

# Deal complexity, loan performance, and the pricing of commercial mortgage backed securities

Craig Furfine  
Kellogg School of Management  
Northwestern University  
May 4, 2011

NORTHWESTERN UNIVERSITY



# Outline

- Motivation
- Research questions and findings
- Related literature
- Data
- Results

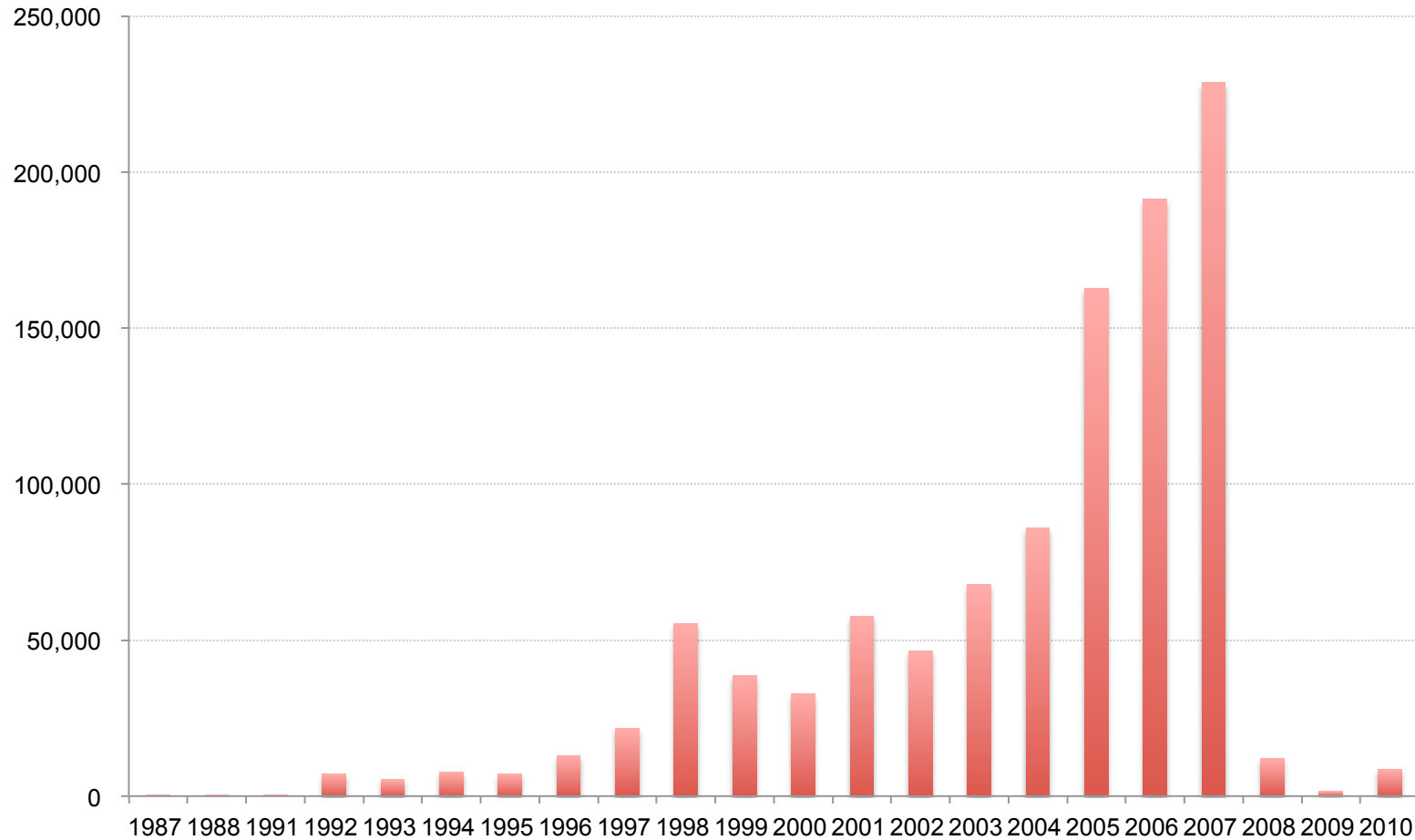
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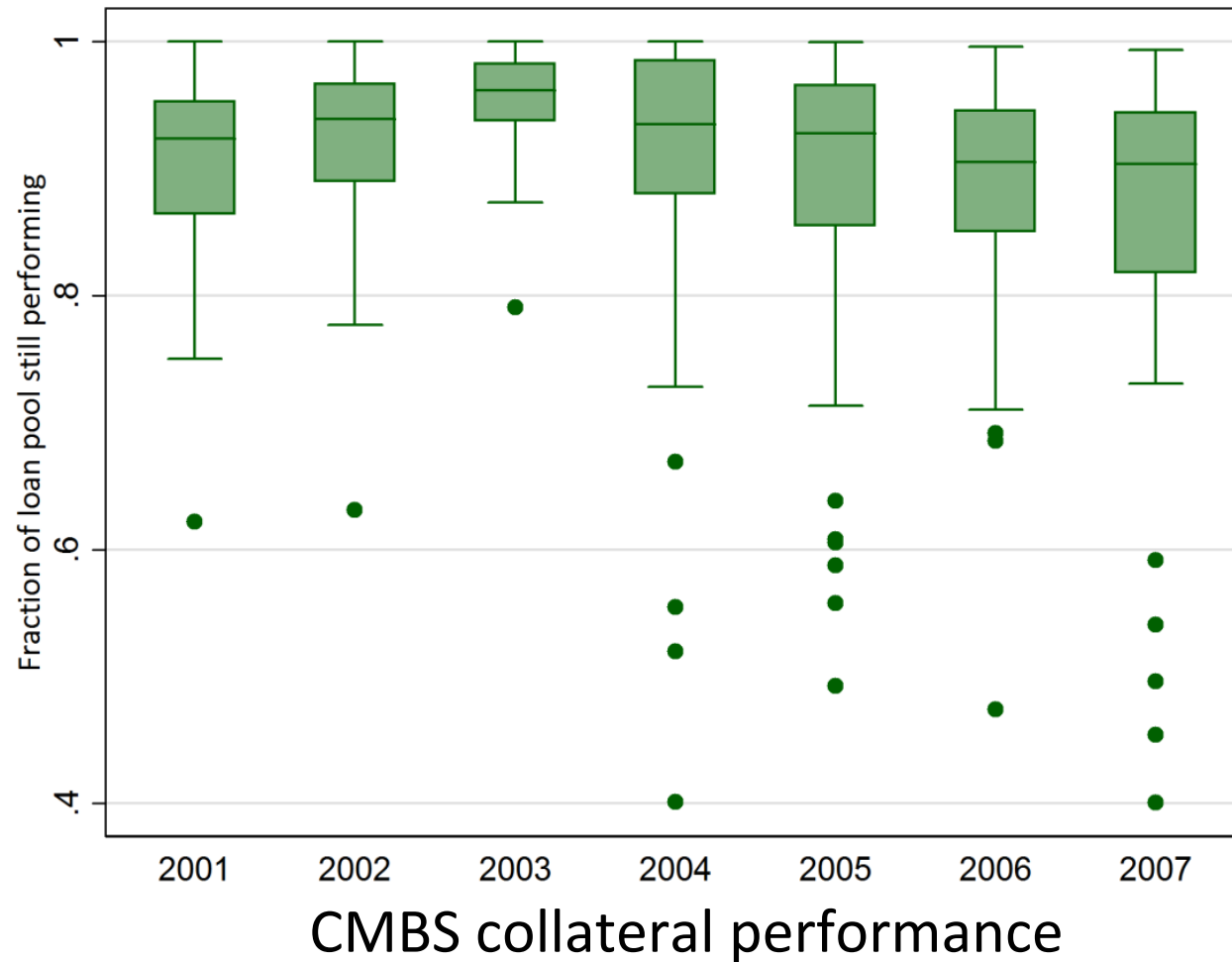


CMBS issuance (\$ millions)

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- Issuance of one such product – Commercial Mortgage Backed Securities (CMBS) – declined from its 2007 peak of \$230 billion to less than \$3 billion in 2009
- The performance of the most recent pre-crisis vintages have fared the worst.

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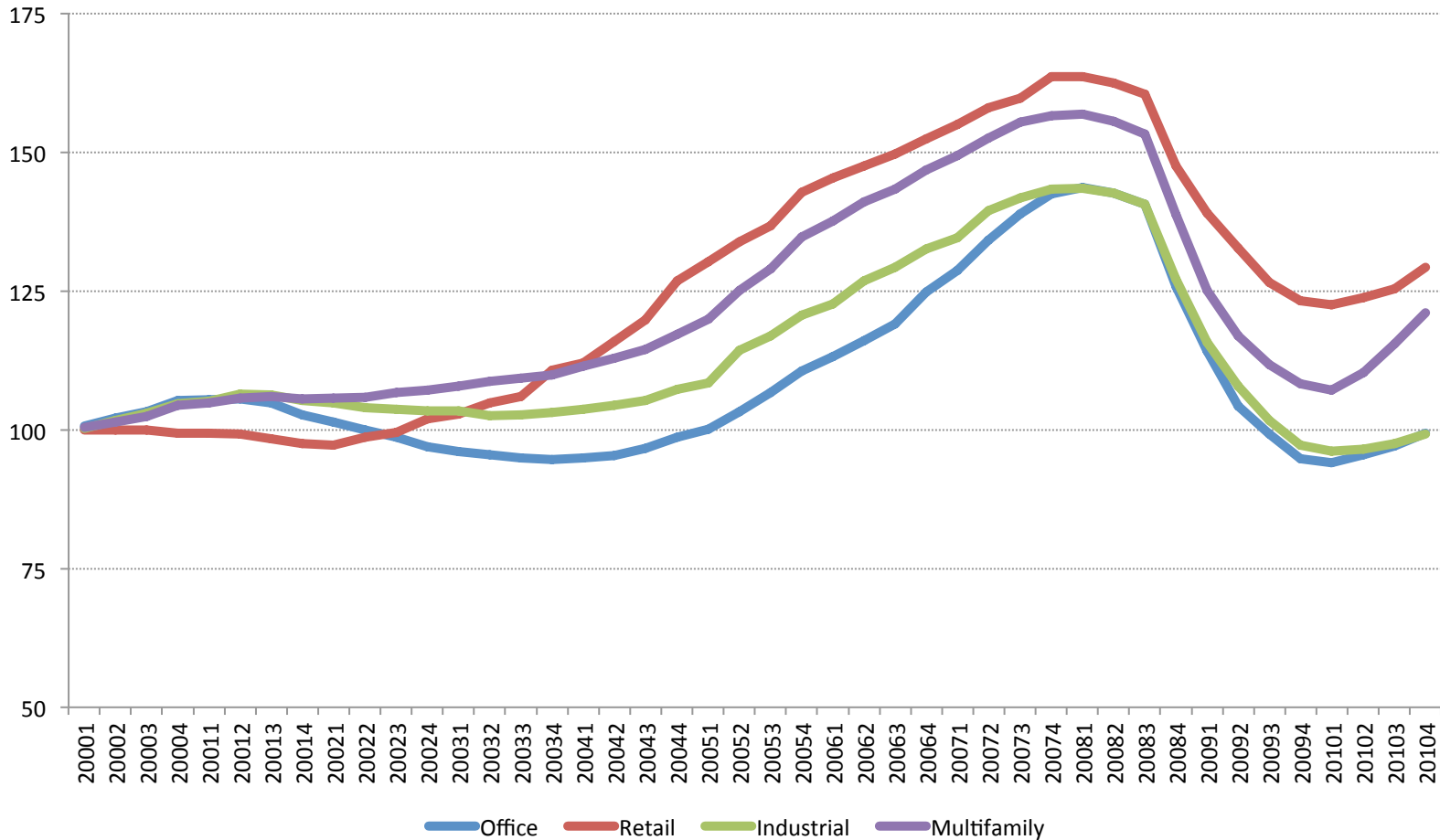


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- Why is the performance of the most recent (pre-crisis) vintages the worst?
  - Near peak valuations



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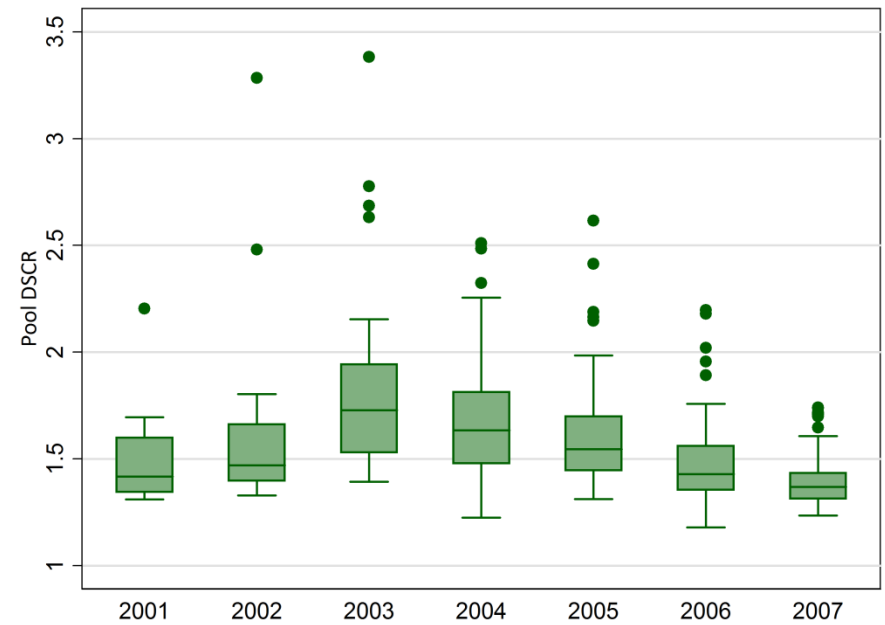
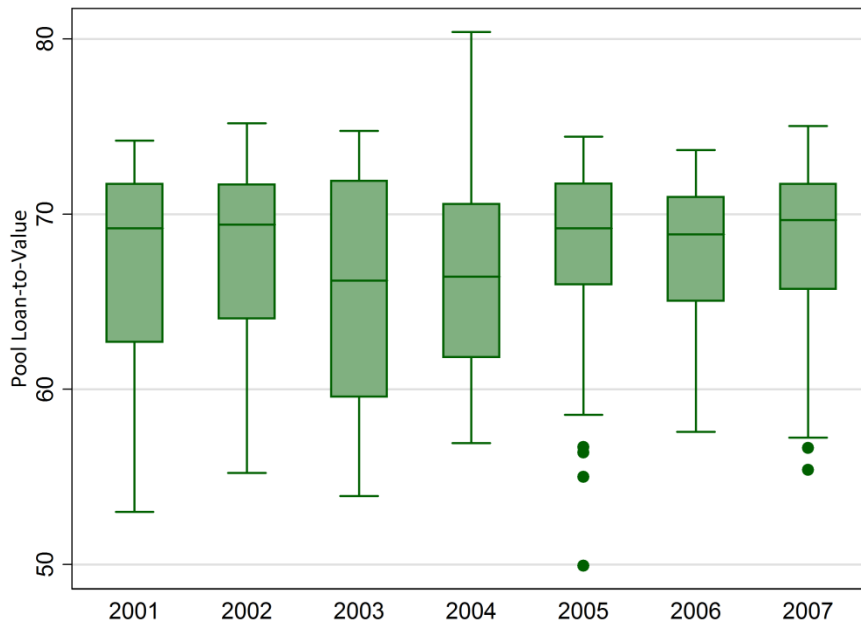


## Commercial Property Prices

# Motivation

- Why is the performance of the most recent (pre-crisis) vintages the worst?
  - Near peak valuations
  - Observably worse collateral

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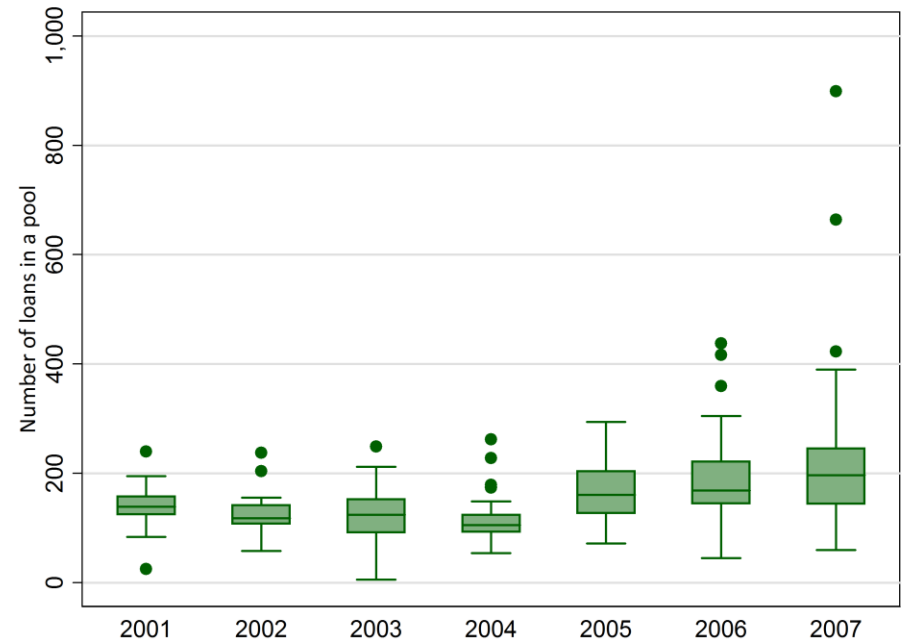
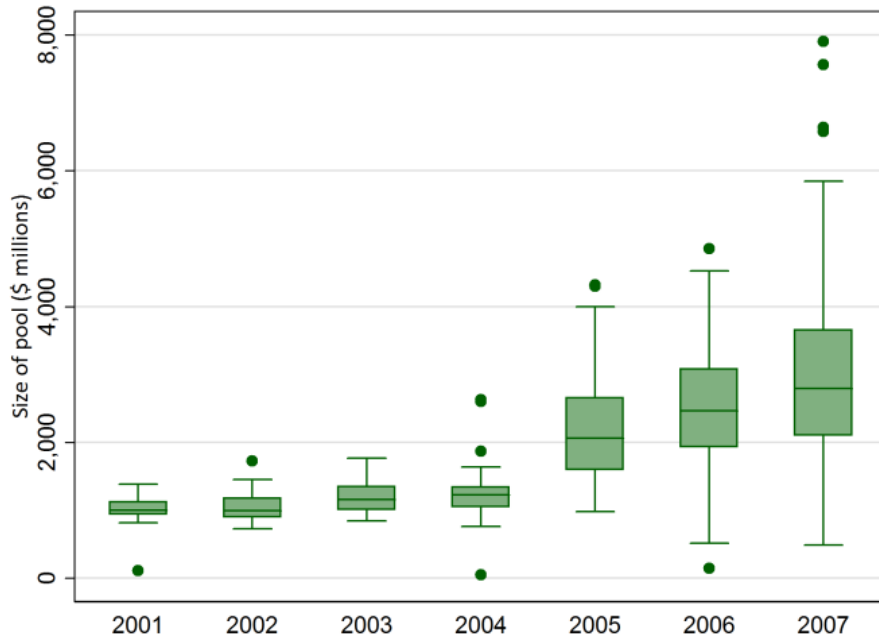


CMBS loan underwriting

# Motivation

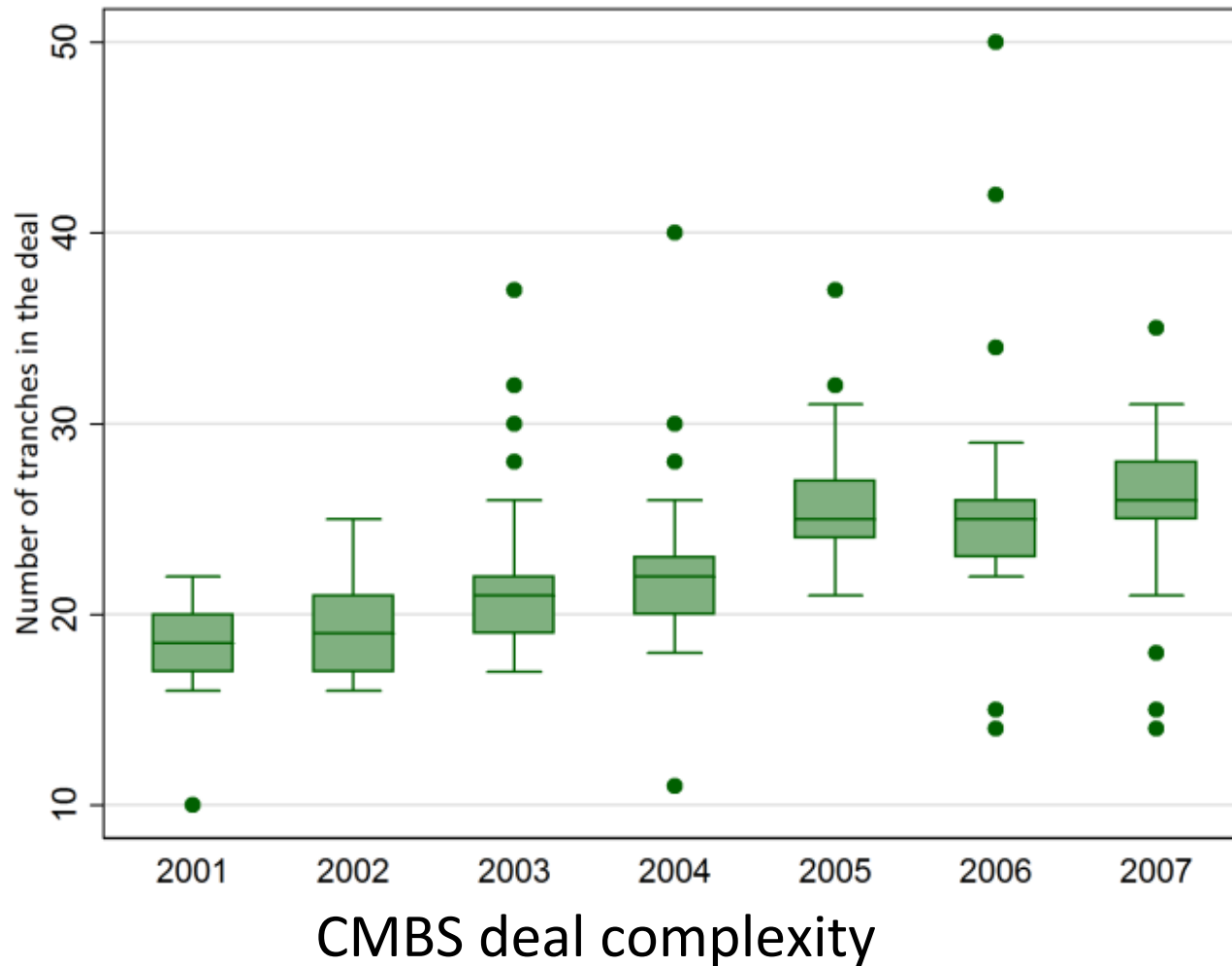
- Why is the performance of the most recent (pre-crisis) vintages the worst?
  - Near peak valuations
  - Observably worse collateral
  - More complex deal structures

# Motivation



CMBS deal complexity

# Motivation



# Research questions

- Do loans in complex deal structures perform worse ex-post, all else equal?

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- If so, are investors in these securities aware of the complexity-quality relationship?



# Findings

- Controlling for observable loan characteristics, subsequent movements in commercial property prices, vintage, property type, location, and the identities of the key institutions involved in the deal, loans perform worse when they are part of a more complex securitization.

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- Controlling for observable loan characteristics, subsequent movements in commercial property prices, vintage, property type, location, and the identities of the key institutions involved in the deal, loans perform worse when they are part of a more complex securitization.
- Controlling for a wide variety of characteristics regarding security structure, investors paid more for securities from more complexly-tranched deals. Evidence is consistent with catering to investors.

# Related literature

- Benchmark: In an M&M world, securitization structures should be independent of valuation.
- Increased complexity of financial products is a key feature of the pre-crisis environment
  - Caballero and Krishnamurthy (2008), Arora et al. (2009)
- Asymmetric information
  - Borrowers and lenders
  - Lenders and underwriters/investors
    - Keys et al. (2010), Bubb and Kaufman (2009), Downing, Jaffee and Wallace (2010), Demiroglu and James (2009), Benmelech, Dlugosz and Ivashina (2009), Titman and Tsyplakov (2007)
  - Lenders/underwriters and servicers
    - Ambrose, Yavas and Sanders (2008), Gan and Mayer (2007)
  - Lenders/underwriters and rating agencies
    - Skreta and Veldkamp (2009), Stanton and Wallace (2010), Coval, Jurek and Stafford (2009)

# Data

- CMAAlert
  - CMBS securitization lists
    - Private issue, US issue, 2001-2007, deal type
  - Security structure and pricing (at issue)

Class	\$	%	Sub-ordination	Coupon	Fx / Fl	WAL	Spread	Rating
A-1	64	2.58%	30	5.018	Fixed	2.68	7	AAA
A-2	326	13.16%	30	5.084	Fixed	4.82	22	AAA
A-3	92	3.72%	30	5.207	Fixed	6.78	35	AAA
A-AB	94	3.80%	30	5.139	Fixed	6.9	28	AAA
A-4	1143.176	46.16%	30	5.156	Fixed	9.68	28	AAA
A-M	245.597	9.92%	20	5.217	Fixed	9.96	34	AAA
A-J	221.037	8.93%	11	5.276	Fixed	9.96	40	AAA
B	15.35	0.62%	10.38	5.306	Fixed	9.96	43	AA
C	27.63	1.12%	9.25	5.335	Fixed	9.96	46	AA
D	24.559	0.99%	8.25	5.365	Fixed	9.96	49	AA
E	18.42	0.74%	7.5	5.404	Fixed	9.96	53	A
F	21.49	0.87%	6.63	5.433	Fixed	9.96	56	A
G	21.489	0.87%	5.75	5.5	Fixed	9.96	66	A
H	24.56	0.99%	4.75	5.561	Fixed	9.96	105	BBB
J	18.42	0.74%	4	5.561	Fixed	10.18	125	BBB
K	24.56	0.99%	3	5.561	Fixed	11.71	190	BBB
L	12.279	0.50%	2.50		Fixed	11.71		BB
M	9.21	0.37%	2.13		Fixed	11.71		BB
N	9.21	0.37%	1.75		Fixed	11.71		BB
P	6.14	0.25%	1.5		Fixed	11.71		B
Q	6.14	0.25%	1.25		Fixed	11.71		B
S	6.14	0.25%	1		Fixed	11.71		B
T	24.56	0.99%	0		Fixed	13.91		NR
IUU-1	7.2	0.29%			Fixed	4.72		NR
IUU-2	2.578	0.10%			Fixed	4.96		NR
IUU-3	3.551	0.14%			Fixed	4.96		NR
IUU-4	1.866	0.08%			Fixed	4.96		NR
IUU-5	1.276	0.05%			Fixed	4.96		NR
IUU-6	0.909	0.04%			Fixed	4.96		NR
IUU-7	0.96	0.04%			Fixed	4.96		NR
IUU-8	1.016	0.04%			Fixed	4.96		NR
IUU-9	1.077	0.04%			Fixed	4.96		NR
X-CP(IO)	2250.748*			0.352	Fixed	5.66	71	AAA
X-CL(IO)	2455.967*			0.063	Fixed	8.81	175	AAA

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- Bloomberg
  - Underlying loan collateral details (at issue)
  - Loan performance (at time of download)

# Data

Collateral Property	Status	Loan size	Coupon	LTV at Deal Cutoff	DSCR at Deal Cutoff	Origination Date	Due Date
1301 Avenue of the Americas	Perform	420,783,734	5.37	38	2.22	1-Dec-05	1-Jan-16
Sand Lake Plaza	In Foreclosure	8,350,000	5.34	79	1.21	1-Oct-05	1-Oct-15
Woodland Arms Apartments	REO	4,350,000	5.86	68	1.2	1-Nov-05	1-Dec-15
Sweetbriar Apartments	Del 30	2,750,000	5.67	80	1.32	1-Dec-05	1-Dec-15
Hinesville Shopping Center	Late	2,592,500	5.81	76	1.27	1-Nov-05	1-Dec-15

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  - Loan performance (at time of download)
- NCREIF
  - Commercial property price indices by MSA/property type

# Results: Performance regressions

- Probit analysis
  - Dependent variable equals 1 if the given loan is performing as of the first quarter of 2010, and is equal to 0 otherwise.
  - Tables report the marginal impact on the probability of a loan being performing, holding all other variables at their mean value.
  - Measures of deal complexity
  - Control variables
    - Observable loan characteristics
    - Underwriter, originator, servicer relationships
    - Implied current LTV
    - Property type, year, state, originator, and underwriter fixed effects

# Results: Performance regressions

Variable	Dependent variable =1 if loan is performing, 0 otherwise
Log pool size	-0.0309*** [0.00552]
Number of tranches in the deal	0.00445*** [0.000776]
# of AAA-rated tranches in the deal	-0.0110*** [0.00145]
# of junk-rated tranches in the deal	-0.00528*** [0.00129]
Indicator for fusion transaction	-0.0156** [0.00704]
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# Results: Yield spread regressions

- Do investors recognize that loans in more complex structures are of lower quality?
- Cannot observe prices on all tranches of a securitization.
- Construct a set of 4,093 tranches from the 334 deals that have pricing information and were originally investment-grade-rated.
- If complexity is profitable for the underwriter/originator, it would be evident in the securities sold to (relatively) unsophisticated investors.

# Results: Yield spread regressions

- Dependent variable is the yield spread (at issue) of a specific tranche.
- Measures of deal complexity
- Control variables
  - Observable pool characteristics
  - Observable characteristics of the tranche
  - Underwriter and quarter fixed effects
- Different regressions by credit rating

# Results: Yield spread regressions

	AAA	AA	A	BBB
Log pool size	-2.389*	-4.843	-6.898	-10.44
	[1.265]	[3.142]	[4.641]	[6.588]
Number of tranches in the deal	0.453***	0.767***	1.008***	1.678***
	[0.131]	[0.283]	[0.358]	[0.549]
# of AAA-rated tranches in the deal	-0.983***	-1.445*	-1.392	-2.475**
	[0.289]	[0.831]	[0.992]	[1.114]
# of junk-rated tranches in the deal	-0.630***	-0.912*	-1.086	-0.739
	[0.244]	[0.522]	[0.684]	[1.097]
Indicator for fusion transaction	3.293***	7.514***	6.753***	9.268***
	[0.750]	[1.909]	[2.025]	[2.657]
Rated by 3 agencies indicator	0.940	3.950	4.835	16.22**
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# Results: Yield spread regressions

	AAA	AAA
Log pool size	-2.389*	-2.242*
	[1.265]	[1.269]
Number of tranches in the deal	0.453***	0.453***
	[0.131]	[0.131]
# of AAA-rated tranches in the deal	-0.983***	-0.978***
	[0.289]	[0.288]
# of junk-rated tranches in the deal	-0.630***	-0.640***
	[0.244]	[0.243]
Indicator for fusion transaction	3.293***	3.238***
	[0.750]	[0.749]
Rated by 3 agencies indicator	0.940	0.946
	[1.033]	[1.028]
Tranche share of deal	-15.14***	-15.20***
	[1.872]	[1.870]
Indicator that tranche is < 1% of the deal		-5.754***
		[2.188]

# Anecdotal evidence of catering

- Commercial Mortgage Alert, February 18, 2011
- The long-term senior class of a \$1.3 billion multi-borrower offering led by Wells Fargo and RBS priced at 100 bp over swaps. The deal originally included two triple-A classes. In addition to the long-term \$493.2 million tranche, the underwriters shopped a \$583.5 million class of five-year bonds at 115 bp over swaps. But ***to take advantage of demand for paper with different terms, the dealers carved the five-year class into three tranches***, with average lives of 2.4 years, 4.8 years and 7.1 years. The subordination level remained at 17.1%.

# Conclusions

- Controlling for observable loan characteristics, subsequent movements in commercial property prices, vintage, property type, location, and the identities of the key institutions involved in the deal, loans perform worse when they are part of a more complex securitization.
- Controlling for a wide variety of characteristics regarding security structure, investors paid more for securities from more complexly-tranched deals. Evidence is consistent with catering to investors.

# Deal complexity, loan performance, and the pricing of commercial mortgage backed securities

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# Summary statistics

Loan-level variables (39,987 Observations)	Mean	Std Dev
Indicator that loan is performing	0.897	0.304
Original maturity (years)	10.704	4.143
Time to maturity (years)	5.861	4.586
Indicator that loan is interest only	0.121	0.326
Original principal balance (millions of \$)	11.900	35.000
LTV at deal cutoff	67.449	14.130
Estimated LTV 2010Q1	74.802	22.128
DSCR at deal cutoff	1.641	1.946
Loan spread to 10 year Treasury	1.462	0.654
Indicator: Originator is the special servicer	0.044	0.205
Indicator: Originator is the master servicer	0.203	0.403
Indicator: Originator is the deal underwriter	0.266	0.442

# Summary statistics

Pool-level variables (334 pools)	Mean	Std Dev
Fraction of deal that is performing	0.895	0.108
LTV at deal cutoff	68.063	4.018
Estimated LTV 2010Q1	70.677	15.208
DSCR at deal cutoff	1.577	0.260

# Summary statistics

Pool-level variables (334 pools)	Mean	Std Dev
Size of pool (millions of \$)	1931.497	1170.152
Number of tranches in the deal	23.428	4.582
# of AAA-rated tranches in the deal	8.183	2.784
# of junk-rated tranches in the deal	7.066	1.327
Indicator for floating rate tranche	0.201	0.401
Fraction of the deal rated AAA	0.851	0.043
Fraction of the deal with junk rating	0.042	0.022
Ratings implied probability of default	2.769	1.243
Rated by 3 agencies indicator	0.081	0.273
Fusion transaction	0.817	0.387

# Performance regressions (marginal effects)

Variable	Model 1	Model 2	Model 3
Log loan size	-0.0105*** [0.00155]	-0.0103*** [0.00155]	-0.0104*** [0.00155]
LTV at deal cutoff	-0.000520* [0.000299]	-0.000477 [0.000298]	-0.000482 [0.000298]
Estimated LTV 2010Q1	-0.00156*** [0.000191]	-0.00161*** [0.000190]	-0.00161*** [0.000190]
DSCR at deal cutoff	0.0342*** [0.00865]	0.0334*** [0.00865]	0.0323*** [0.00864]
Loan spread to 10 year Treasury	-0.0378*** [0.00388]	-0.0387*** [0.00389]	-0.0387*** [0.00388]



# Yield spread regressions

	AAA	AA	A	BBB	AAA
Tranche subordination level	-0.352***	1.104	-0.167	2.056	-0.351***
	[0.0609]	[1.098]	[1.486]	[1.794]	[0.0608]
Tranche weighted average expected life	2.375***	-1.819	-1.239	-0.00288	2.344***
	[0.108]	[1.127]	[1.156]	[0.793]	[0.109]
Tranche share of deal	-15.14***	-75.61	-91.03	-207.1	-15.20***
	[1.872]	[117.5]	[138.1]	[285.0]	[1.870]
Indicator that tranche is < 1% of the deal					-5.754***
					[2.188]
Fraction of the deal rated AAA	65.67***	84.00	119.9*	463.1***	67.23***
	[24.48]	[53.93]	[70.17]	[107.6]	[24.52]
Fraction of the deal with junk rating	76.18*	134.7	183.8	320.6	77.46*
	[40.80]	[108.7]	[175.5]	[260.9]	[41.02]
Ratings implied probability of default	2.491**	0.960	2.858	6.926	2.563**
	[1.088]	[2.516]	[3.539]	[5.138]	[1.097]