

The Impact of Risk Retention Regulation on the Underwriting of Securitized Mortgages

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September 2018

Northwestern | Kellogg



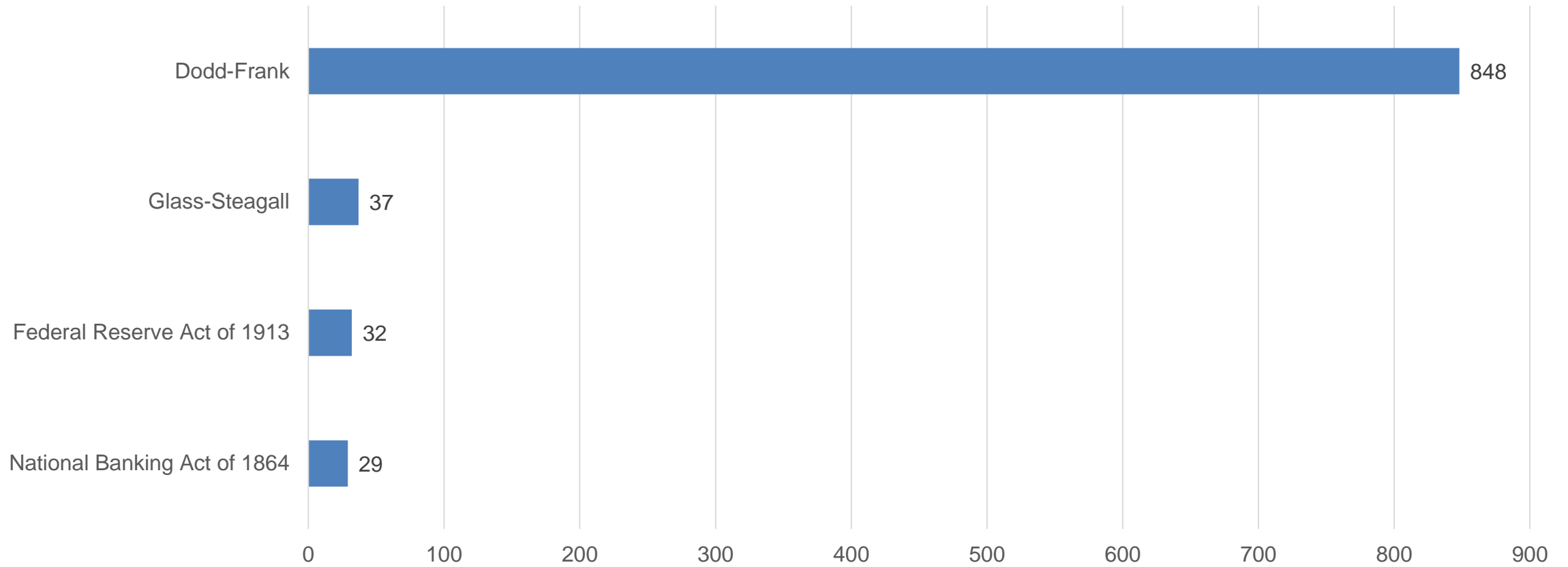
Motivation

- “To promote the financial stability of the United States by improving accountability and transparency in the financial system, to end “too big to fail”, to protect the American taxpayer by ending bailouts, to protect consumers from abusive financial services practices, and for other purposes.”

Dodd-Frank Wall Street Reform and Consumer Protection Act, July 2010

Motivation

Pages in Legislation



Motivation

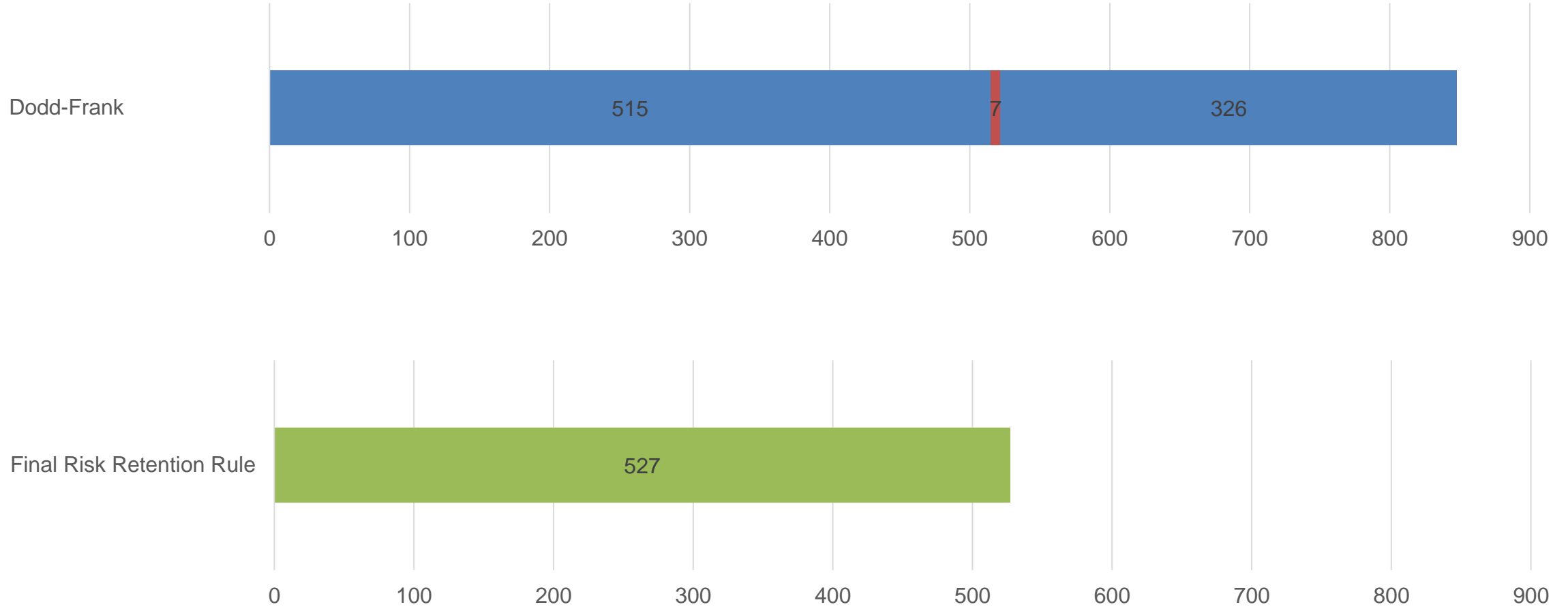
- “Laws classically provide people with rules. Dodd-Frank is not directed at people. It is an outline directed at bureaucrats and it instructs them to make still more regulations and to create more bureaucracies.”
Jonathan Macey, Yale Law School as quoted in the Economist. February 2012.

Motivation

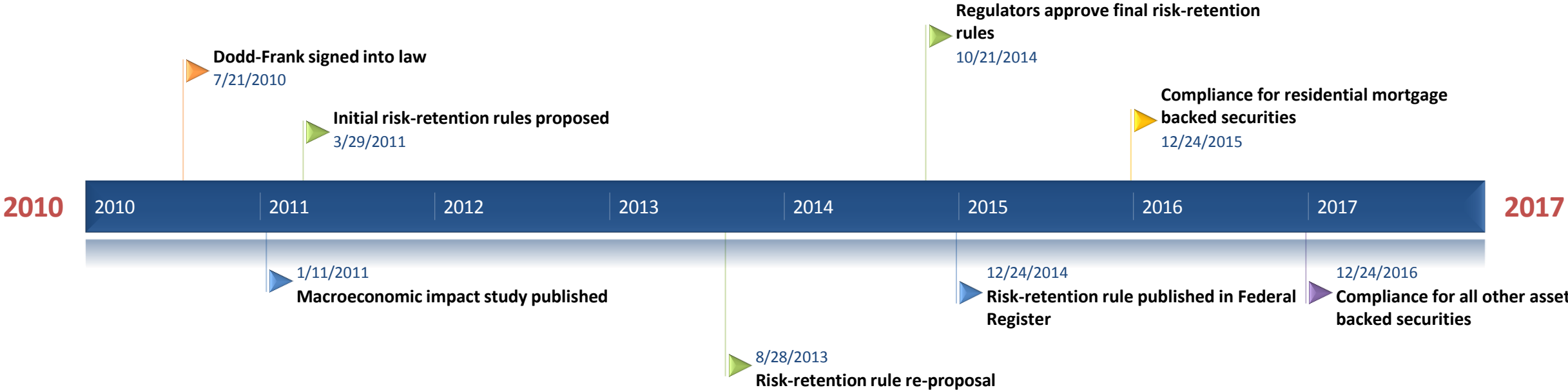
- “Collapsing mortgage-lending standards and the mortgage securitization pipeline lit and spread the flame of contagion and crisis.”

Financial Crisis Inquiry Commission Report on the Causes of the Financial Crisis 2011

Motivation



Risk retention timeline



Motivation

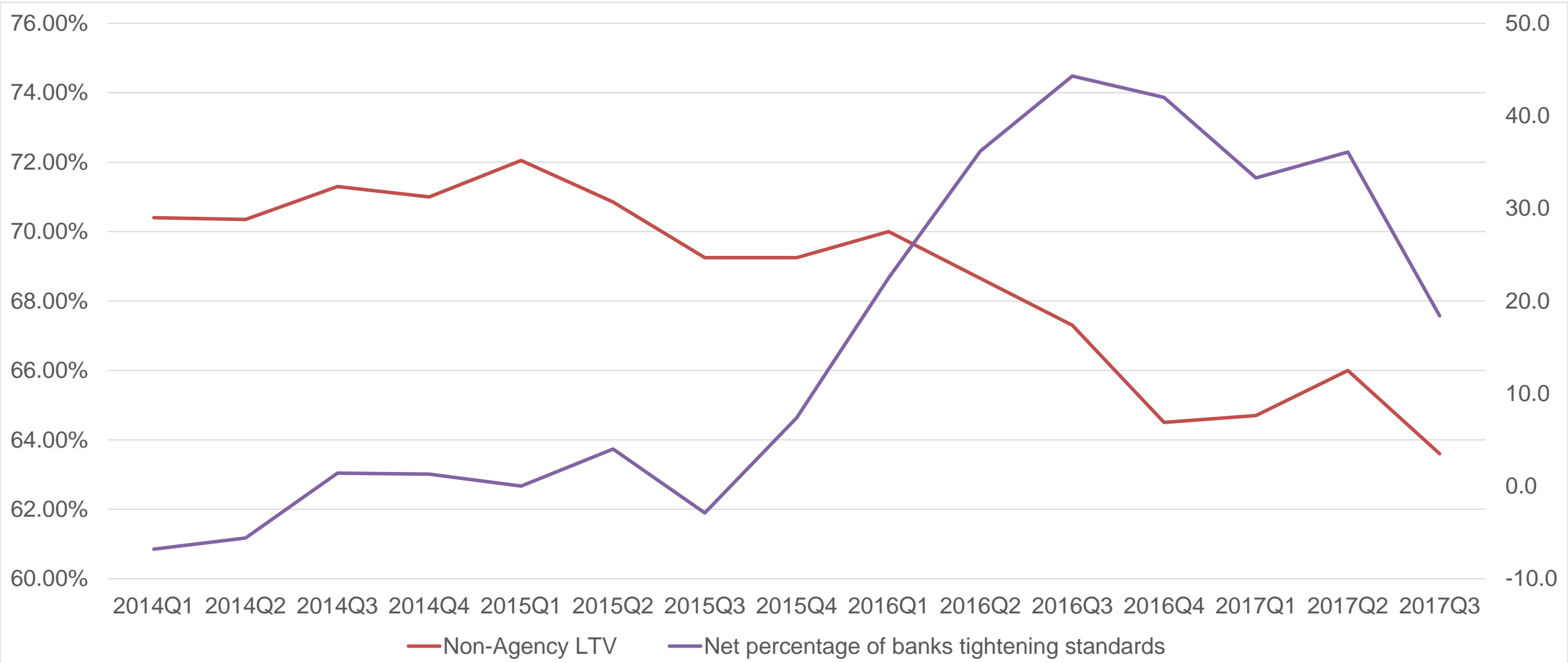
- “Dodd-Frank ... prescribe(s) regulations that (i) require a securitizer to retain not less than 5 percent of the credit risk of any asset that the securitizer, through the issuance of an asset-backed security (ABS), transfers, sells, or conveys to a third party, and (ii) prohibit(s) a securitizer from directly or indirectly hedging or otherwise transferring the credit risk that the securitizer is required to retain”
- “By requiring that a securitizer retain a portion of the credit risk of the securitized assets, the requirements ... provide securitizers an incentive to monitor and ensure the quality of the securitized assets underlying a securitization transaction, and, thus, help align the interests of the securitizer with the interests of the investors.”

12 CFR Part 43 2014

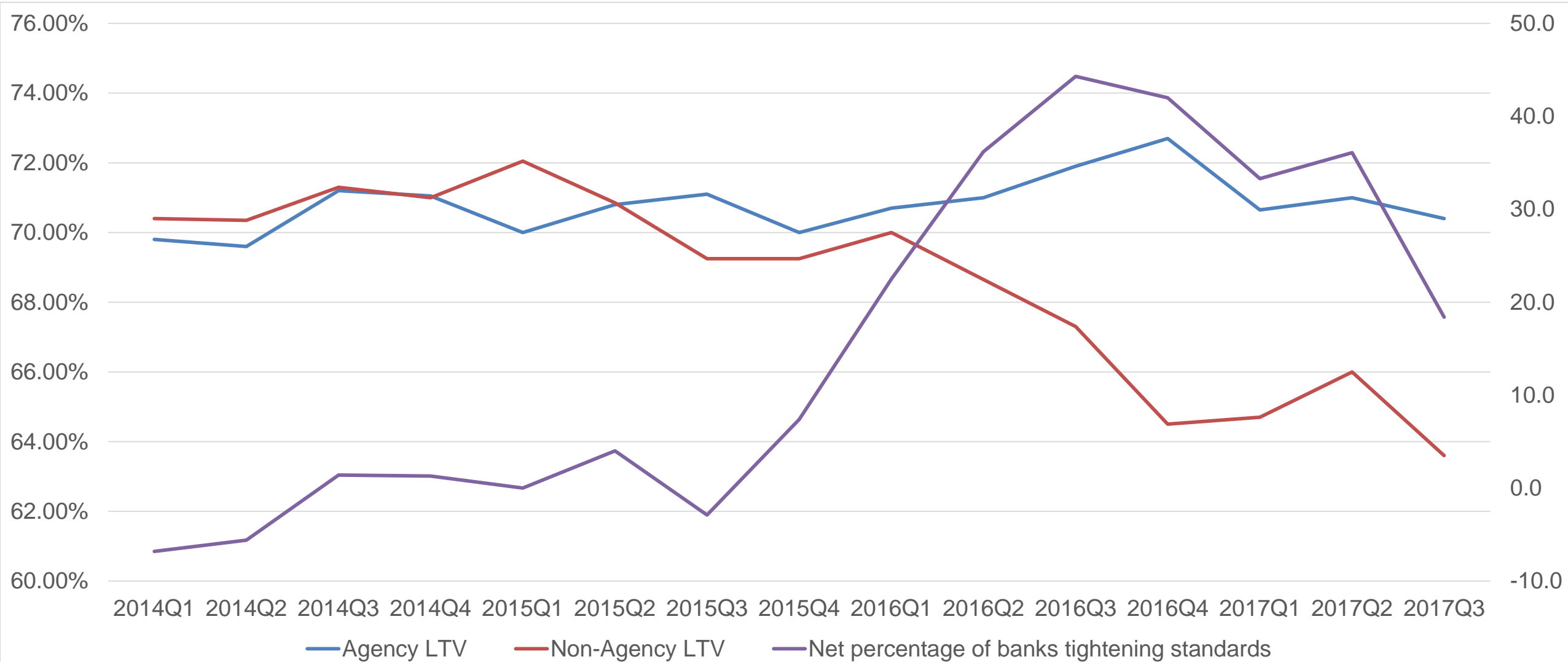
Research questions

- Did the implementation of risk-retention requirements impact the underwriting of securitized commercial mortgages?
- Were requirements binding?
- Are loans now safer?

Suggestive evidence



Suggestive evidence



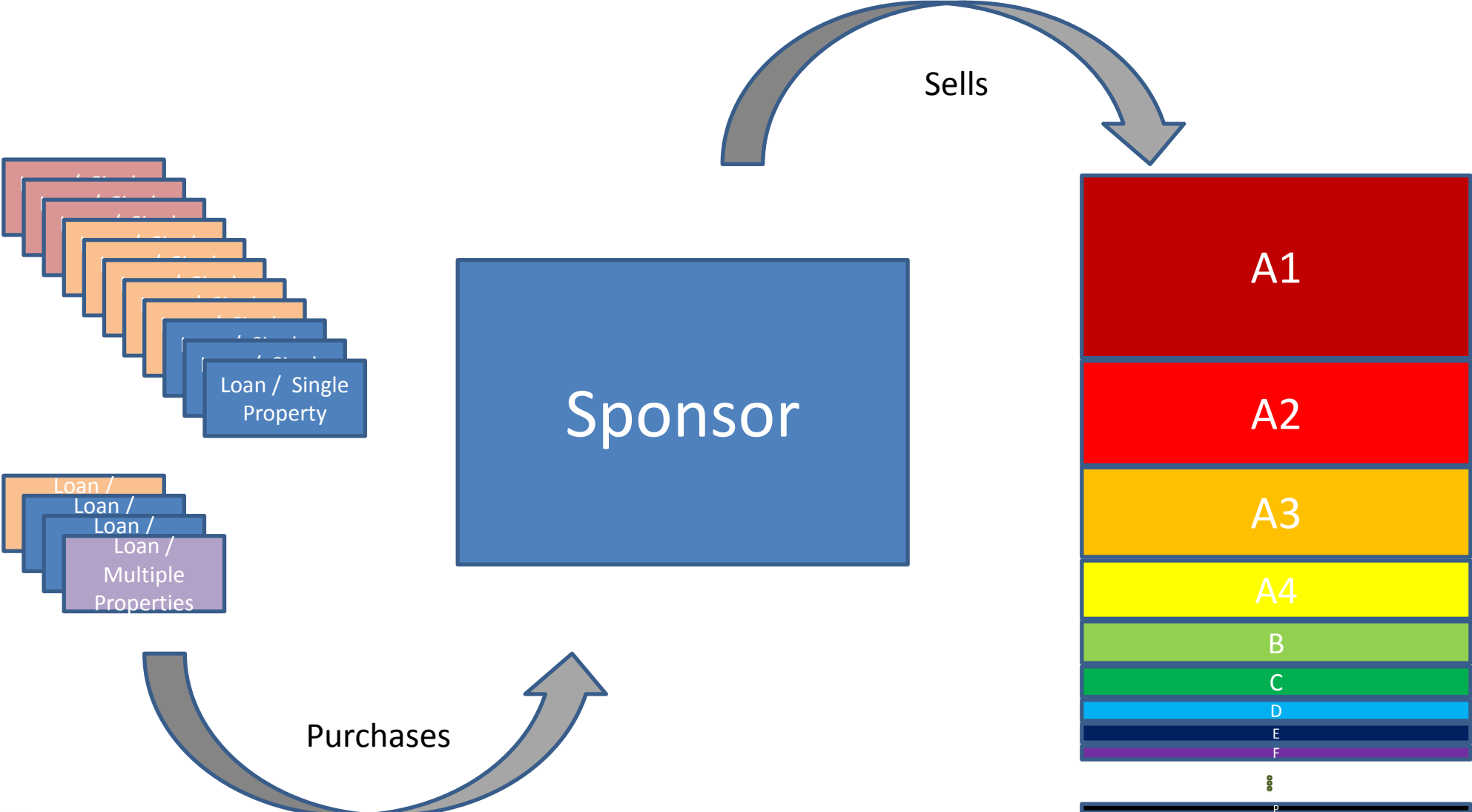
Preview of findings

- Commercial mortgages securitized after risk-retention rules were implemented had
 - Higher interest rates
 - Lower loan-to-value (LTV) ratios
 - Higher debt service coverage (DSCR) ratios
- Risk-retention requirements were binding
 - Retention levels have tripled
 - Securitizers rushed before the implementation date
- Loans appear safer
 - Controlling for observable characteristics of each loan, mortgages subject to risk-retention have become non-performing less often.

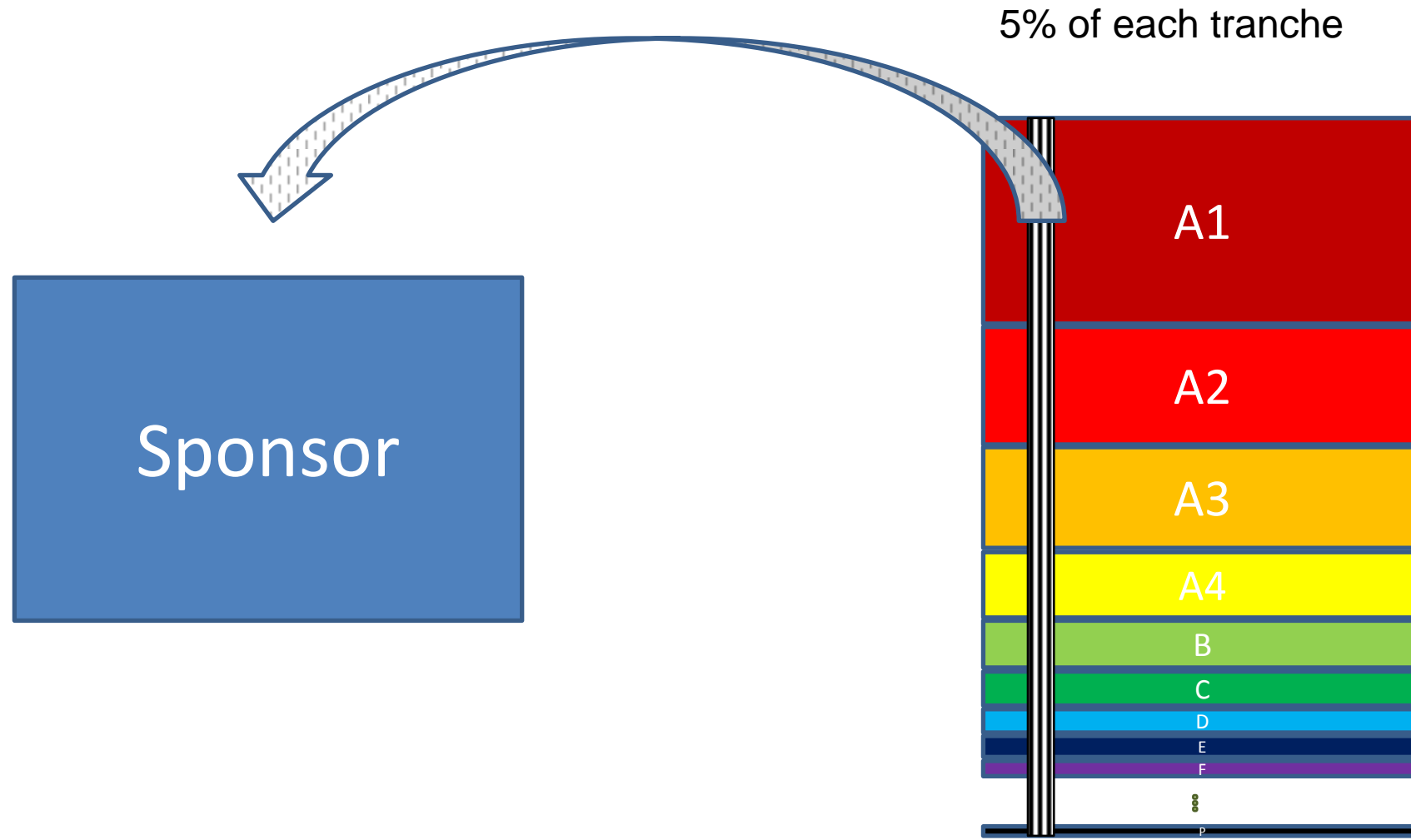
Outline

- Risk retention
- Data
- Evidence regarding underwriting changes
- Evidence on securitization changes
- Evidence on performance

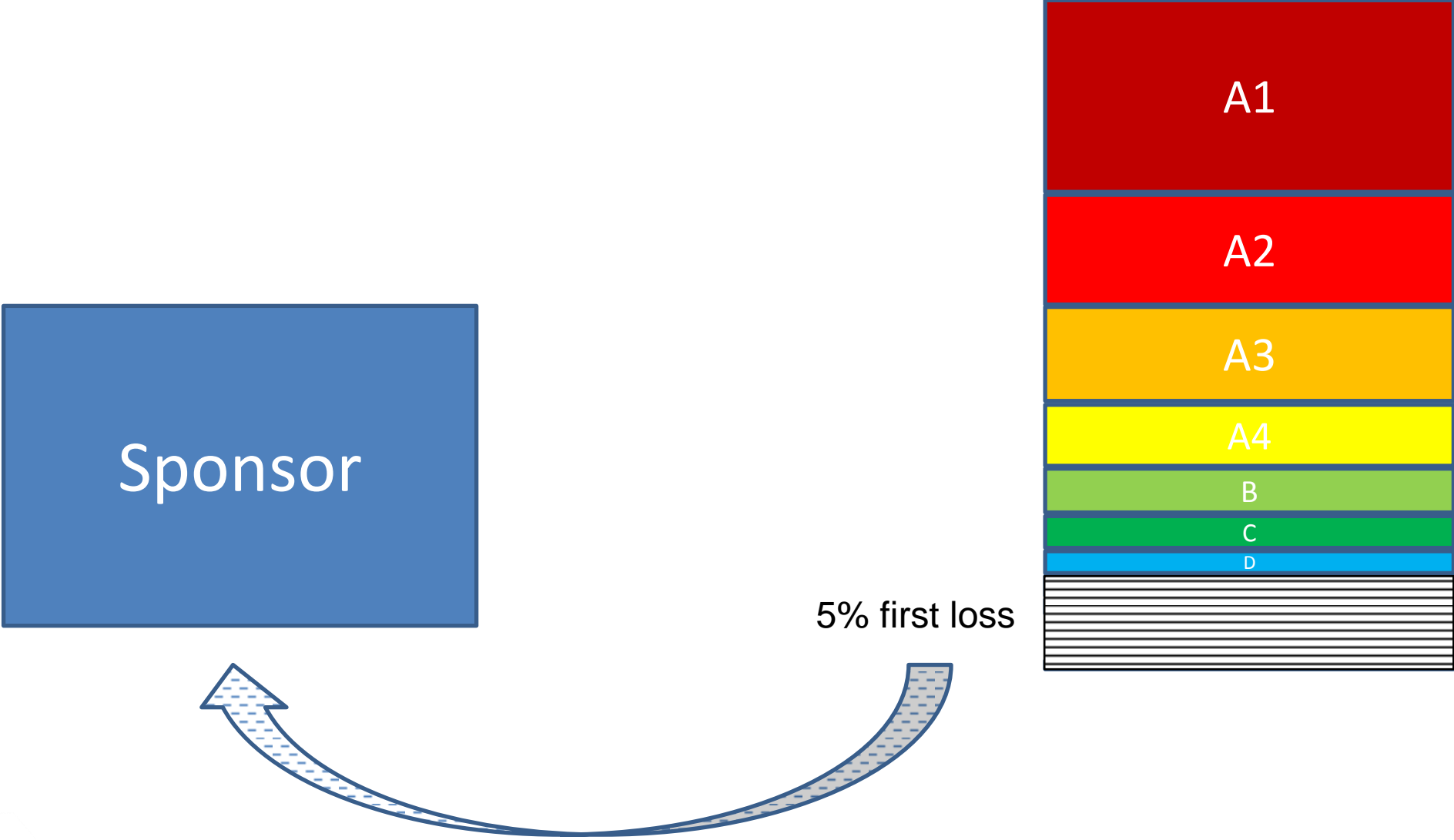
Commercial Mortgage Backed Securities (CMBS)



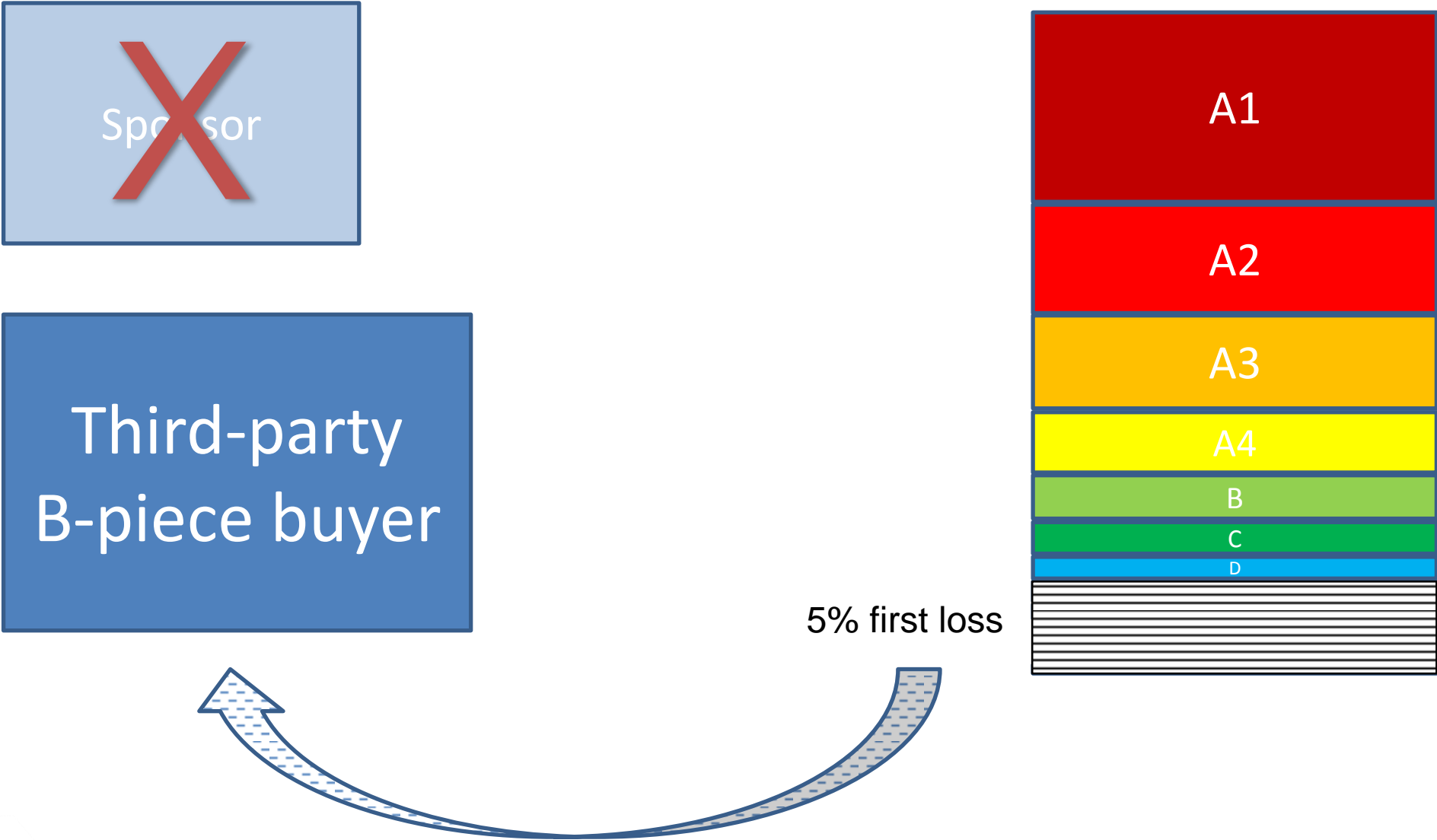
Vertical (V) risk-retention



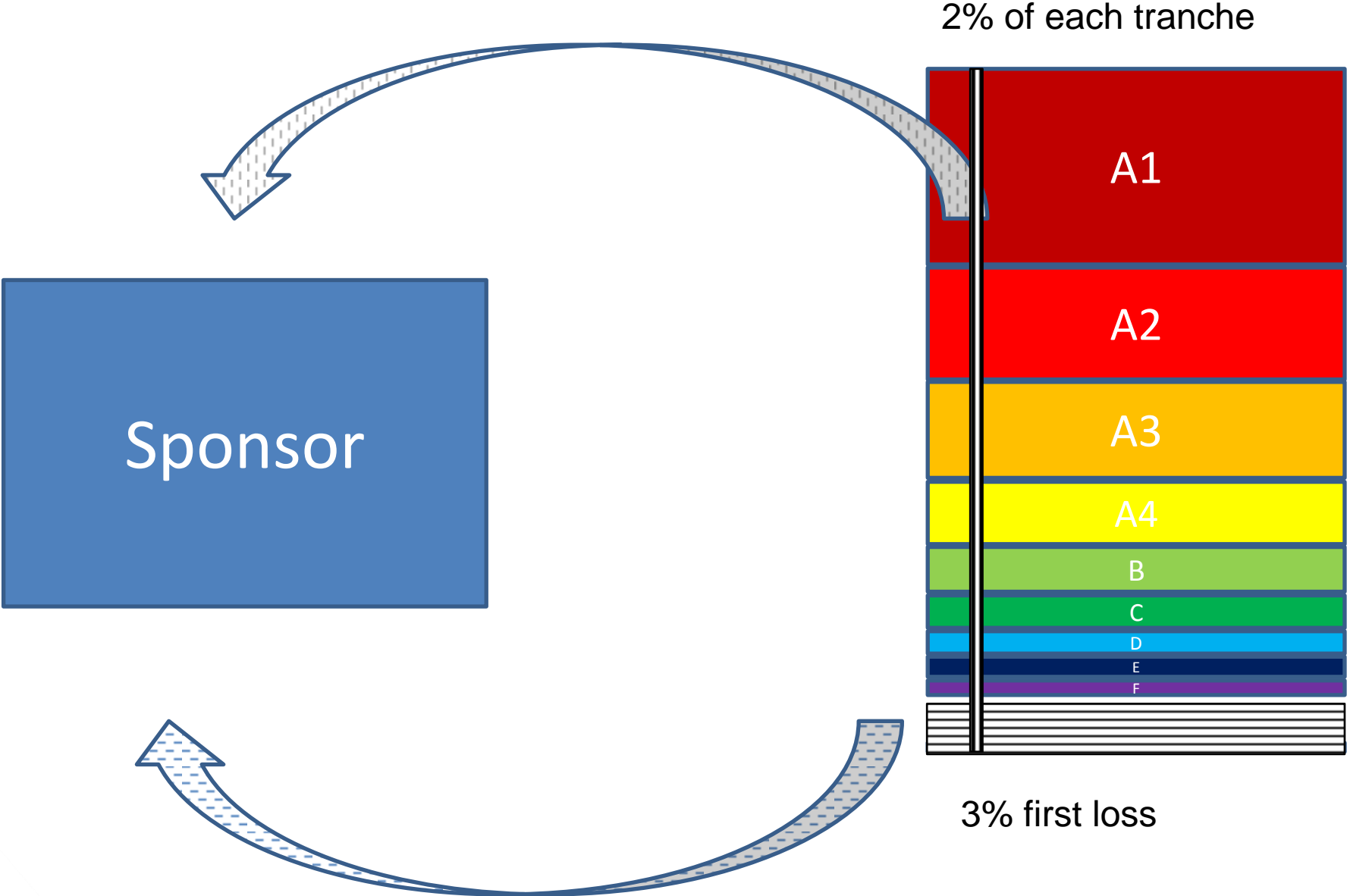
Horizontal (H) risk-retention



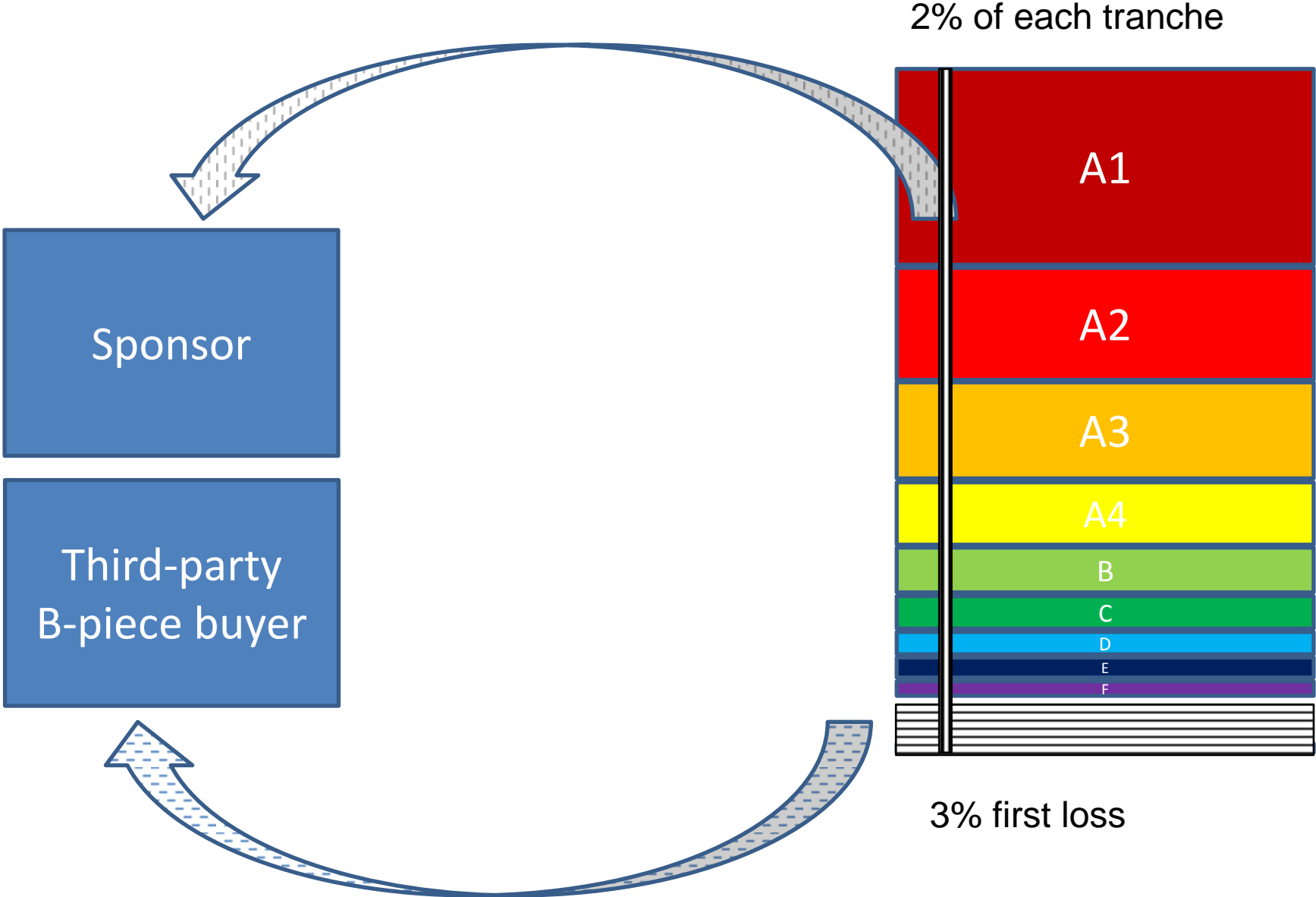
CMBS Horizontal (H) risk-retention



L-shaped (L) risk-retention



CMBS L-shaped (L) risk-retention



Risk retention exemptions

- Government sponsored enterprises
 - Full guarantee (for timely principal and interest) by the Enterprises while they operate under the conservatorship or receivership of FHFA with capital support from the United States (satisfies) the risk retention requirements.
- Qualifying Commercial Real Estate loans
 - Minimum DSCR
 - Fixed rate
 - Maximum amortization
 - Minimum term
 - Maximum LTV/CLTV

Data

- Complete set of multi-borrower Commercial Mortgage Backed Securities that settled between January 1, 2014 and March 31, 2018.
 - 844 Agency
 - 301 Non-agency
- Prospectus supplements
 - Size, originator, interest rate, LTV, DSCR, collateral location and type, amortization, etc.

Data

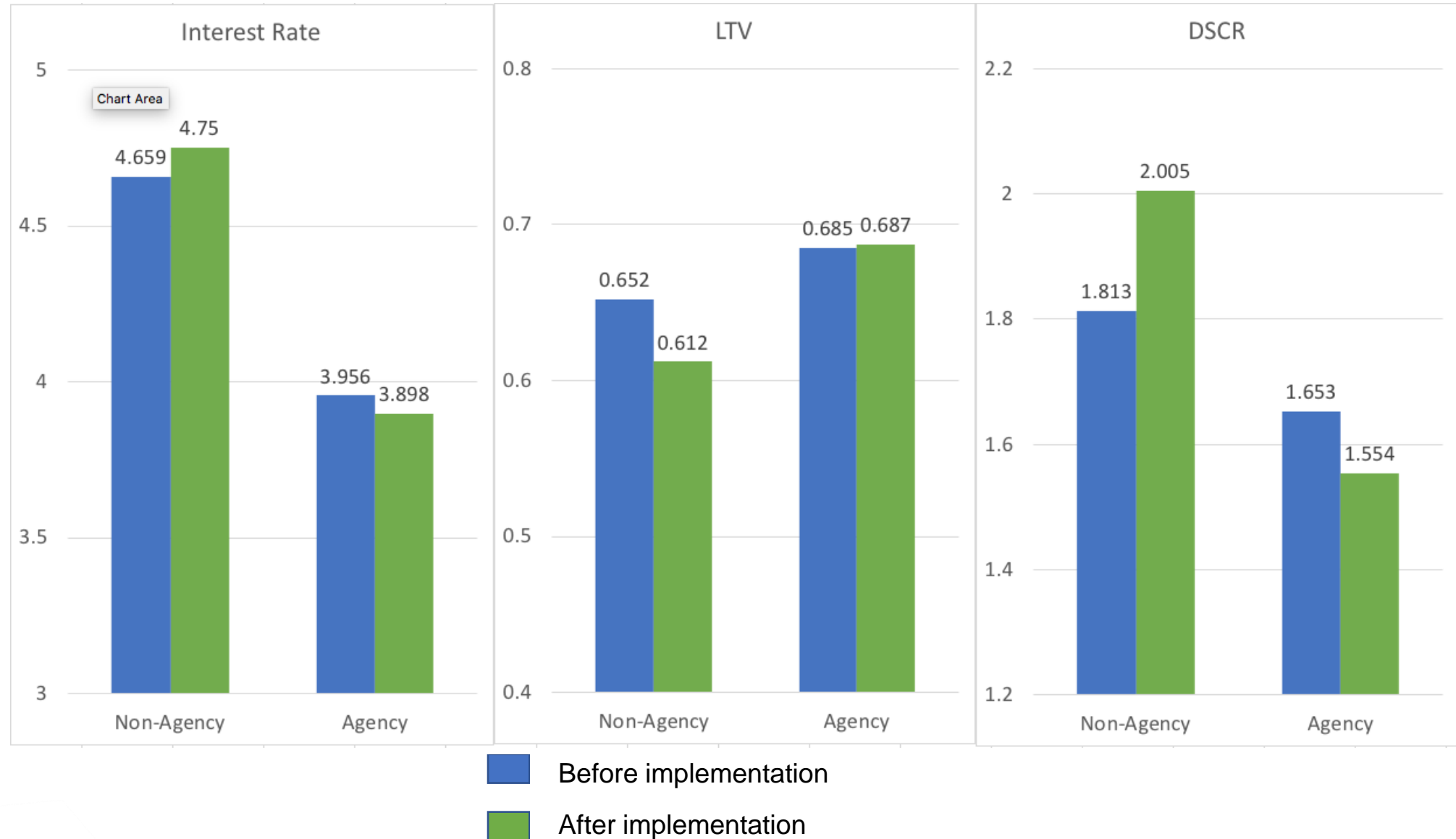
- Dropped loan observations where ...
 - Interest rate not observable
 - Loans secured by multiple properties
 - Loans secured by properties outside of the United States
 - More than 18 months between origination and securitization
- Final sample of 62,155 loans
 - 49,319 Agency
 - 12,836 Non-agency

Summary statistics

TABLE 1: SUMMARY STATISTICS ON THE COMPLETE LOAN SAMPLE

	10th percentile	Median	90th percentile	Mean	SD	Count
Panel A: Full Sample						
<i>Agency Loans</i>						
Loan Size (in millions)	1.192	6.59	27.942	11.714	15.384	49319
Interest rate	3.18	3.91	4.73	3.936	0.631	49319
LTV	0.554	0.706	0.793	0.686	0.102	24857
DSCR	1.275	1.46	2.145	1.614	0.472	24457
<i>Non-Agency Loans</i>						
Loan Size (in millions)	2.513	8.35	50	30.296	107.637	12836
Interest rate	4.077	4.655	5.32	4.681	0.538	12836
LTV	0.513	0.668	0.746	0.643	0.103	12314
DSCR	1.37	1.68	2.48	1.855	0.611	12206
<i>All Loans</i>						
Loan Size (in millions)	1.351	7	30.253	15.552	51.35	62155
Interest rate	3.25	4.074	4.94	4.09	0.683	62155
LTV	0.542	0.695	0.783	0.672	0.104	37171
DSCR	1.29	1.53	2.274	1.694	0.535	36663

Summary statistics

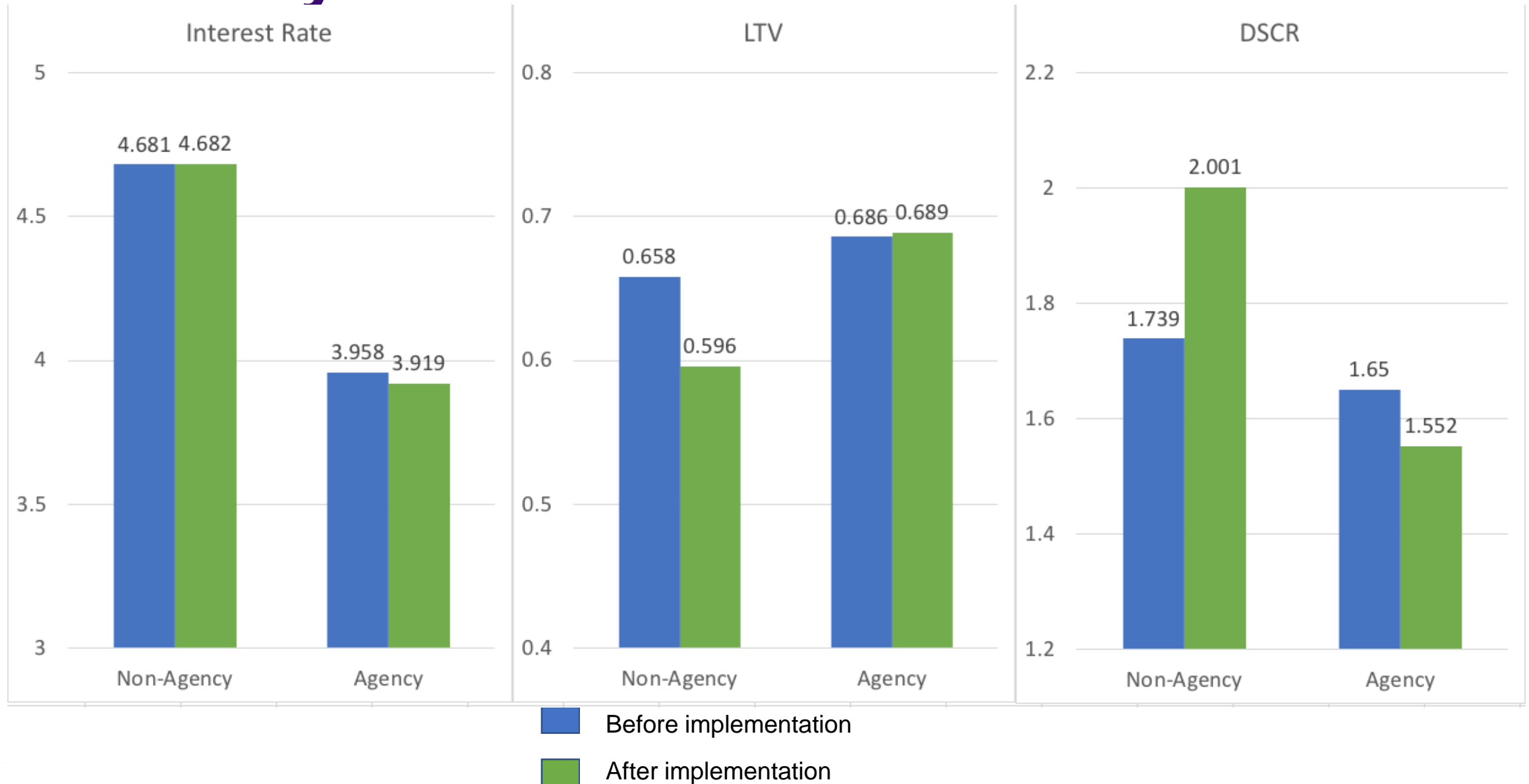


Summary statistics

TABLE 3: SUMMARY STATISTICS ON THE MULTIFAMILY LOAN SAMPLE

	10th percentile	Median	90th percentile	Mean	SD	Count
Panel A: Full Sample						
<i>Agency Loans</i>						
Loan Size (in millions)	1.2	6.625	29.35	12.129	15.997	43079
Interest rate	3.15	3.93	4.75	3.944	0.646	43079
LTV	0.556	0.708	0.793	0.687	0.102	23880
DSCR	1.273	1.457	2.144	1.611	0.472	23485
<i>Non-Agency Loans</i>						
Loan Size (in millions)	1.5	6.225	24.25	11.203	17.702	2661
Interest rate	3.949	4.64	5.5	4.681	0.616	2661
LTV	0.482	0.696	0.75	0.648	0.139	2199
DSCR	1.31	1.55	2.32	1.779	0.77	2185
<i>All Loans</i>						
Loan Size (in millions)	1.225	6.599	28.978	12.076	16.102	45740
Interest rate	3.18	3.96	4.81	3.987	0.667	45740
LTV	0.55	0.706	0.792	0.684	0.106	26079
DSCR	1.276	1.463	2.165	1.625	0.507	25670

Summary statistics



Empirical specification

Control
variables

Indicates Loan in Deal Settling
After December 24, 2016

$$y_{idt} = \alpha + X'_{idt} \cdot \gamma + \beta_1 \cdot NonA_{id} + \beta_2 \cdot Post_d + \beta_3 \cdot NonA_{id} \times Post_d + \varepsilon_{idt}$$

Interest rate
LTV
DSCR

Indicates Loan in
Non-Agency Deal

Difference in
difference

Evidence regarding underwriting changes

TABLE 4: RISK RETENTION DIFFERENCE IN DIFFERENCE SPECIFICATIONS (ALL LOANS)

VARIABLES	Interest rate	Interest rate	Interest rate	Interest rate	LTV	DSCR
Non-Agency Loan	0.703*** (0.0303)	0.676*** (0.0219)	0.131 (0.208)	0.383* (0.200)	0.207*** (0.0272)	-1.428*** (0.182)
Deal Settled After 24Dec2016	-0.0581 (0.0376)	-0.0324 (0.0384)	-0.00944 (0.0353)	0.231*** (0.0317)	-0.00766 (0.00499)	-0.0865*** (0.0288)
Non-Agency x Deal Settled After 24Dec2016	0.149*** (0.0465)	0.267*** (0.0480)	0.294*** (0.0397)	0.373*** (0.0351)	-0.0307*** (0.00442)	0.232*** (0.0287)
Observations	62,155	62,155	62,155	62,155	37,922	37,424
R-squared	0.197	0.250	0.393	0.435	0.275	0.193

Robust standard errors (clustered by both origination month and originator) in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Column 2 adds interest rate controls. Column 3 adds loan size and amortization controls as well as fixed effects for Originator, Property Type, and Location. Columns 4-6 also include fixed effects for month of origination.

Implicit Assumptions

- Originator knows whether or not the loan being made will be securitized in an Agency or Non-Agency deal.
- Originator knows whether or not the loan being made will be securitized before or after December 24, 2016.

Implicit Assumptions

- Originator knows whether or not the loan being made will be securitized in an Agency or Non-Agency deal.

	Non-Agency Loans	Agency Loans
Health Care	0	5521
Full Service Hotels	616	0
Limited Service Hotels	1115	0
Industrial	580	0
Mixed Use	672	15
Mobile Home Parks	446	699
Multifamily Housing	2662	43084
Office	2084	0
Other	116	0
Anchored Retail	2312	0
Unanchored Retail	1453	0
Self Storage	858	0
Warehouse	14	0
Total	12928	49324

Implicit Assumptions

- Originator knows whether or not the loan being made will be securitized in an Agency or Non-Agency deal.

Originator	Agency	Non-Agency	Total
Arbor	1,396	1	1,397
Bank of America, NA	29	634	663
Berkadia Commercial..	2,429	0	2,429
Berkeley Point Capi..	1,048	0	1,048
CBRE Capital Markets	3,349	0	3,349
CCRE	0	712	712
Capital One Multifa..	857	0	857
Citigroup Inc.	97	634	731
Goldman Sachs	0	515	515
Grandbridge Real Es..	573	0	573
Greystone Servicing..	1,417	1	1,418
Holliday Fenoglio F..	1,174	0	1,174
Hunt Mortgage	500	10	510
JPMorgan Chase & Co.	18	548	566
KeyBank NA	1,342	248	1,590
Ladder Capital Fina..	0	558	558
Morgan Stanley Mort..	0	509	509
NorthMarq Capital	1,074	0	1,074
PNC	545	0	545
Red Mortgage Capita..	2,062	0	2,062
Rialto Mortgage Fin..	0	616	616
Starwood Property M..	0	545	545
Walker & Dunlop	2,213	29	2,242
Wells Fargo Bank, NA	1,164	1,148	2,312

Implicit Assumptions

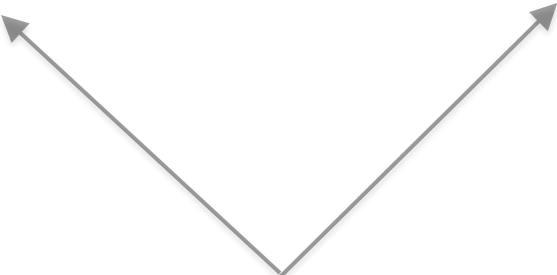
- Originator knows whether or not the loan being made will be securitized in an Agency or Non-Agency deal.

Originator	Agency	Non-Agency	Total
Arbor	1,391	1	1,392
Bank of America, NA	29	122	151
Berkadia Commercial..	2,351	0	2,351
Berkeley Point Capi..	1,031	0	1,031
CBRE Capital Markets	3,298	0	3,298
CCRE	0	105	105
Capital One Multifa..	808	0	808
Citigroup Inc.	97	87	184
Goldman Sachs	0	69	69
Grandbridge Real Es..	509	0	509
Greystone Servicing..	1,403	0	1,403
Holliday Fenoglio F..	1,137	0	1,137
Hunt Mortgage	495	5	500
JPMorgan Chase & Co.	18	98	116
KeyBank NA	940	31	971
Ladder Capital Fina..	0	75	75
Morgan Stanley Mort..	0	92	92
NorthMarq Capital	1,059	0	1,059
PNC	485	0	485
Red Mortgage Capita..	1,730	0	1,730
Rialto Mortgage Fin..	0	143	143
Starwood Property M..	0	54	54
Walker & Dunlop	2,126	9	2,135
Wells Fargo Bank, NA	949	94	1,043

Implicit Assumptions

- Originator knows whether or not the loan being made will be securitized before or after December 24, 2016.

$$y_{idt} = \alpha + X'_{idt} \cdot \gamma + \beta_1 \cdot NonA_{id} + \beta_2 \cdot \Pr(Post_d) + \beta_3 \cdot NonA_{id} \times \Pr(Post_d) + \varepsilon_{idt}, \quad (2)$$



Estimated Probability that Loan
will be placed in Deal Settling After
December 24, 2016

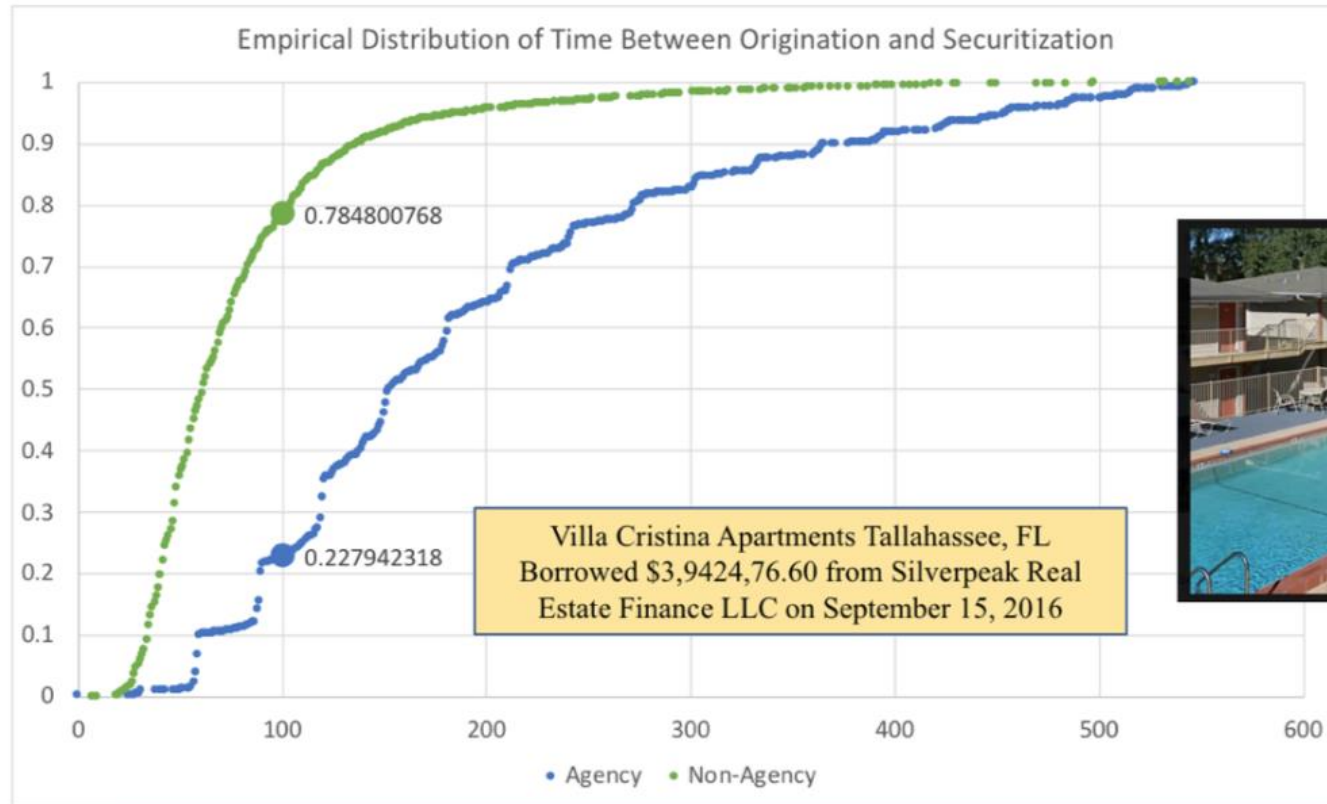
Estimating securitization timing

$$Pr(\text{ParkWest is Sold After December 24, 2016}) = 1 - Pr(\text{PW Sold Within 100 days}) = 1 - 0.7848 \approx .2152$$



Park West Office Virginia Beach, VA
Borrowed \$10,097,000 from NorthMarq Capital on September 15, 2016

September 15, 2016 is
100 days before
December 24, 2016



Villa Cristina Apartments Tallahassee, FL
Borrowed \$3,9424,76.60 from Silverpeak Real Estate Finance LLC on September 15, 2016



$$Pr(\text{Villa Cristina is Sold After December 24, 2016}) = 1 - 0.2279 \approx 0.7721$$

Evidence regarding underwriting changes

□

TABLE 5: RISK RETENTION D-I-D SPECIFICATIONS WITH FORECASTED PROBABILITIES OF SETTLEMENT TIMING

VARIABLES	ALL LOANS			MULTIFAMILY LOANS		
	Interest rate	LTV	DSCR	Interest rate	LTV	DSCR
Non-Agency Loan	0.381* (0.201)	0.211*** (0.0272)	-1.413*** (0.181)	-0.802** (0.400)	-0.0933* (0.0560)	0.968*** (0.362)
Probability Deal Settles After 24Dec2016	-0.472*** (0.106)	0.0215 (0.0132)	-0.121* (0.0733)	-0.401** (0.198)	-0.0340 (0.0254)	-0.0170 (0.141)
Non-Agency x Probability Deal Settles After 24Dec2016	0.470*** (0.0368)	-0.0363*** (0.00464)	0.259*** (0.0302)	0.279*** (0.0775)	-0.0415*** (0.00896)	0.354*** (0.0685)
Observations	62,155	37,922	37,424	45,740	26,772	26,396
R-squared	0.433	0.275	0.194	0.327	0.294	0.182

Robust standard errors (clustered by both origination month and originator) in parentheses.

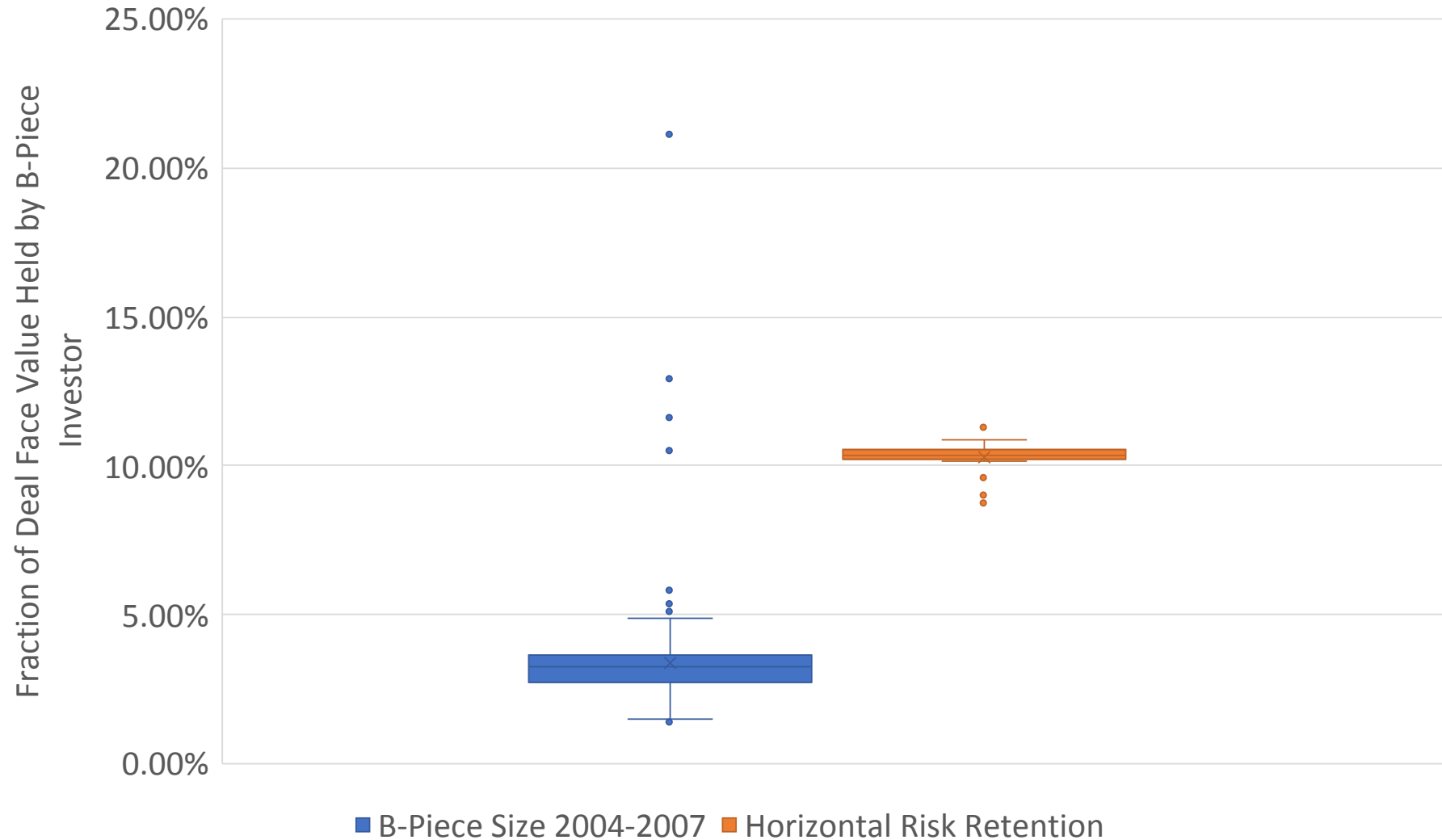
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

All specifications include interest rate controls, loan size and amortization controls as well as fixed effects for Originator, Property Type (Columns 1-3 only), Location, and month of origination.

Evidence on securitization changes

- Size and informativeness of retained tranches
- Rushing to securitize before implementation

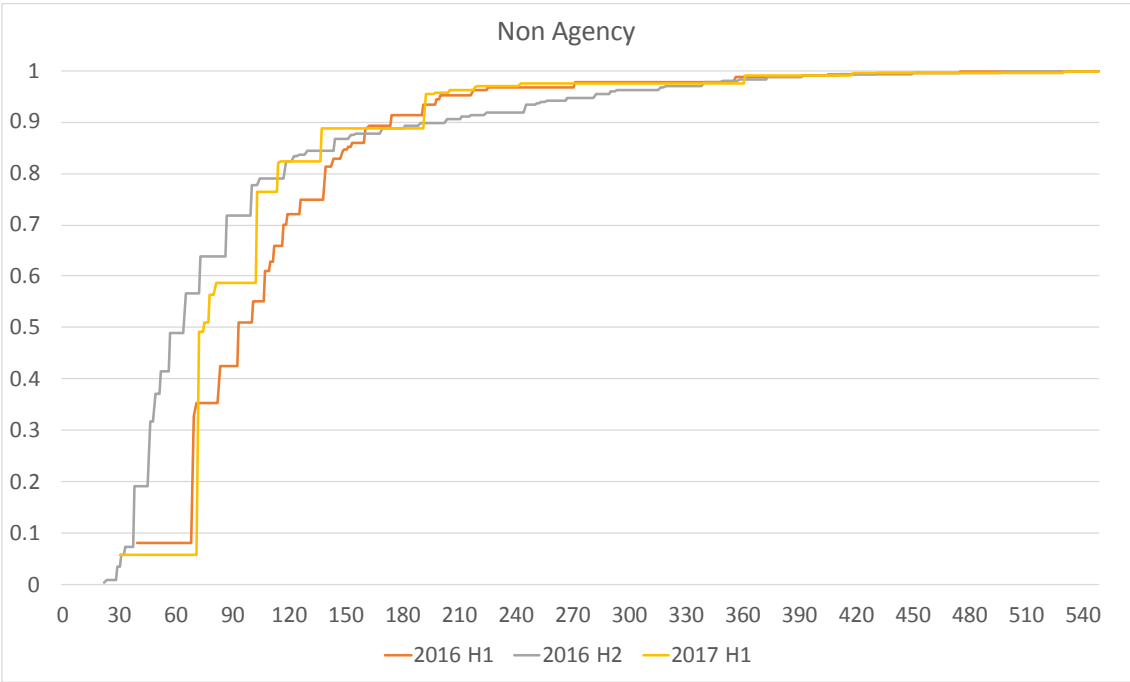
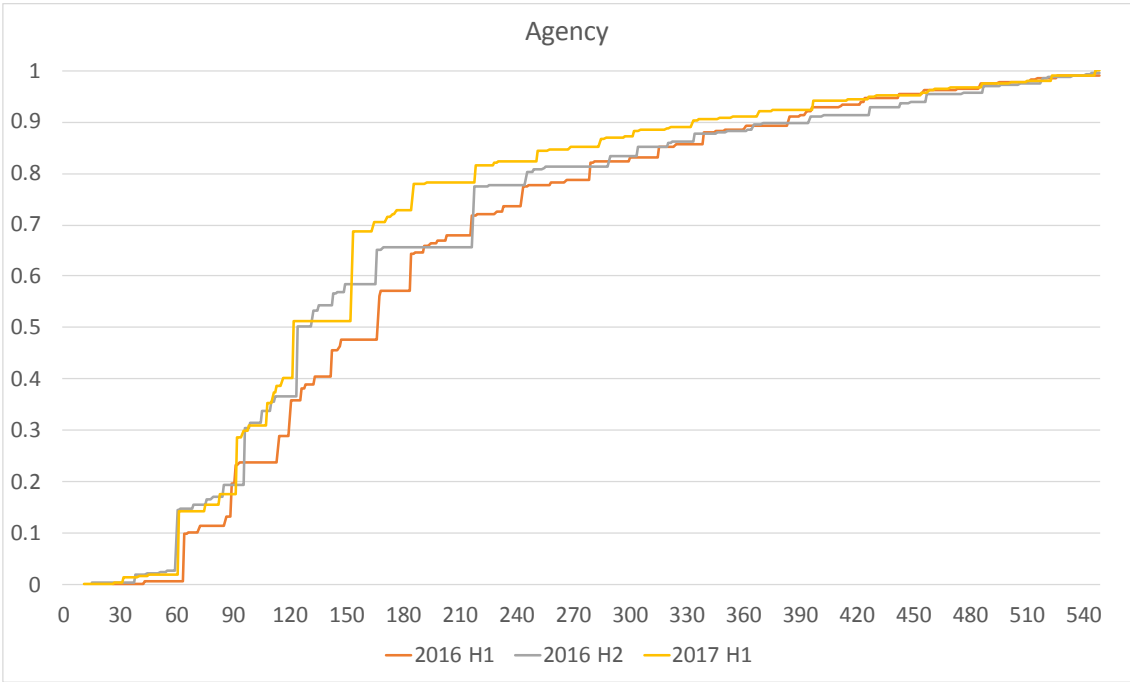
Risk retention is a binding constraint



Risk retention is less informative

VARIABLES	B-Piece Size 2005-2007	Horizontal Risk Retention Since December 2016
Pool LTV	0.000995*** (0.000337)	-0.000969 (0.000737)
Pool Interest Rate Spread over Treasuries	0.0143*** (0.00301)	-0.00593 (0.00556)
Pool Debt Service Coverage Ratio	0.00566 (0.00477)	-0.00168 (0.00706)
Constant	-0.0602* (0.0306)	0.177*** (0.0586)
Observations	234	24
R-squared	0.418	0.393
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Lenders hurried to beat deadline



Evidence on ex-post performance

VARIABLES	All Loans	Multifamily Loans
	<u>Loan is non-performing/watchlist</u>	
Loan interest rate	0.00481 (0.00355)	0.00261 (0.00315)
Loan LTV	0.0295 (0.0202)	0.0271 (0.0202)
Loan DSCR	-0.00512 (0.00402)	-0.00730* (0.00436)
Non-Agency Loan	0.0717 (0.0490)	0.0857 (0.0638)
Deal Settled After 24Dec2016	-0.00494 (0.0273)	-0.0188 (0.0489)
Non-Agency x Deal Settled After 24Dec2016	-0.0482*** (0.0107)	-0.0415*** (0.0158)
Observations	34,964	24,079
Pseudo R-squared	0.0986	0.1097

Analysis also includes fixed effects for origination month, originator, property type (first column), and the location (State) of the collateral property.

Robust standard errors (clustered by both origination month and originator) in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Review of findings

- Evidence consistent with originators charging more and being less generous with LTVs and DSCRs post risk-retention.
- Effects are economically large.
- Risk retention was a binding constraint.
- Securitizers rushed in the months before implementation.
- Loans subject to risk retention have been less likely to become non-performing.

The impact of risk-retention regulation on commercial mortgage underwriting

Craig Furfine
September 2018

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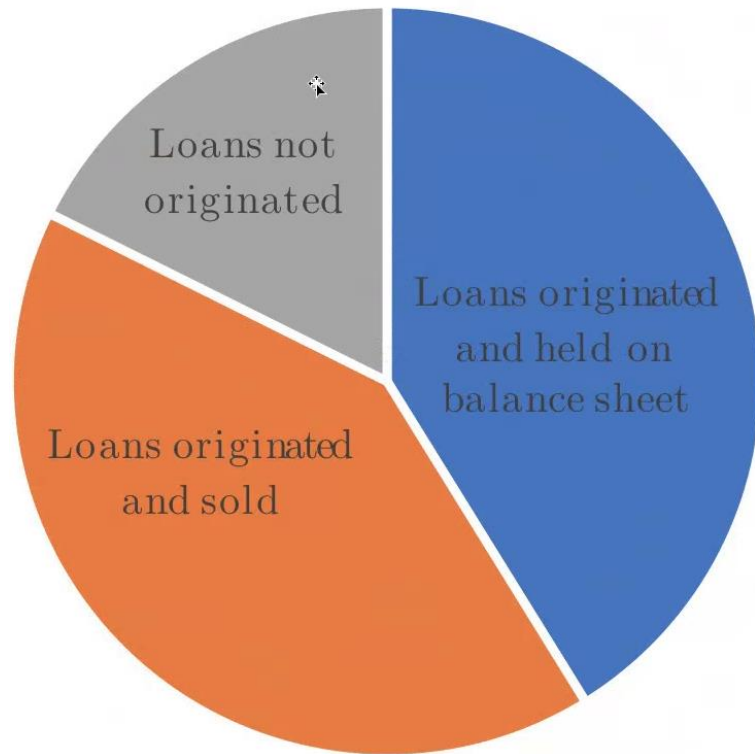


Related literatures

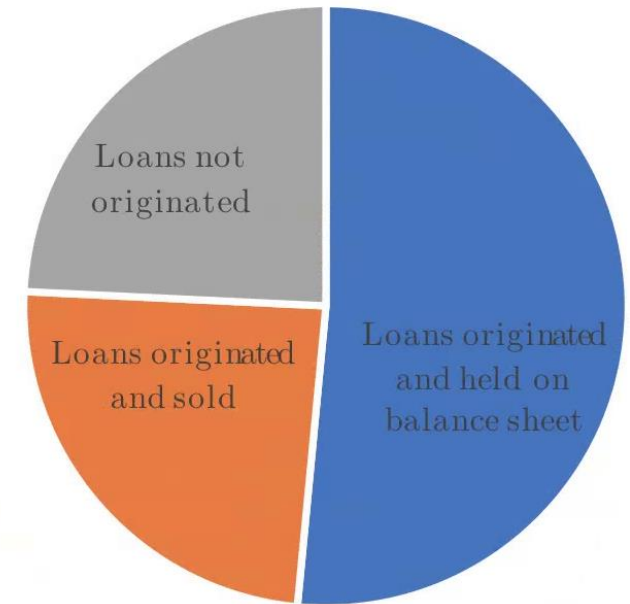
- Skin in the game and securitization
 - Begley and Purnanandam (2017), Guo and Wu (2014), Pagès (2013), Demiroglu and James (2012), DeMarzo (2005), DeMarzo and Duffie (1999), Riddiough (1997), Leland and Pyle (1977)
- The effectiveness of crisis-era government programs
 - DeFusco, Johnson, and Mondragon (2017), Eberly and Krishnamurthy (2014), Zhang et al. (2013), Agarwal et al. (2011), ...

Impact of risk retention regulation

Before risk retention



After risk retention



Additional specifications

- Originators who are sponsors
- Type of originator
- Shape of risk retention

Results – Originator who is a sponsor

TABLE 6: RISK RETENTION – IS THE ORIGINATOR THE DEAL SPONSOR?

VARIABLES	ALL LOANS			MULTIFAMILY LOANS		
	Interest rate	LTV	DSCR	Interest rate	LTV	DSCR
Non-Agency x Probability Deal Settles After 24Dec2016	0.424*** (0.114)	-0.0217* (0.0130)	0.410*** (0.0724)	0.278 (0.180)	-0.000298 (0.0184)	0.412*** (0.0951)
Non-Agency x Probability Deal Settles After 24Dec2016 x Originated by Deal Sponsor	0.0657 (0.117)	-0.0174 (0.0132)	-0.152** (0.0729)	0.0198 (0.192)	-0.0456** (0.0194)	-0.0948 (0.107)
Observations	62,155	37,922	37,424	45,740	26,772	26,396
R-squared	0.432	0.270	0.188	0.327	0.295	0.183

⊕

Robust standard errors (clustered by both origination month and originator) in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

All specifications include interest rate controls, loan size and amortization controls as well as fixed effects for Originator, Property Type (Columns 1-3 only), Location, and month of origination.

Results – Originator type

TABLE 7: RISK RETENTION – VARIATION ACROSS LENDER TYPE

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VARIABLES	ALL LOANS			MULTIFAMILY LOANS		
	Interest rate	LTV	DSCR	Interest rate	LTV	DSCR
Non-Agency x Probability Deal Settles After 24Dec2016	0.340*** (0.0490)	-0.0296*** (0.00729)	0.150*** (0.0408)	-0.235** (0.0956)	-0.0302*** (0.0114)	0.163** (0.0783)
Non-Agency x Probability Deal Settles After 24Dec2016 x Originated by Bank	0.109 (0.0745)	-0.0126 (0.00973)	0.159*** (0.0532)	0.439*** (0.133)	-0.0225 (0.0179)	0.384*** (0.127)
Non-Agency x Probability Deal Settles After 24Dec2016 x Originated by REIT	0.304*** (0.0912)	-0.00867 (0.0128)	-0.0176 (0.0577)	0.901*** (0.139)	-0.00634 (0.0181)	0.0151 (0.101)
Observations	62,155	37,922	37,424	45,740	26,772	26,396
R-squared	0.438	0.275	0.195	0.337	0.295	0.187

Robust standard errors (clustered by both origination month and originator) in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

All specifications include interest rate controls, loan size and amortization controls as well as fixed effects for Originator, Property Type (Columns 1-3 only), Location, and month of origination.

Results – Shape of risk retention

⊕

TABLE 8: RISK RETENTION – VARIATION ACROSS FORMS OF RETENTION

VARIABLES	ALL LOANS			MULTIFAMILY LOANS		
	Interest rate	LTV	DSCR	Interest rate	LTV	DSCR
Non-Agency x Probability Deal Settles After 24Dec2016	0.520*** (0.0451)	-0.0258*** (0.00570)	0.237*** (0.0381)	0.322*** (0.0903)	-0.0279** (0.0123)	0.285*** (0.108)
Non-Agency x Probability Deal Settles After 24Dec2016 x Horizontal Risk Retention	-0.0434 (0.153)	-0.00438 (0.0152)	-0.0260 (0.106)	-0.454* (0.259)	0.00120 (0.0358)	0.315 (0.217)
Non-Agency x Probability Deal Settles After 24Dec2016 x Vertical Risk Retention	0.0106 (0.125)	-0.0384 (0.0235)	0.217 (0.163)	-0.431 (0.280)	-0.0262 (0.0667)	0.663** (0.292)
Observations	62,155	37,922	37,424	45,740	26,772	26,396
R-squared	0.434	0.275	0.194	0.328	0.294	0.183

Robust standard errors (clustered by both origination month and originator) in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

All specifications include interest rate controls, loan size and amortization controls as well as fixed effects for Originator, Property Type (Columns 1-3 only), Location, and month of origination.

Suggestive evidence

