

# Liquidity Regulations in Mortgage Markets. The Regulatory Premium Channel and the Rise of the Nonbanks.

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# The Liquidity Coverage Ratio (LCR)

- ▶ **Goal: avoid bank runs** (Diamond and Kashyap 2016)
- ▶ **Large financial institutions must hold enough liquid assets**

- ▶ U.S. liquidity weights:
  - ▶ GNMA-backed MBS is 1
  - ▶ GSE-backed MBS is 0.85
- ▶ Announced in October 2013, finalized in September 2014

# This paper

- ▶ Question 1:

What is the market price of LCR regulatory weights?

- ▶ Question 2:

What are spillovers of LCR in U.S. mortgage markets?  
Did LCR help nonbanks?

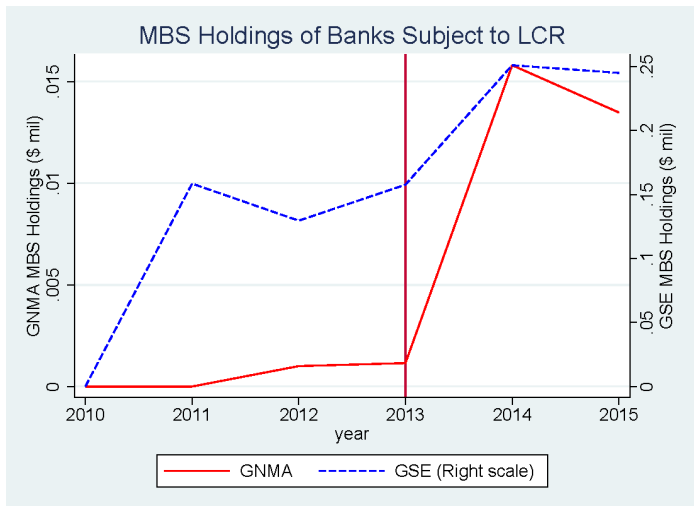
## Question 1:

What is the LCR regulatory premium?

## Preview of results

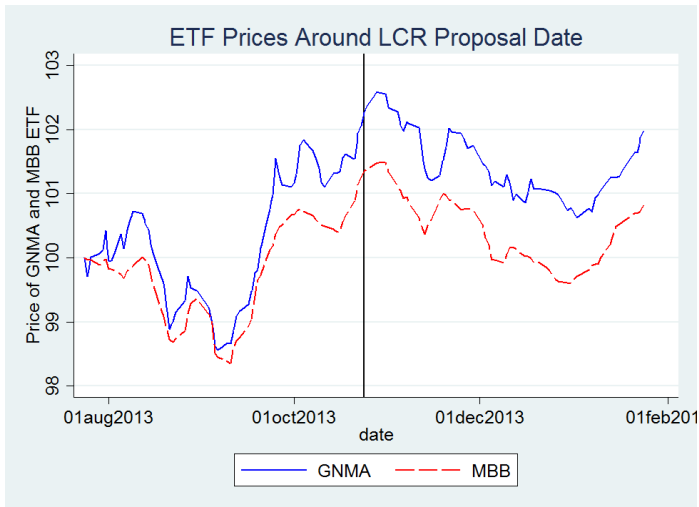
- 1) Regulatory premium for a security with 100% LCR weight is 25bp.
  - ▶ this is 25% of effect of QE1 on MBS yields (Krishnamurthy and Vissing Jorgensen 2011)
- 2) LCR raised the MBS premium of Ginnie Mae (GNMA) by 10% compared to the GSEs.

# MBS Holdings of banks affected by LCR



Source: Call Reports (FR Y-9C)

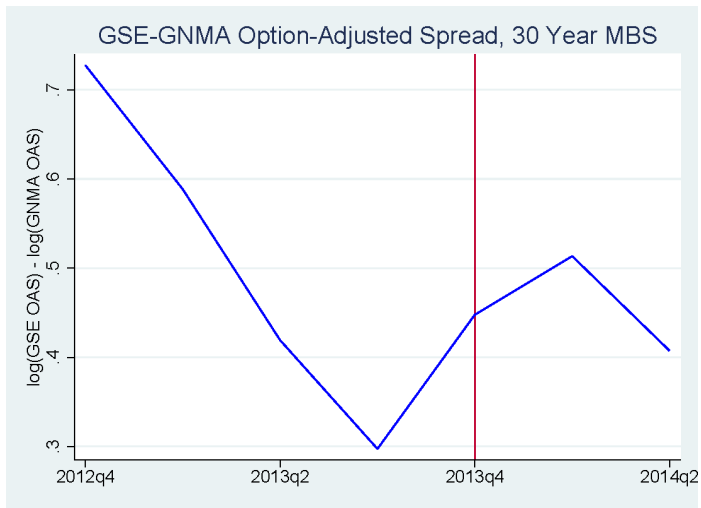
# Compare prices GNMA and GSEs MBS



Source: Blackrock



# OAS spreads



Source: Bloomberg

# Quantifying the LCR premium:

$$\text{OAS}_{j,t} = \alpha_j + \beta_1 (\text{LCRweight}_j \times \text{PostLCR}_t) + \text{PostLCR}_t + \beta_2 X_{jt} + u_{j,t},$$

- ▶  $j$  = OAS data for GNMA, FNMA, and FHLMC MBS and U.S. AAA Corporate Bonds
- ▶ OAS is already adjusted for prepayment risk
- ▶  $\text{PostLCR}$  = day is after Oct. 24, 2013

	OAS <sub>s,t</sub>					
PostLCR <sub>t</sub> × Weight <sub>s</sub>	-3.22 (0.03)	-6.79 (0.00)	-9.84 (0.00)	-18.68 (0.00)	-25.98 (0.00)	-25.68 (0.00)
PostLCR <sub>t</sub>	1.94 (0.10)	3.09 (0.07)	5.22 (0.03)	4.75 (0.19)	6.98 (0.05)	4.62 (0.16)
Security FE	Yes	Yes	Yes	Yes	Yes	Yes
Time Controls	Yes	Yes	Yes	Yes	Yes	Yes
Window (Days)	±10	±20	±40	±70	±100	±130
R-squared	0.22	0.53	0.54	0.56	0.6	0.65
# Obs	84	164	320	556	796	1024

p-values in parenthesis

# Only agency MBS:

Outcome:	$\log(\text{OAS}_{s,t})$	$\log\left(\frac{\text{OAS}_{\text{FN},t}}{\text{OAS}_{\text{GN},t}}\right)$	$\log\left(\frac{\text{OAS}_{\text{FH},t}}{\text{OAS}_{\text{GN},t}}\right)$
$\text{PostLCR}_t \times \text{GNMA}_s$	-0.128 (0.000)		
$\text{PostLCR}_t$		0.085 (0.000)	0.114 (0.007)
Agency FE	Yes	No	No
Quarter FE	Yes	No	No
Prepayment Controls	Yes	Yes	Yes
R-squared	0.996	0.974	0.894
# Obs	21	7	7
Sample period:	2012Q4 - 2014Q2		

p-values in parenthesis

# Prices instead of OAS

Outcome:	$\log(P_{s,t})$	$\log(P_{s,t})$	$\log\left(\frac{P_{GN,t}}{P_{FN,t}}\right)$	$\log\left(\frac{P_{GN,t}}{P_{FH,t}}\right)$
PostLCR <sub>t</sub>	0.018 (0.000)		0.013 (0.000)	0.006 (0.001)
PostLCR <sub>t</sub> × GNMA <sub>s</sub>	0.007 (0.031)	0.007 (0.003)		
Sample	Oct 12 - Oct 14	Jan 12 - Apr 15	Oct 12 - Oct 14	Oct 12 - Oct 14
Agency FE	Yes	Yes	No	No
Month FE	No	Yes	No	No
Controls	Yes	Yes	Yes	Yes
# Obs	75	120	25	25

p-values in parenthesis

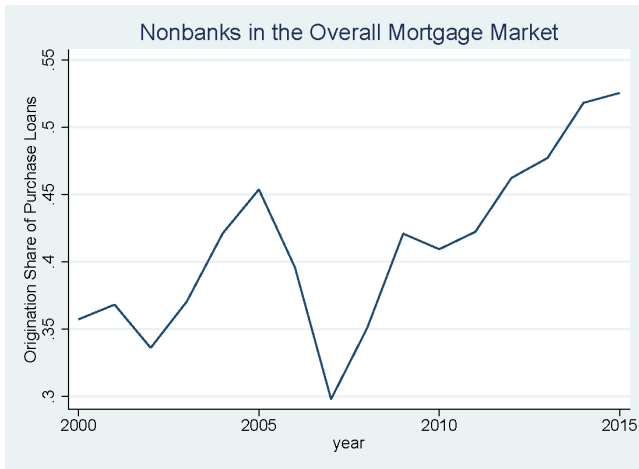
- ▶ GNMA spread increased by 0.7-1 points (on a 100 par), it was 1.6-2.1 before the LCR

Question 2:  
Did LCR help nonbanks?

# Why care about nonbanks?

- ▶ In 2006, non-depository institutions (non-banks) accounted for 43% of total subprime loans (Lux and Greene 2015)
- ▶ Among top 15 subprime lenders in 2006, 13 were non-banks (Demyanyk and Loutskina 2016)
  - ▶ New Century, Countrywide, WMC Mortgage, First Franklin, Ameriquest, Option One, Accredited Home Lenders, American General Finance, BNC Mortgage...
- ▶ All of those non-banks either defaulted or were restructured post-2007

# Nonbanks are back



Source: HMDA



# The new non-banks

- ▶ Quicken Loans, PennyMac, PHH Mortgage, Freedom Mortgage, Walter Investment, Caliber Home Loans, Nationstar Mortgage, Prospect Mortgages, Stearns Lending, Loan Depot...
- ▶ They focus on FHA loans

## Nonbanks in the FHA Mortgage Market



- ▶ Nonbank Lenders have fragile funding:
  - ▶ Short-term debt is 90% of their debt
  - ▶ Refinancing risk and runs
- ▶ Danger of race to the bottom in lending standards

# Our theory for nonbanks and LCR

- ▶ LCR causes:
  1. Direct channel:
    - ▶ higher demand for GNMA MBS
    - ▶ both by banks subject to LCR and entities not yet affected

## 2. Indirect (general eq'm) channels

- ▶ Collateral channel
- ▶ Market liquidity
- ▶ They affect lenders that securitize

## Indirect channels

- ▶ Collateral channel:

MBS has higher price  $\implies$  more collateral value  $\implies$  borrow more against it (repo funding)

- ▶ Market liquidity: easier to sell the MBS in the secondary mortgage market

- ▶ Indirect channels matter in the originate-to-distribute model
- ▶ Nonbanks:
  - ▶ fund loans with repo borrowings or lines of credit
  - ▶ securitize them as MBS
  - ▶ use the proceeds to repay

## Preview of results

- 1) Post-LCR: Nonbanks originate more FHA loans, deny less
- 2) Higher risk-taking in FHA loans
  - ▶ Less denials for blacks & Hispanics (low FICO) and high LTI



- 3) Crowding out effect between FHA and GSEs
- 4) LCR increased nonbanks share in FHA by 26% between 2013 and 2015
- 5) Nonbanks increased homeownership

# Specification

$$\text{outcome}_{i,l,t} = \beta (M_t^{GNMA} \times F_l) + \text{PostLCR}_t + \delta Z_{l,t} + \gamma X_{i,t} + \alpha_l + u_{i,l,t},$$

$$\text{outcome} = \{\text{denied}, \text{origination}\}$$

## ► Proxies of lender's exposure to LCR

$$F_l = \left\{ \begin{array}{l} \text{Nonbanks (NDI),} \\ \text{2011 Securitization Rate,} \\ \text{1- Banks' } \frac{\text{Deposits}}{\text{Assets}} \text{ Ratio in 2011} \end{array} \right\}$$

► Proxies of LCR shock:

$$M_t^{GNMA} = \left\{ \begin{array}{l} \text{PostLCR,} \\ \log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right), \\ \log \left( \frac{OAS_t^{FHLMC}}{OAS_t^{GNMA}} \right) \end{array} \right\}$$

- $Z_{l,\tau}$  MSA-lender FE
- $X_{i,t}$  borrower controls: LTI, log income, minority
- Banks controls: lagged log of total assets, lagged ratios of: net income to total assets, loss provisions to total assets, and total equity to total assets

# Mortgage denials and nonbanks

		Denied <sub><i>i,l,t</i></sub>	
$M_t^{GNMA} =$	PostLCR <sub><i>t</i></sub>	$\log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right)$	$\log \left( \frac{OAS_t^{FHLMC}}{OAS_t^{GNMA}} \right)$
$M_t^{GNMA} \times NDI_l$	-0.006 (0.000)	-0.044 (0.000)	-0.040 (0.000)
Borrower Controls	Yes	Yes	Yes
Lender-MSA FE	Yes	Yes	Yes
Post-LCR Indicator	Yes	Yes	Yes
R-squared	0.108	0.108	0.108
Number of Observations	2,809,984	2,809,984	2,809,984
p-values in parenthesis			

# Lenders more exposed to securitization

$M_t^{GNMA} =$	PostLCR <sub>t</sub>	Denied <sub>i,l,t</sub>	
		$\log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right)$	$\log \left( \frac{OAS_t^{FHLMC}}{OAS_t^{GNMA}} \right)$
$M_t^{GNMA} \times \text{Sec Rate}_{l,2011}$	-0.029 (0.000)	-0.057 (0.000)	-0.053 (0.000)
Borrower Controls	Yes	Yes	Yes
Lender-MSA FE	Yes	Yes	Yes
Post-LCR Indicator	Yes	Yes	Yes
R-squared	0.108	0.108	0.108
Number of Observations	2,809,345	2,809,345	2,809,345

p-values in parenthesis

# Banks

	Denied <sub>i,l,t</sub>		
$M_t^{GNMA} =$	PostLCR <sub>t</sub>	$\log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right)$	$\log \left( \frac{OAS_t^{FHLMC}}{OAS_t^{GNMA}} \right)$
$M_t^{GNMA} \times (1 - \text{DepRat}_{t,2011})$	-0.030 (0.049)	-0.332 (0.000)	-0.326 (0.000)
Borrower Controls	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes
Lender-MSA FE	Yes	Yes	Yes
Post-LCR Indicator	Yes	Yes	Yes
R-squared	0.089	0.089	0.089
Number of Observations	622,925	622,925	622,925

p-values in parenthesis

# Originations

	Originations <sub><i>i,l,t</i></sub>		
PostLCR <sub><i>t</i></sub> × NDI <sub><i>t</i></sub>	0.071 (0.000)		
PostLCR <sub><i>t</i></sub> × Sec Rate <sub><i>l,2011</i></sub>		0.080 (0.000)	
PostLCR <sub><i>t</i></sub> × (1 - Dep Ratio <sub><i>l,2011</i></sub> )			0.292 (0.000)
Sample	All	All	Banks
Borrower Controls	Yes	Yes	Yes
Bank Controls	No	No	Yes
Lender-MSA FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R-squared	0.086	0.086	0.081
Number of Observations	2,809,984	2,809,345	622,925

# Robustness

- ▶ Lender-Year-MSA Fixed Effects

$$\text{Denied}_{i,l,t} = \beta \left( M_t^{GNMA} \times \text{NDI}_l \times \text{FHA}_i \right) + \alpha_{m,l,t} + u_{i,l,t},$$

- ▶ Regulatory arbitrage? Focus on 2013-14. Far from Dodd-Frank (2010-11)
- ▶ Net Stable Funding Ratio? Check securitization only for banks



## More robustness

- ▶ Changing pool FHA applicants? No, or getting riskier
- ▶ Changing pool nonbanks applicants? No, or getting riskier
- ▶ Fed purchases? Not skewed towards GNMA

# Measuring LCR induced risk taking

# Blacks and Hispanics proxy for FICO

Outcome:	Denied <sub><i>i,l,t</i></sub>	Denied <sub><i>i,l,t</i></sub>
$\log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right) \times NDI_l$	-0.032 (0.000)	
$\log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right) \times NDI_l \times \text{Minority}_i$	-0.034 (0.000)	
$\log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right) \times \text{Sec Rate}_{l,2011}$		-0.052 (0.000)
$\log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right) \times \text{Sec Rate}_{l,2011} \times \text{Minority}_i$		-0.015 (0.000)
Sample	All	All
Borrower Controls	Yes	Yes
Lender-MSA FE	Yes	Yes
Post-LCR Indicator	Yes	Yes
R-squared	0.108	0.108
Number of Observations	2,809,984	2,809,345

# Loan-to-income

Outcome:	Denied <sub><i>i,l,t</i></sub>	Denied <sub><i>i,l,t</i></sub>
$\log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right) \times NDI_l$	-0.034 (0.000)	
$\log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right) \times NDI_l \times \text{High LTI}_{i,t}$	-0.020 (0.000)	
$\log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right) \times \text{Sec Rate}_{l,2011}$		-0.052 (0.000)
$\log \left( \frac{OAS_t^{FNMA}}{OAS_t^{GNMA}} \right) \times \text{Sec Rate}_{l,2011} \times \text{High LTI}_{i,t}$		-0.014 (0.000)
Sample	All	All
Borrower Controls	Yes	Yes
Lender-MSA FE	Yes	Yes
Post-LCR Indicator	Yes	Yes
R-squared	0.108	0.108
Number of Observations	2,809,984	2,809,345

# Crowding-out of conventional Loans

Outcome:	Denied <sub><i>i,l,t</i></sub>	Denied <sub><i>i,l,t</i></sub>
PostLCR <sub><i>t</i></sub> × NDI <sub><i>t</i></sub>	0.011 (0.000)	
PostLCR <sub><i>t</i></sub> × Sec Rate <sub><i>l,2011</i></sub>		0.016 (0.000)
Sample	All	All
Borrower Controls	Yes	Yes
Lender-MSA FE	Yes	Yes
Post-LCR Indicator	Yes	Yes
R-squared	0.095	0.095
Number of Observations	6,982,398	6,981,516

# Nonbanks market share

## Back-of-the-envelope calculation

- ▶ Without LCR, nonbanks 2015 market share 74.5% of FHA originations, instead of actual 77.1%
- ▶ Nonbank market share grew 9.9pp from 2013 to 2015
- ▶ If no LCR, share 2.6pp less, or 26% less

# Homeownership

	$\Delta\text{Homeownership}_{m,t}$
PostLCR <sub>t</sub> × NDI <sub>m,t</sub>	0.059 (0.000)
MSA FE	Yes
MSA controls	Yes
Post-LCR Indicator	Yes
R-squared	0.050
Number of Observations	258



# Conclusions

- ▶ LCR created regulatory premium
- ▶ General eq'm effects encouraged securitization, nonbank market share in FHA
- ▶ Regulations to prevent runs have increased the credit risk borne by U.S. taxpayers
- ▶ In next recession: hard for FHA to recover losses from nonbanks