How Do Banks Compete in Conforming Residential Mortgage Loan Market? Role of Balance Sheet

Office of the Comptroller of the Currency

January 6, 2024

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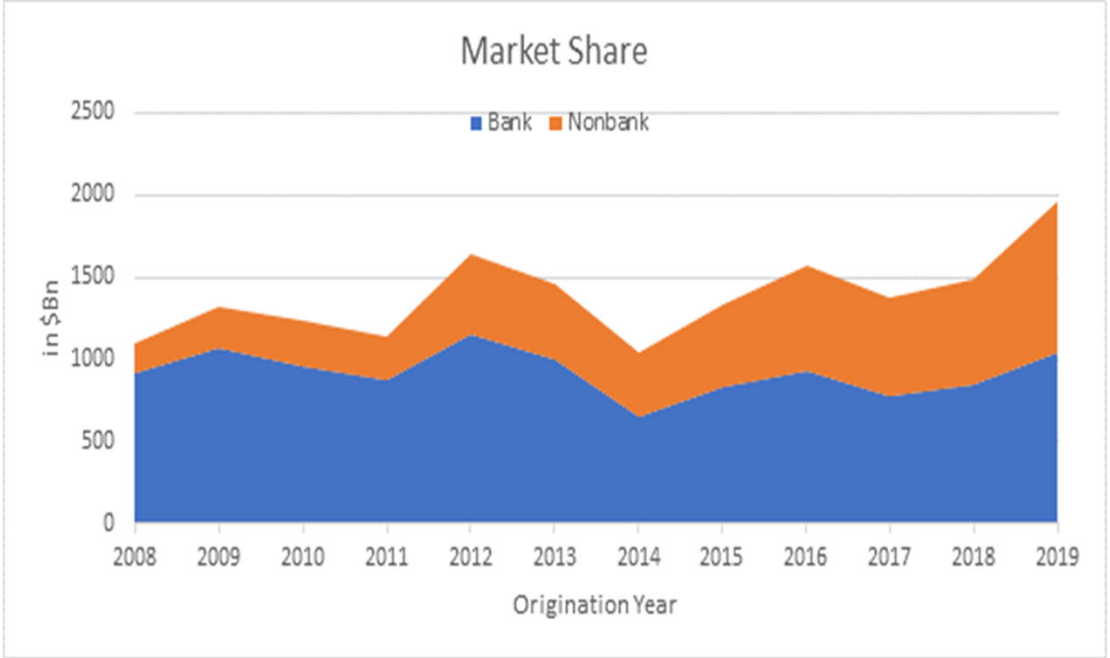
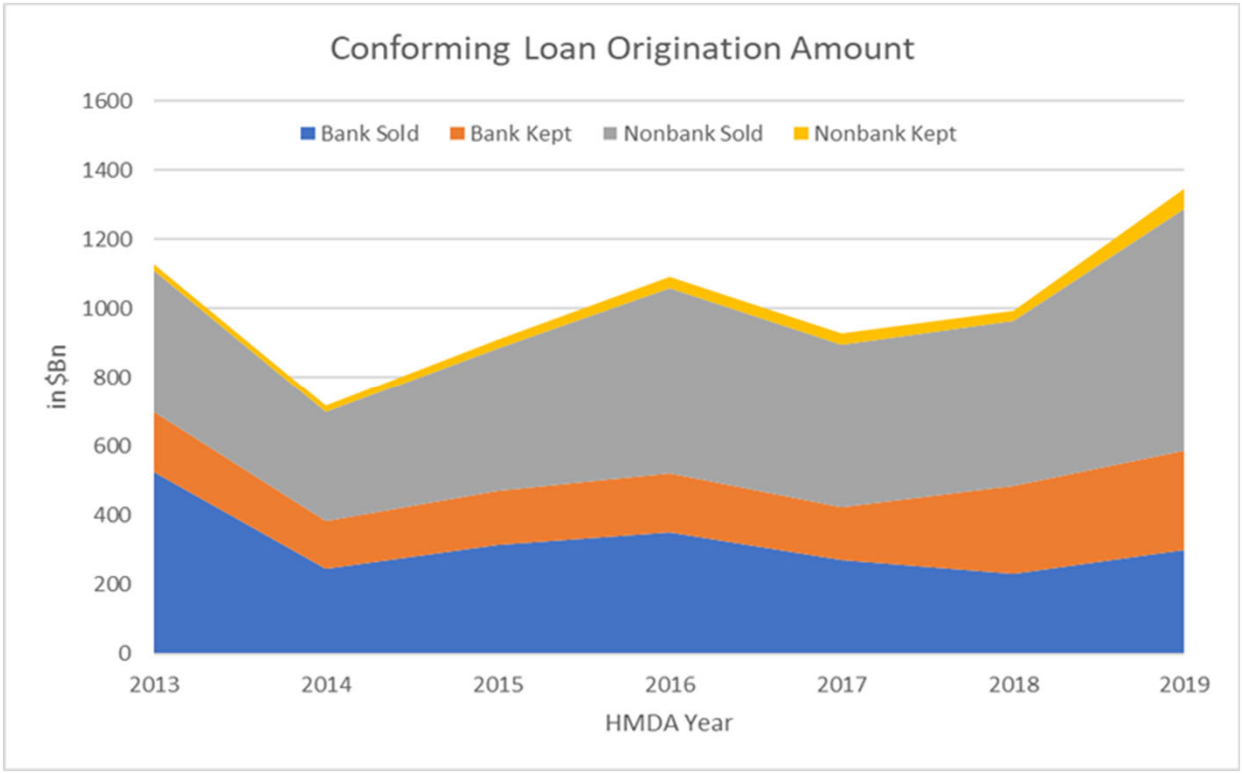
Non-Banks' Share in Conforming Loan Market Has Been Rapidly Rising

- Current literature documented the role of non-banks post 2008
  - Pricing/convenience competitive advantage
    - Regulatory changes post 2008 facing banks and non-banks
    - Technology
- Question: how do banks respond to non-bank competition?

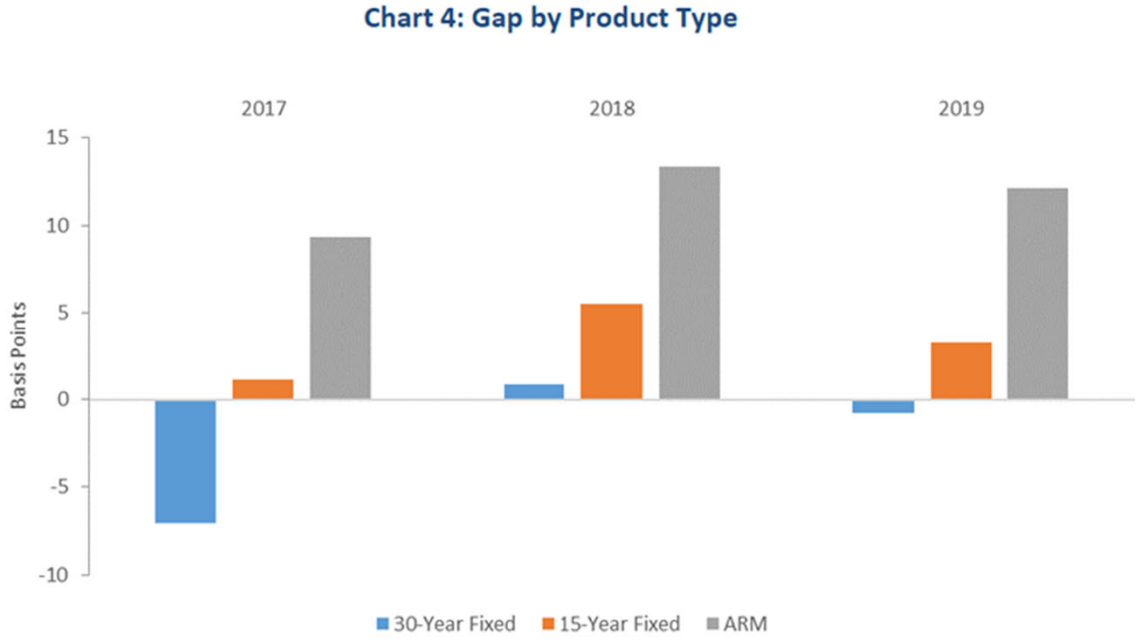


Banks' Retention of Conforming Loans Increased



Data source: HMDA 2013-2019.

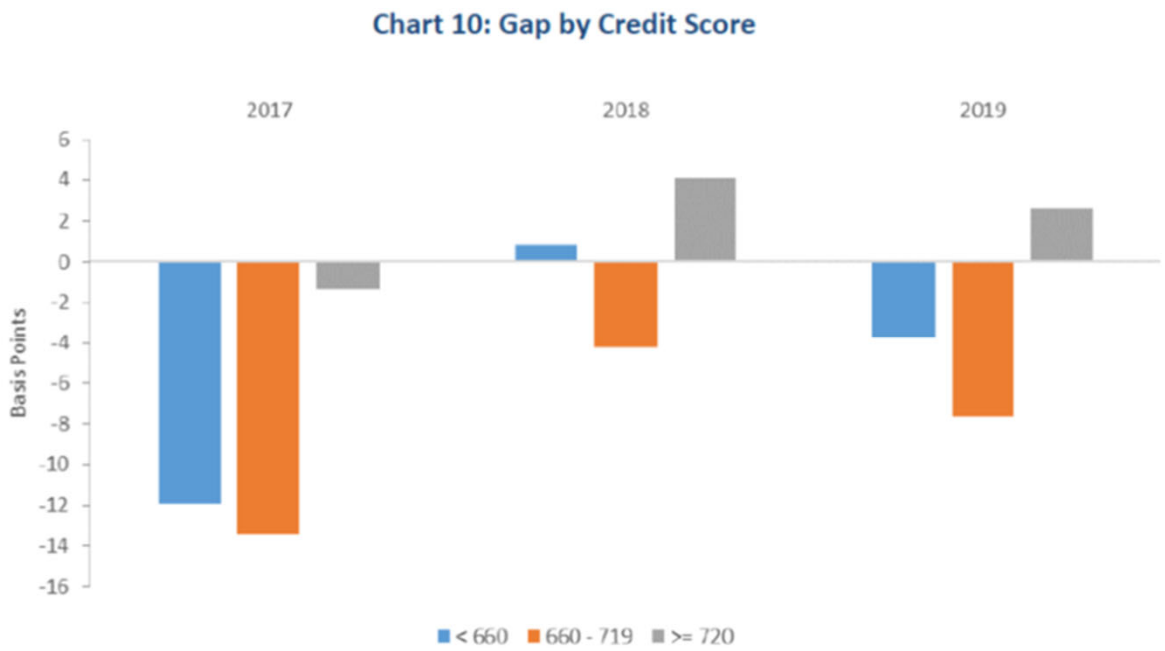
Cross-Subsidization in GSE Pricing – Product type



- ARM post 2013 has high FICO score (avg. 766) and low default rates (24 m 90+DPD rate is 0.05%)
- Bank ARMs have higher FICO and lower default rates than nonBank ARMs

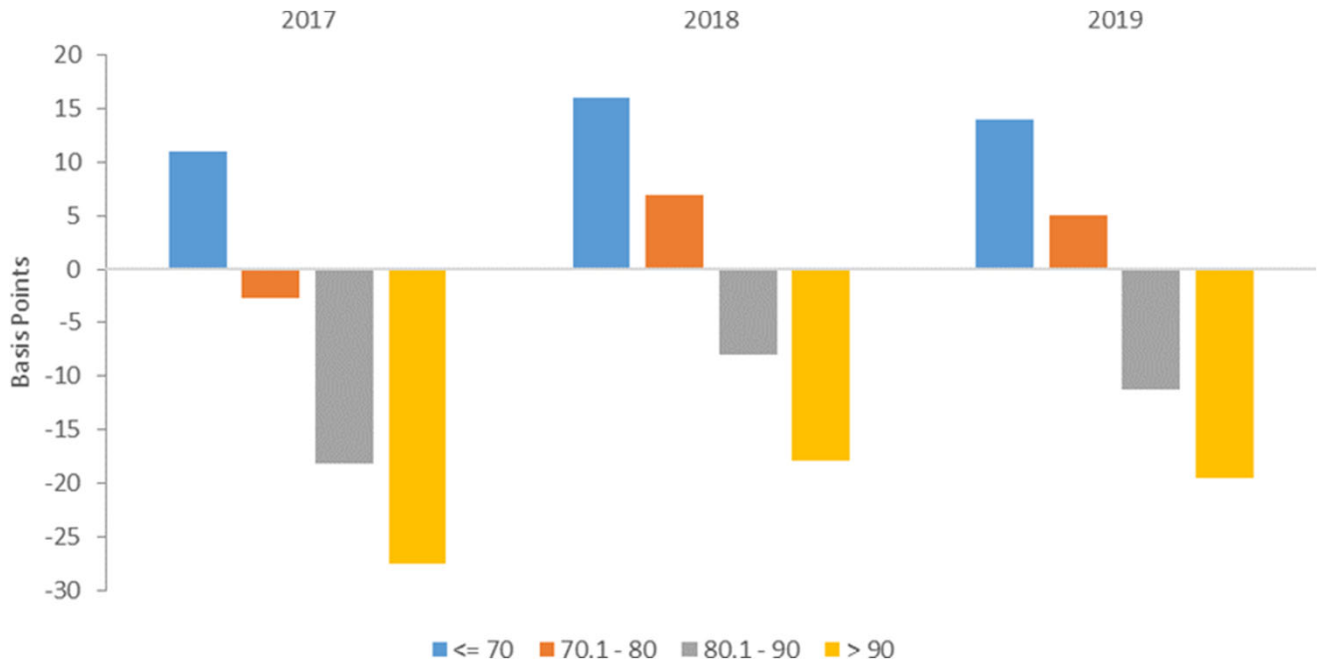
Source: FHFA report. Gap: Revenue to GSE – costs to GSE.
This figure supports an interpretation that ARMs subsidizes fixed rate mortgages in GSE pricing.

Cross-Subsidization in GSE Pricing – Credit score



Source: FHFA report. Gap: Revenue to GSE – costs to GSE.

Cross-Subsidization in GSE Pricing - CLTV



Source: FHFA report. Gap: Revenue to GSE – costs to GSE.

Our questions: How do banks' respond to non-bank competition

- GSEs' cross-subsidy in G-fee structure
- Given the adverse impact on non-interest income from mortgage banking due to non-bank competition, banks can adjust by
  - Holding more (using their balance sheet capacity)
  - Loans where GSE (mission-based) pricing scheme creates opportunities
    - ARMs vs FRMs
    - Loans with higher CS and lower CLTVs
      - Reports by FHFA indicate that G-fees for these loans have a wedge with the costs they pose, to make up for the loss for other loans.

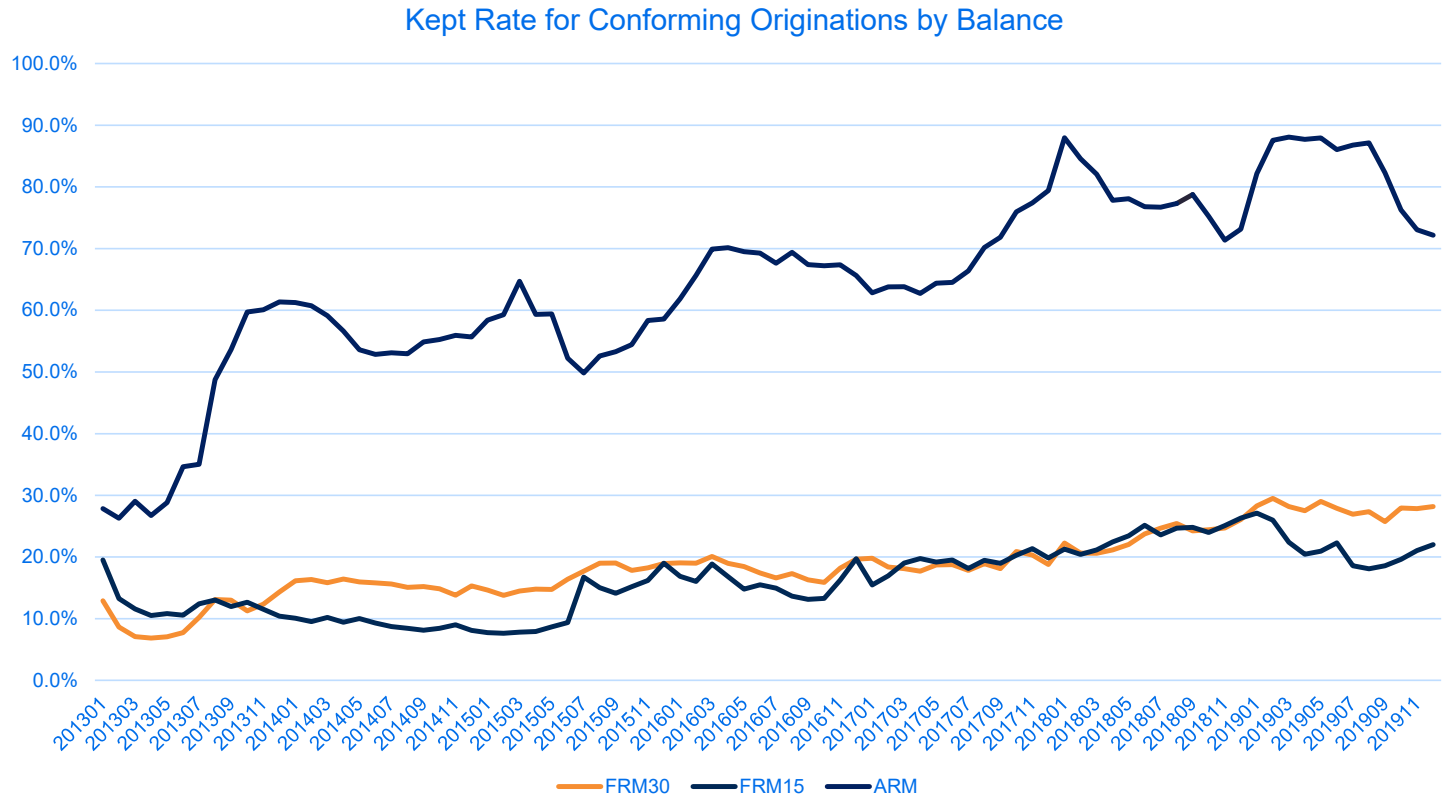
  ⇒ Banks can originate and hold more of such loans

⇒Lack of empirical result in the current literature on banks' response to non-bank competition

Our data

- FRB Y-14 First Lien data
  - Includes all first-lien residential mortgages that are serviced by the largest 19 national banks
  - Covering both the bank-held and GSE loans
  - Updated monthly
  - Contains a rich set of borrower and loan-level variables at origination and for loan performance
  - Sample from 2013 to 2019
- Focuses on conforming mortgages
  - Exclude non-conventional loans, jumbo loans, correspondent loans, purchased loans
  - Exclude loans not eligible for sale to GSE (interest only loans, negative amortization loans, balloon lates, low- or no-doc loans, and loans with prepayment penalties)
  - Exclude loans with servicing right transferred within 24 months of origination, CS<620 or CLTV>97%

Our Sample



We focus on ARM and FRM30 in our study

Loan retention regression

$$Retained = \beta_G group(CS, CLTV) + \beta_X X + \mu_{orig\ year} + \mu_{state} + \mu_{lender} + \varepsilon$$

- Retained" is an indicator variable that takes the value of 1 if a loan is kept on banks' balance sheet over the course of the loan's life, and 0 if the loan is sold to GSE
- Group(CS, CLTV) is nine groups by interacting borrower origination CS bands (<=679, 680-739, >=740), and CLTV bands (<=70%, 70.1-80%, >80%)
- *X* contains other borrower and loan characteristics
  - Including DTI ratio bands, loan purpose (home purchase, rate refinance, cash-out refinance), occupancy (owner occupied, second home, or investment properties), property type (single family, townhouse, condo), loan origination channel (retail, broker, wealth management), and loan origination amount
  - In ARM regression: *X* also include ARMs product type dummies, including ARM2, ARM3, ARM5, ARM7, ARM10, and other ARMs
  - Debt-to-income ratio is missing for a sizable portion of borrowers; we thus create indicator variables for missing DTI and create DTI groups using the 25th, 50th, and 75th percentiles as cut-off points
  - The loan origination amount variable has both large and small values; to help reduce the impact of extreme values, we create group indicator variables by utilizing the 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles as cut offs
- $\mu_{orig\ year}$, μ_{state}, and μ_{lender} are fixed effects for origination year, state, and lender, respectively

Loan retention: 2013-2019

	ARM		FRM30	
	Coef.	Std. Err.	Coef.	Std. Err.
csH_cltvM	0.06***	(0.00)	0.05***	(0.00)
csH_cltvL	0.07***	(0.01)	0.07***	(0.00)
csM_cltvH	-0.02***	(0.00)	0.01***	(0.00)
csM_cltvM	0.03***	(0.01)	0.03***	(0.00)
csM_cltvL	0.02***	(0.01)	0.03***	(0.00)
csL_cltvH	0.02	(0.02)	0.05***	(0.00)
csL_cltvM	0.04***	(0.01)	-0.00**	(0.00)
csL_cltvL	-0.04***	(0.01)	-0.02***	(0.00)
Origination year: 2014	0.07***	(0.02)	0.00	(0.02)
Origination year: 2015	0.05***	(0.02)	0.00	(0.01)
Origination year: 2016	0.10***	(0.01)	0.02*	(0.01)
Origination year: 2017	0.12***	(0.02)	0.04***	(0.01)
Origination year: 2018	0.14***	(0.02)	0.06***	(0.01)
Origination year: 2019	0.13***	(0.02)	0.05***	(0.01)
Intercept	0.49***	(0.04)	0.21***	(0.02)
Observations	198,025		2,368,858	
R-squared	0.577		0.355	

The reference CS/CLTV group is CS>=740 and CLTV>80 %

CS bands (csL <=679, 680-739, >=740),

CLTV bands (<=70%, 70.1-80%, >80%)

Additional investigations

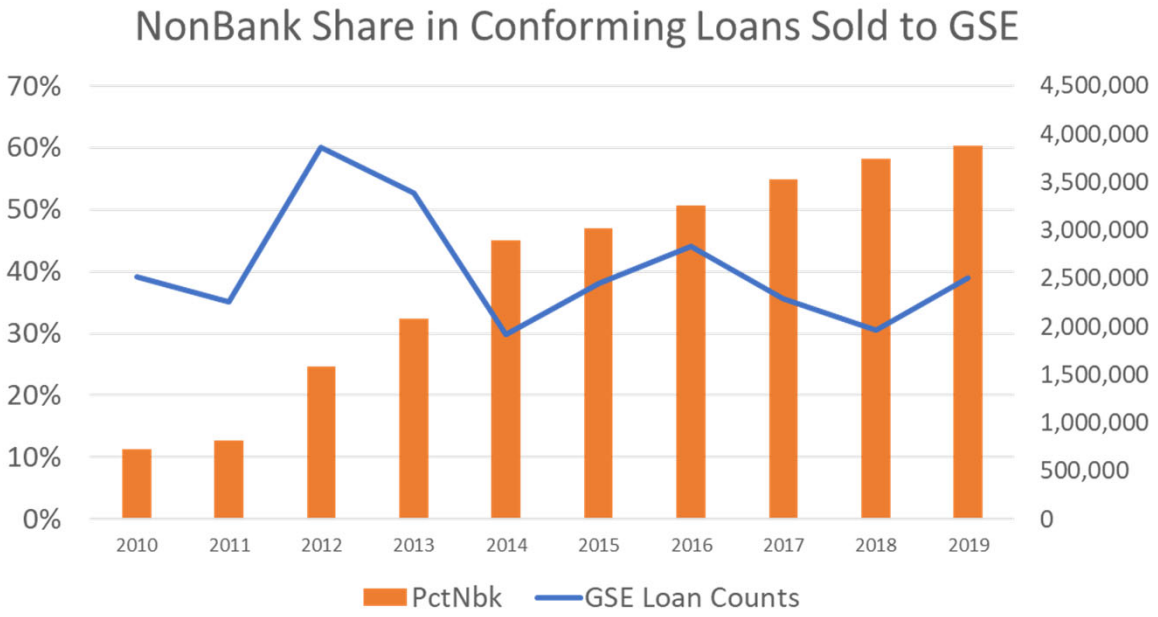
- Loan retention from 2008-2012
  - Based on the Mortgage Metrics data
  - We find banks hold high risk loans in this period
- Impact from non-bank competition in loan retention regression
  - Include among the explanatory variables non-bank share of origination at the national level of previous year
  - Interact this variable with the CS and CLTV buckets
  - This variable can completely absorb
    - Pattern of rising proportion of loans kept on banks' balance sheet over time
    - The positive coefficient of the high credit score and low CLTV buckets

Loan retention regression 2008-2012 – FRM30

	2008-10		2011-12		2012	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
csH_cltvM	-0.04***	(0.00)	-0.04***	(0.01)	-0.03***	(0.01)
csH_cltvL	-0.01	(0.02)	0.00	(0.02)	-0.03**	(0.01)
csM_cltvH	0.06***	(0.01)	0.06***	(0.01)	0.04***	(0.01)
csM_cltvM	-0.03***	(0.00)	-0.04***	(0.01)	-0.03***	(0.01)
csM_cltvL	-0.01	(0.01)	0.00	(0.02)	-0.03***	(0.01)
csL_cltvH	0.26***	(0.02)	0.33***	(0.03)	0.20***	(0.02)
csL_cltvM	0.02***	(0.00)	-0.02***	(0.00)	-0.01**	(0.01)
csL_cltvL	0.00	(0.01)	0.01	(0.02)	-0.02**	(0.01)
Intercept	1.37***	(0.06)	-0.31***	(0.04)	-0.03	(0.03)
Observations	1,016,694		611,206		318,256	
R-squared	0.178		0.15		0.215	

Loan retention regressions for 2013-2019 originations, controlling for nonbank share

- $Retained = \beta_G gr(CS, CLTV) + \beta_n gr(CS, CLTV) * PctNbk_{t-1} + \beta_X X + \mu_{orig\ yr} + \mu_{st} + \mu_{ldr} + \varepsilon$



Previous retention patterns can be explained mostly by non-bank shares

	ARM		FRM30	
	coefficient	Std. Err.	coefficient	Std. Err.
csH_cltvM	-0.00	(0.02)	-0.05***	(0.01)
csH_cltvL	-0.03	(0.02)	-0.06***	(0.02)
csM_cltvH	0.05**	(0.02)	0.05***	(0.01)
csM_cltvM	-0.06***	(0.02)	-0.08***	(0.01)
csM_cltvL	-0.05***	(0.02)	-0.09***	(0.02)
csL_cltvH	0.27***	(0.06)	0.18***	(0.02)
csL_cltvM	0.15***	(0.04)	0	(0.01)
csL_cltvL	0.04	(0.03)	-0.03**	(0.01)
PctNbk*csH_cltvH	0.20***	(0.07)	-0.04	(0.03)
PctNbk*csH_cltvM	0.34***	(0.07)	0.20***	(0.04)
PctNbk*csH_cltvL	0.44***	(0.08)	0.25***	(0.04)
PctNbk*csM_cltvH	0.05	(0.07)	-0.12***	(0.04)
PctNbk*csM_cltvM	0.41***	(0.08)	0.20***	(0.03)
PctNbk*csM_cltvL	0.37***	(0.07)	0.23***	(0.03)
PctNbk*csL_cltvH	-0.39***	(0.14)	-0.30***	(0.06)
PctNbk*csL_cltvM	-0.07	(0.09)	-0.05**	(0.02)
PctNbk*csL_cltvL	0.00	(0.00)	0.00	(0.00)
Origination year: 2014	0.04**	(0.02)	-0.01	(0.02)
Origination year: 2015	-0.02	(0.02)	-0.03	(0.02)
Origination year: 2016	0.02	(0.02)	-0.01	(0.01)
Origination year: 2017	0.03	(0.02)	0.01	(0.02)
Origination year: 2018	0.03	(0.02)	0.02	(0.02)
Origination year: 2019	0.01	(0.03)	0.01	(0.02)

Interest rate regressions for 2013-2019 Origination

$$Interest\ Rate = Retained + \beta_G group(CS, CLTV) + \beta_X X + \mu_{orig\ year-month} + \mu_{state} + \mu_{lender} + \varepsilon$$

Dep Var: rate (in bps)	ARM		FRM30	
	coefficient	Std. Err.	coefficient	Std. Err.
Retained	-0.12***	(0.01)	-0.10***	(0.01)
csH_cltvM	-0.08***	(0.00)	-0.07***	(0.00)
csH_cltvL	-0.18***	(0.01)	-0.17***	(0.00)
csM_cltvH	0.10***	(0.01)	0.13***	(0.00)
csM_cltvM	0.07***	(0.01)	0.10***	(0.00)
csM_cltvL	-0.08***	(0.01)	-0.09***	(0.00)
csL_cltvH	0.44***	(0.04)	0.37***	(0.02)
csL_cltvM	0.32***	(0.01)	0.46***	(0.01)
csL_cltvL	0.08***	(0.01)	0.08***	(0.01)
Intercept	3.20***	(0.09)	3.69***	(0.16)
Observations	200,191		2,440,355	
R-squared	0.613		0.569	

Findings

- Banks have a higher propensity to keep low risk conforming loans
  - The G-fees on these loans are high relative to their credit risk
- Banks have become increasingly inclined in keeping such loans during the period 2013-2019
  - A loan retention pattern different from that before 2013
  - The rising non-bank competition seems to be a primary reason behind banks' increasing holding of low risk conforming mortgages on their balance sheet
- Banks charge lower interest rates on conforming mortgages retained on their balance sheet relative to those sold to the GSEs

Appendix: Summary statistics of Loan retention sample

	ARM		FRM30	
	Sold	Kept	Sold	Kept
Interest rate (in %)	3.32	3.38	4.22	4.04
Origination loan amount (in $1,000)	285	413	233	344
Credit score at origination	766	767	752	763
CLTV at origination	0.66	0.65	0.75	0.70
DTI at origination (in %)	32.39	32.60	34.33	33.22
Purpose:				
Purchase	0.46	0.45	0.57	0.54
Rate or term refi	0.25	0.32	0.18	0.21
Cash-out refi	0.26	0.20	0.24	0.22
ARM3	0.00	0.01		
ARM5	0.30	0.20		
ARM7	0.48	0.46		
ARM10	0.20	0.29		
ARM Other	0.02	0.04		
Occupied:				
By owner	0.85	0.84	0.87	0.86
2nd home	0.09	0.09	0.05	0.06
Investment property	0.06	0.08	0.08	0.08
Loan source				
Retail	0.98	0.79	0.94	0.82
Broker	0.02	0.07	0.05	0.02
Wealth management	0.00	0.14	0.01	0.11
Property:				
Single family	0.78	0.66	0.82	0.76
Townhouse	0.03	0.06	0.05	0.02
Condo	0.18	0.26	0.11	0.18
Observations	103,275	98,096	2,104,680	348,601
DPD60+ (24m)	0.07%	0.05%	0.28%	0.16%
DPD90+ (24m)	0.05%	0.03%	0.19%	0.11%
Prepaid (24m)	20.57%	19.22%	12.17%	12.82%
Observations	84,500	61,930	1,386,489	203,796