Sample (1)	Excluding Int. Rate = 0 (2)	Full Sample (3)	Excluding Int. Rate = 0 (4)
MC Dum. x 2011-2013 Dum.	-0.4831*	-0.2936		
	[0.2155]	[0.2355]		
MC Dum. x 2014-2016 Dum.	-0.3055	-0.2278		
	[0.1780]	[0.1748]		
MC Dum. x Decline MSA Share			-1.5953*	-1.2847*
			[0.6195]	[0.6280]
MC Dum.			-0.0148	0.0424
			[0.2022]	[0.2057]
Decline MSA Share			-1.0996	-1.2696*
			[0.5663]	[0.5652]
Other Controls	Included	Included	Included	Included
Pricing Grid	Included	Included	Included	Included
Bank Effects	Included	Included	Included	Included
Vintage Effects	Included	Included	Included	Included
Observations	2,846	2,710	2,846	2,710
Adjusted R-squared	0.31	0.30	0.31	0.30

Note: Standard errors in brackets clustered by maturity / rating bin / interest rate type.

Conclusions

- We present a model where banks want to increase their indirect participation when they are pushed away participating directly in mortgage intermediation
- We report post-crisis trends in the intermediation of mortgage credit that are consistent with the model predictions
- Moreover, we find further evidence in support of the model from the pricing of loans to MC relative to OF
- This suggests that banks are engaging in regulatory arbitrage: get exposure at lower costs
- Calls for taking a system view to measure systemic risk and reconsider the effect of regulation on systemic risk