

CMBS Subordination, Ratings Inflation, and Regulatory-Capital Arbitrage

Richard Stanton
U.C. Berkeley

Nancy Wallace
U.C. Berkeley

Asian Bureau of Finance and Economic Research

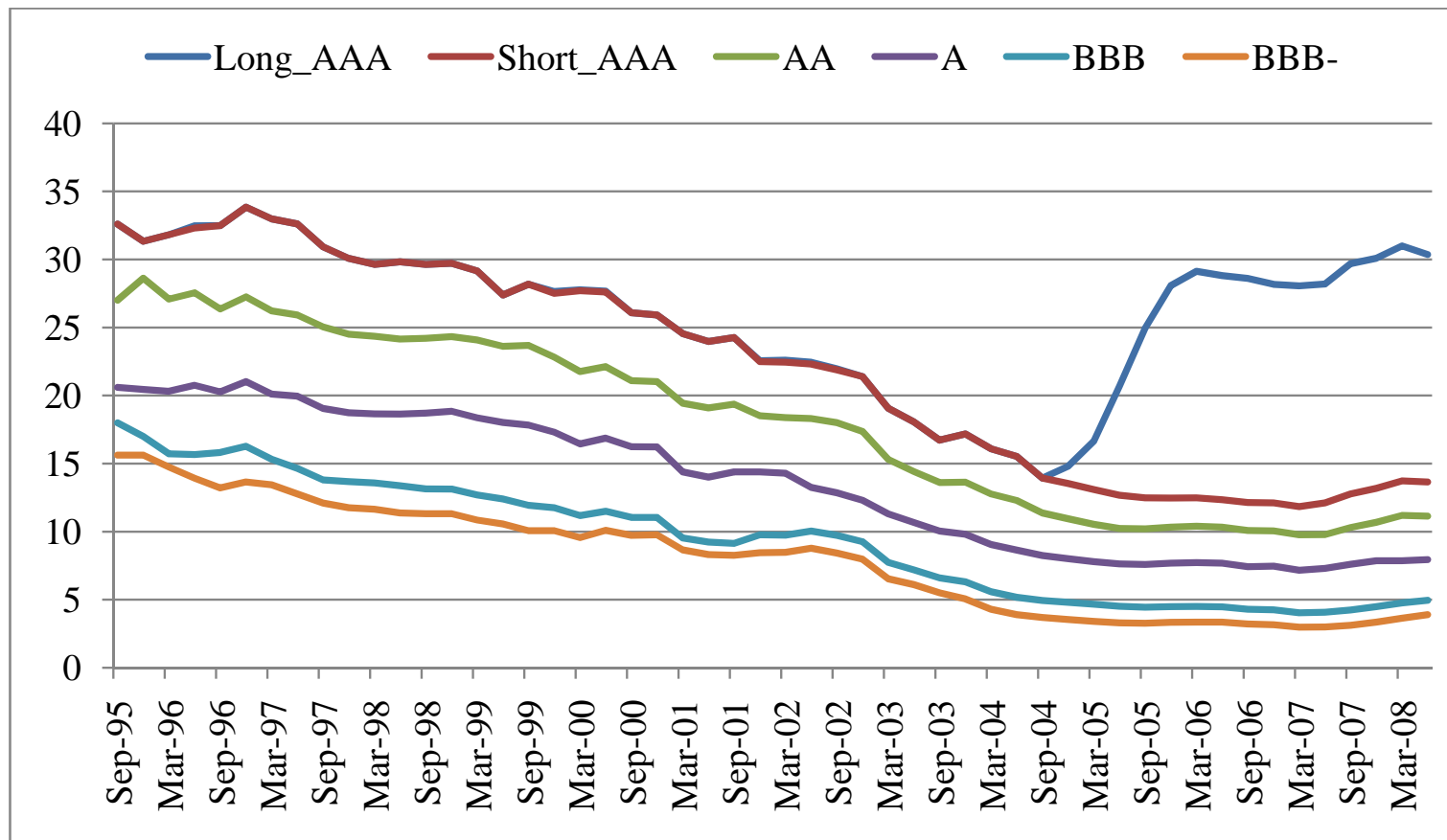
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Overview

- ▶ Empirical analysis of the rating agencies' role in the financial crisis.
- ▶ Focus on the Commercial Mortgage Backed Securities (CMBS) market.
 - We use detailed origination and performance data on the loans, the CMBS bonds, and similarly rated RMBS bonds.
 - We apply reduced-form and structural modeling strategies to test for regulatory capital arbitrage and ratings inflation in CMBS.
 - We quantify the CMBS-related risk-based capital savings and expected losses associated with these policies.
- ▶ **Conclusion:** The performance of the CMBS market and the actions of its investors are consistent with distortions associated with regulatory arbitrage facilitated by the rating agencies and bank regulators.
 - Consistent with theoretical model of Opp, Opp and Harris (2012).

CMBS Conduit Subordination (587 Deals): 1995–2008



Advantages of the CMBS Market for Evaluating Rating Agency Performance

- ▶ Fewer confounding factors than in other securitized bond markets.
 - There are detailed origination and performance data on the CMBS tranches and the loans underlying them.
 - Unlike the residential RMBS market, all agents in the CMBS market can reasonably be viewed as sophisticated, informed investors.
 - ◆ 90% held by insurance companies, mutual funds, 12 commercial banks, and GSEs.
 - Unlike the RMBS market, there were no major changes in the underlying market for commercial loans over this period.
 - Regulatory changes in the CMBS market in the years prior to the crisis significantly increased incentives for institutions to hold highly rated CMBS.

Risk-Based Capital (RBC) Requirements for Commercial Banks (2002) and Insurance Companies (2001)

		Commercial Banks			Life Insurance Companies		
	Rating	Risk Weight	Capital Requirement	Risk Based Capital Requirement per \$1 of Book Value	Asset Class	Factor	Risk Based Capital Requirement per \$1 Adj. Carrying Value
				2002–2008	2001–2008		
CMBS Bonds							
a) Investment Grade							
	AAA	20%	8%	\$0.016	1	0.3%	\$0.003
	AA	20%	8%	\$0.016	1	0.3%	\$0.003
	A	50%	8%	\$0.040	1	0.3%	\$0.003
	BBB	100%	8%	\$0.080	2	1.0%	\$0.010
b) Non-Investment Grade							
	BB	200%	8%	\$0.160	3	4.0%	\$0.040
Commercial Real Estate Mortgages	BBB	100%	8%	\$0.080		2.60%	\$0.0260
				1997–2001	1997–2000		
CMBS Bonds							
a) Investment Grade							
	AAA	100%	8%	\$0.080	1	0.3%	\$0.003
	AA	100%	8%	\$0.080	1	0.3%	\$0.003
	A	100%	8%	\$0.080	1	0.3%	\$0.003
	BBB	100%	8%	\$0.080	2	1.0%	\$0.010
b) Non-Investment Grade							
	BB	200%	8%	\$0.160	3	4.0%	\$0.040
Commercial Real Estate Mortgages	BBB	100%	8%	\$0.080		2.25%	\$0.0225

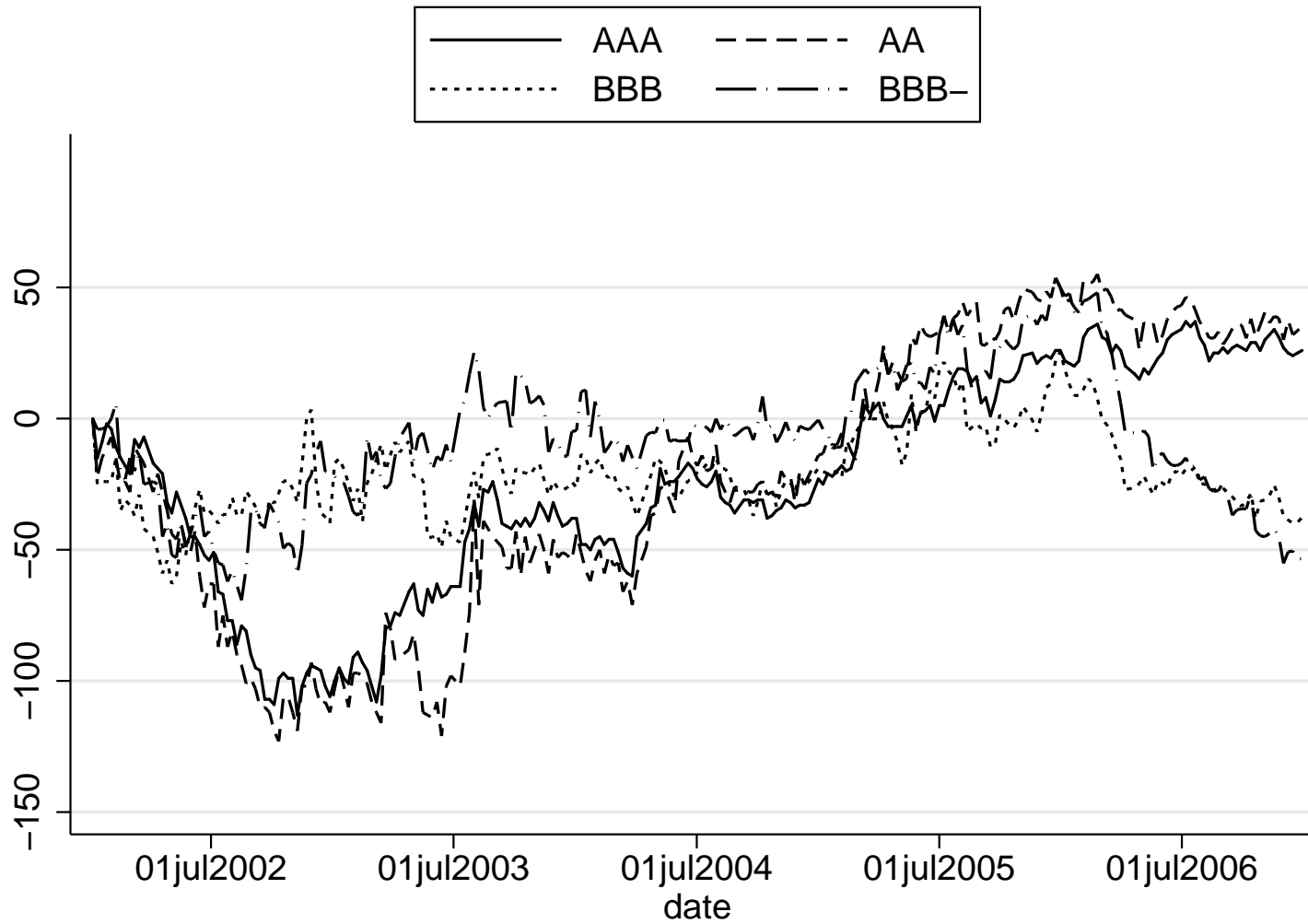
Risk-Based Capital Savings from Holding AAA CMBS

	Bank RBC (\$ billions)	Insurance RBC (\$ billions)
AAA-CMBS Held in 2007	46.62	188.50
2007 Risk-Based Capital required for AAA-CMBS	0.75	0.57
2007 Risk-Based Capital required for Holding Equivalent as Commercial Real Estate Mortgages	3.73	4.90
Capital Savings	2.98	4.33

Reduced-form Tests for Regulatory Arbitrage

- ▶ Exploit the natural experiment induced by the RBC rule change.
- ▶ Questions we seek to address:
 1. Is there a spread differential between AAA CMBS yields and AAA corporate bond yields following the loosening of CMBS capital requirements?
 2. Were there shifts in overall risk perceptions for AAA-rated paper, or does the CMBS market exhibit unique performance dynamics?
 3. Were the decreases in subordination levels (with corresponding increase in the proportion of AAA-rated CMBS) accompanied by any change in the quality of the underlying loans?

CMBS versus Corporate Bond Yields

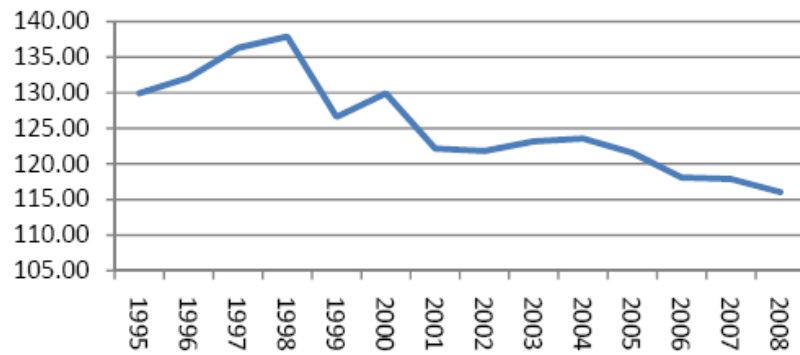


Structural Modeling Evidence: A Robustness Check on Reduced-Form Evidence

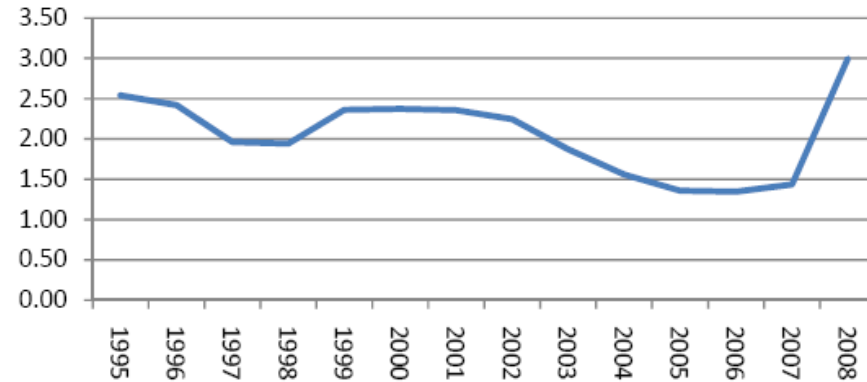
- ▶ Recap of reduced-form evidence (CMBS bond performance):
 1. Consistent with a regulatory-arbitrage explanation, spreads for AA and AAA CMBS were significantly lower than for corporate bonds starting in 2002.
 2. Likelihood of an upgrade to AA or above was significantly higher in the CMBS market than in the RMBS market.
- ▶ Exploit a structural modeling framework testing for structural shifts in loan contracting (CMBS loan characteristics):
 1. Were there changes in loan quality?
 2. Were there changes in pool composition?
 3. Were there changes in loan pricing at origination?

Changes in Loan Underwriting Quality

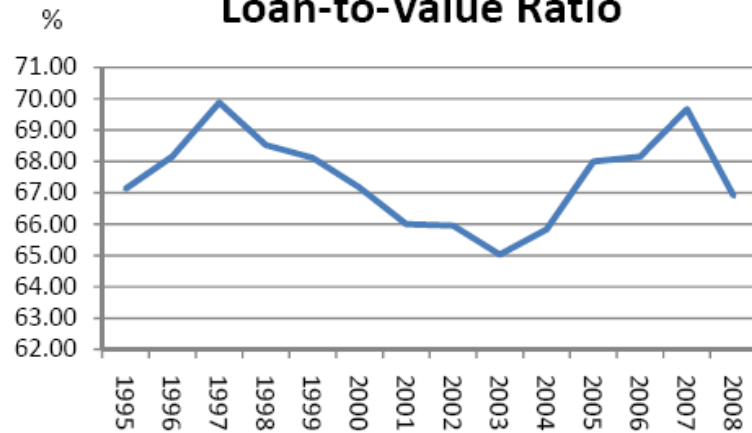
Payout Term



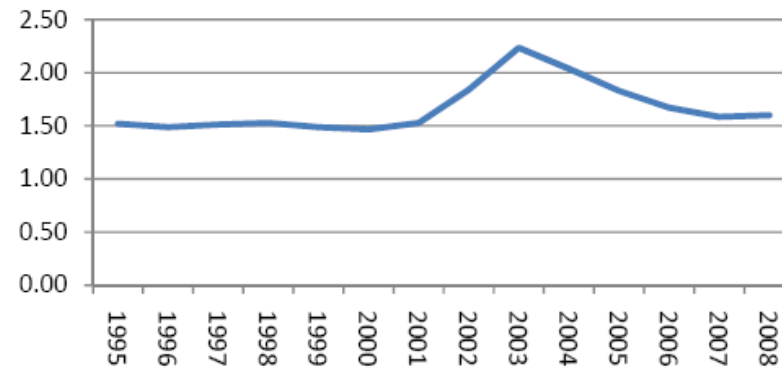
Spread to 10-Year Treasury



Loan-to-Value Ratio



Debt Service Coverage Ratio

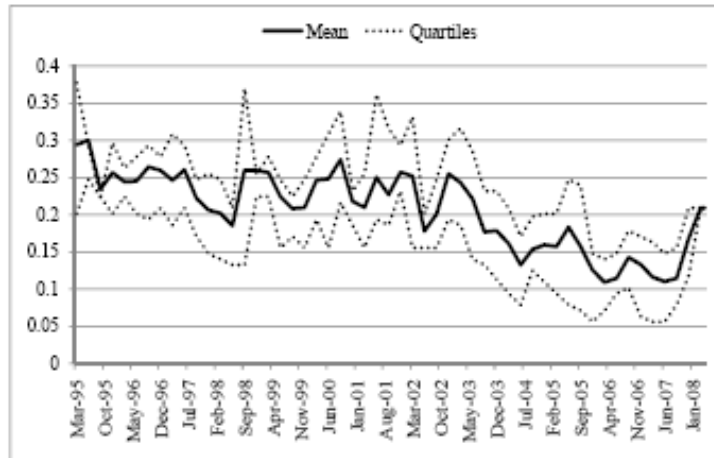


Solving for Implied Volatility

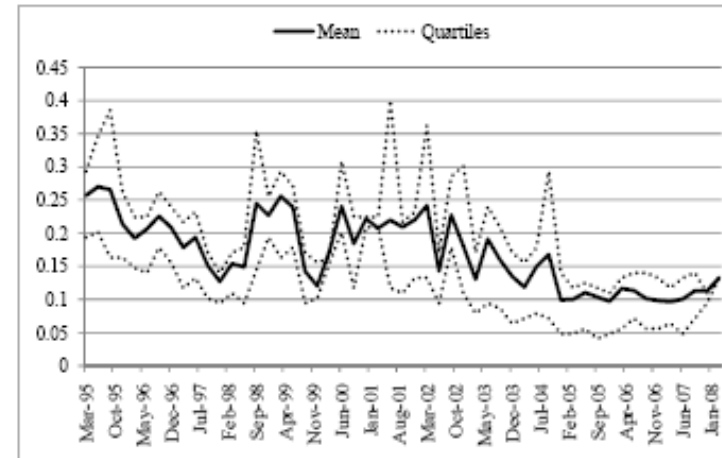
- ▶ Origination data on mortgage contract terms:
 - Loan-level CMBS data: 516 CMBS deals, 51,677 loans, all from Trepp LLC.
 - Originated between 1995 and 2008.
 - Coupon, term, amort. period, prepayment lockout period, LTV.
- ▶ **Solve for the volatility that sets the mortgage price to par.**

	Number of Observations	Mean (%)	Standard Deviation (%)
Retail	18,399	18.842	5.526
Multifamily	15,129	17.051	5.392
Office	9,778	21.478	5.973
Industrial	4,675	20.619	5.250

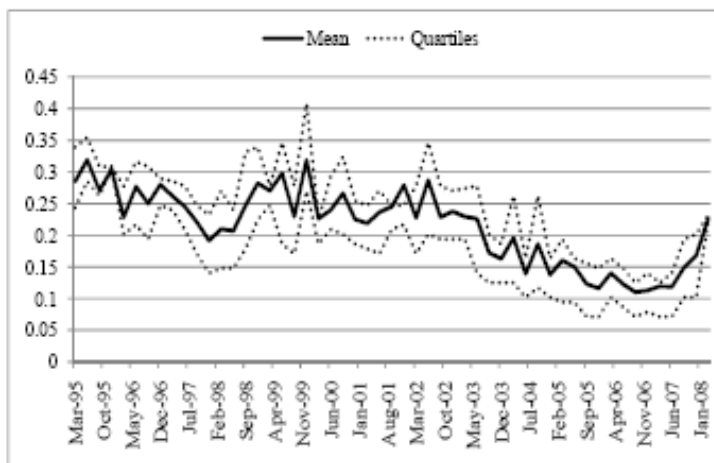
Implied Volatility by Property Type/Origination Date



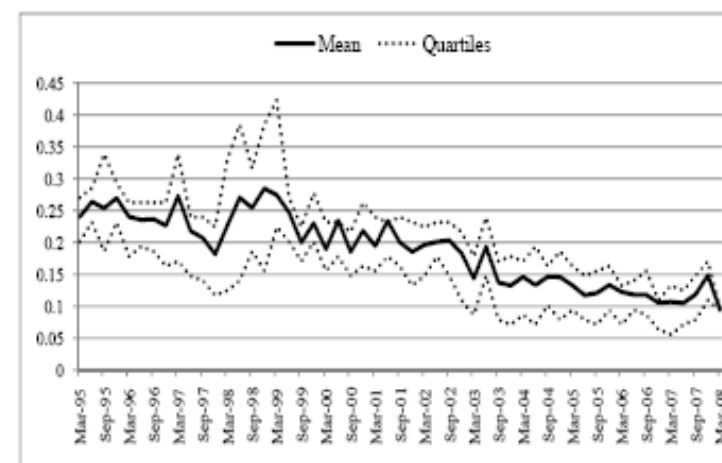
(a) Industrial



(b) Multifamily



(c) Office

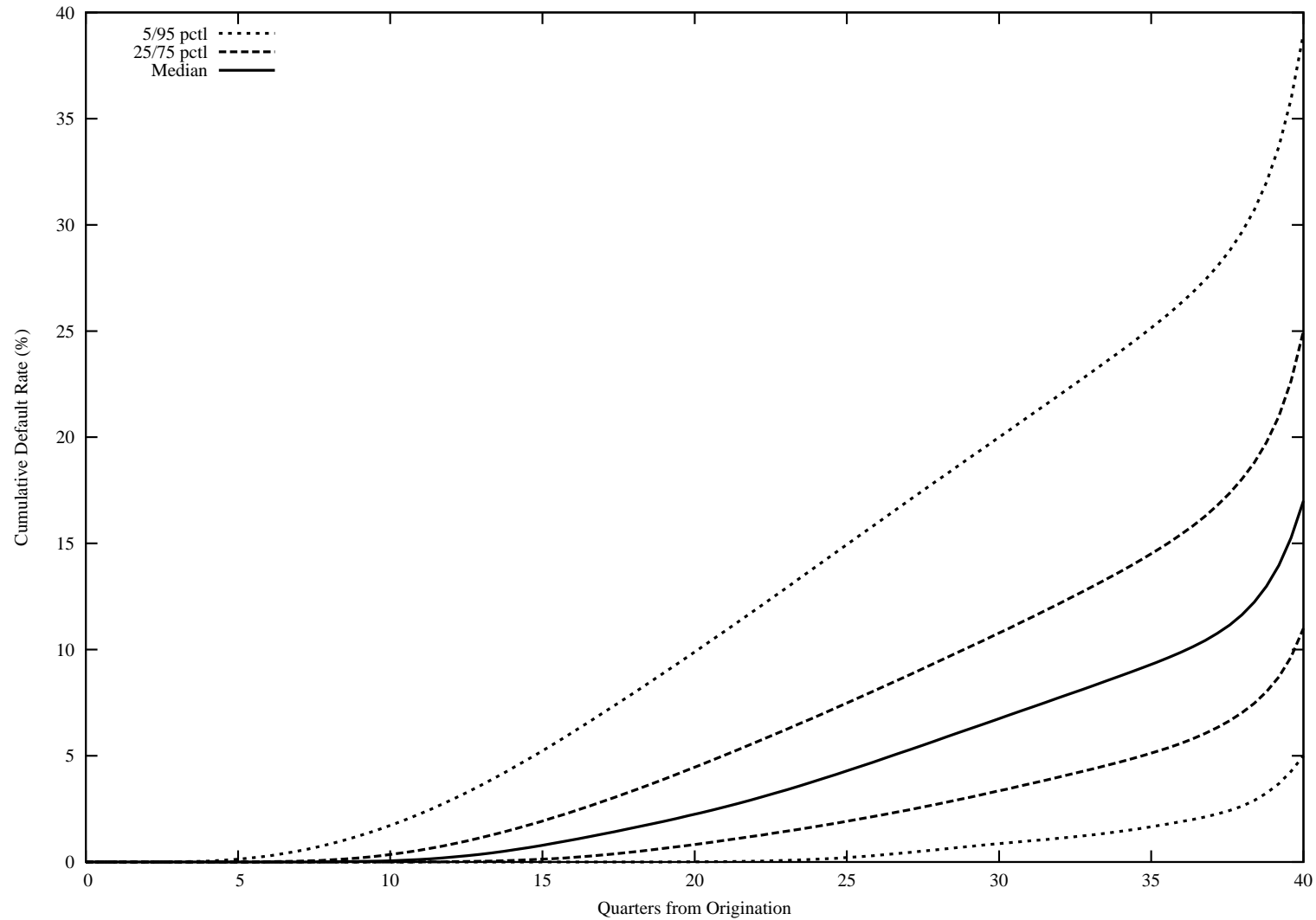


(d) Retail

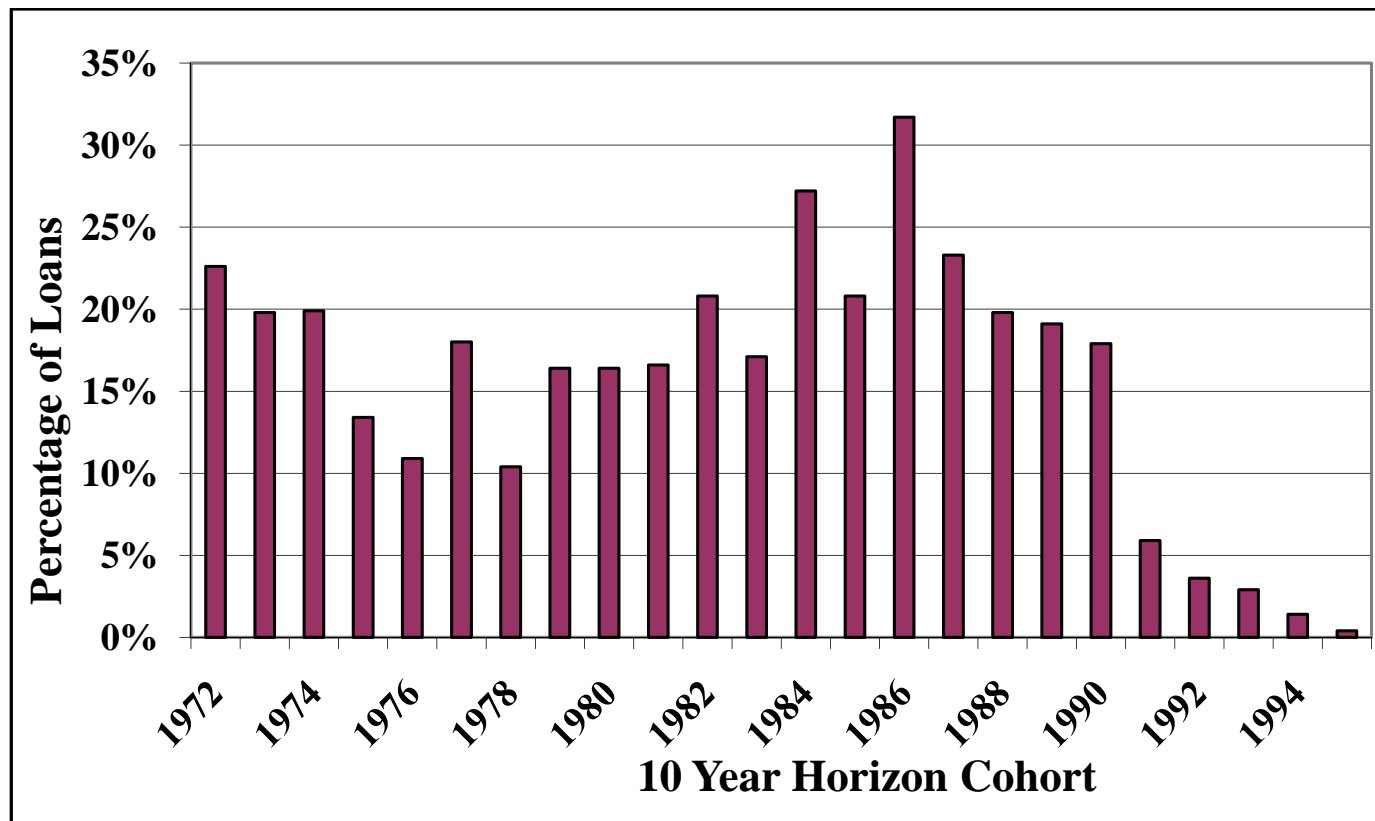
Simulating Expected Default Rates

- ▶ We solve the pricing problem on a discrete grid over all possible property prices and interest rates for representative CMBS pools (100 mortgages in each pool, 50 pools);
 - 25% Multifamily; 20% Office; 30% Retail; 10% Industrial; and 15% Other.
- ▶ Contract features matched to property specific means (e.g. coupon, amortization, maturity, and roll-over);
- ▶ Randomly draw LTVs to match mean and standard deviation;
- ▶ Simulate property prices and interest rates for each mortgage;
 - Valuation model determines default boundary for each loan type;
- ▶ **Solve for cumulative CMBS pool default rates given mortgage contract and property distributions**

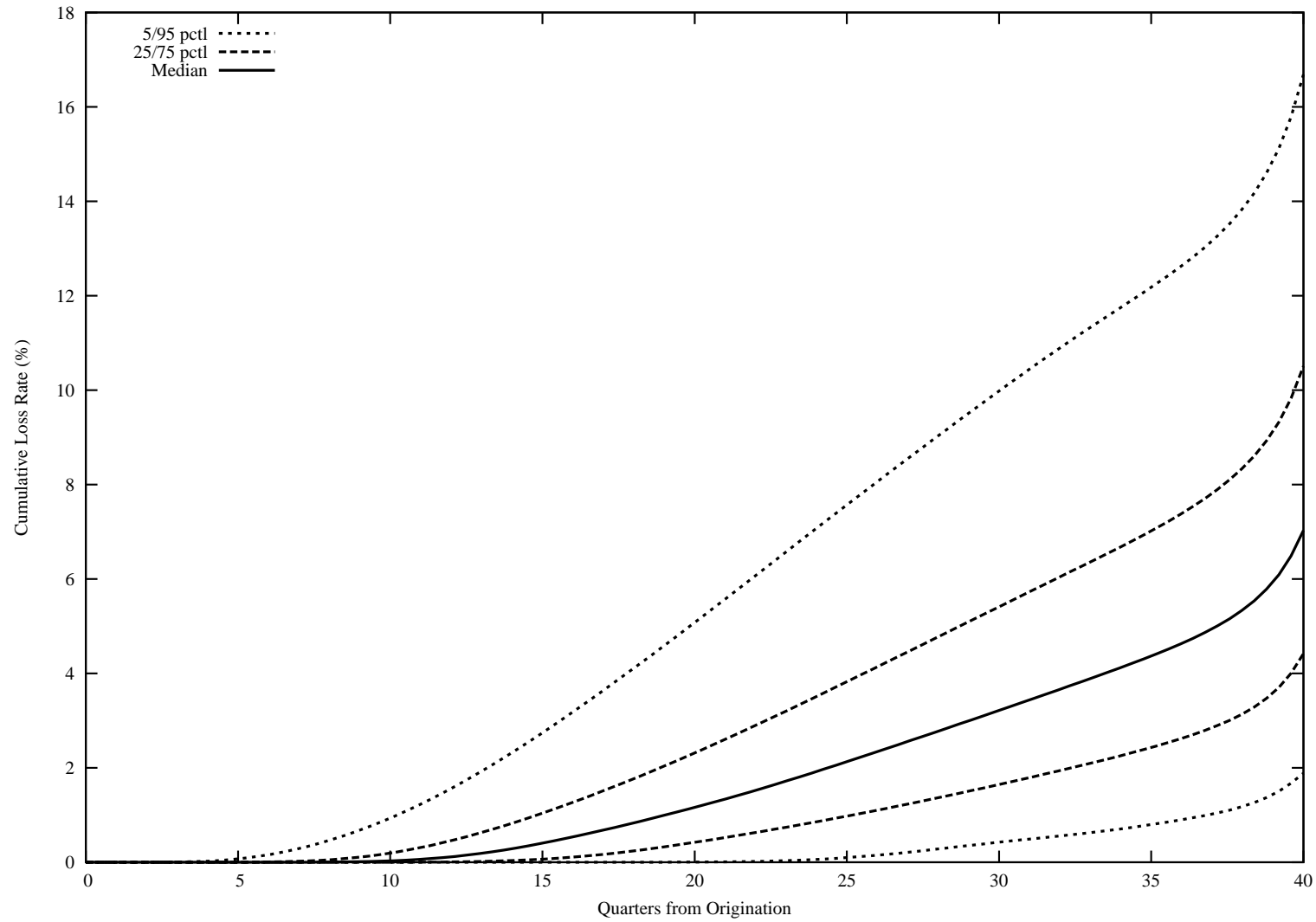
Distribution of Simulated Cumulative Default Rates



Realized Commercial Real Estate Default Rates (Esaki and Goldman, 2005)



Distribution of Simulated Cumulative Loss Rates



CMBS Default Rates Required for Loss

- ▶ The loss levels that would generate losses to BBB investors are:
 - 4.6% for 2006 pools,
 - 4.7% for 2007 pools.

2006 CMBS Conduit Pools - Number of Pools = 70

Short-Senior AAA	28.4
Long-Junior AAA	12.4
AA	10.4
A	7.8
BBB	4.6
BBB-	3.3

2007 CMBS Conduit Pools - Number of Pools = 65

Short-Senior AAA	28.5
Long-Junior AAA	13.6
AA	10.5
A	8.0
BBB	4.7
BBB-	3.2

Summary and Conclusions

- ▶ Ratings inflation has been hard to pin down due to the presence of many other confounding factors in bond markets other than CMBS.
 - CMBS investors are sophisticated.
 - There were no significant changes in commercial loan characteristics or pricing from 1995 through 2007.
 - Expected defaults are in line with levels observed over almost the whole of the 40-year period before the crisis.
- ▶ Trends in the CMBS market are consistent with regulatory arbitrage following the loosening of risk-based capital requirements in 2002:
 - Significant decreases in the subordination levels for senior bonds.
 - Sophisticated investors were willing to pay high prices for AA and AAA CMBS.
 - Elevated rates of upgrading CMBS bonds relative to similarly rated RMBS bonds (inconsistent with overall shifts in risk perceptions for AAA labels).
- ▶ **Conclusion:** Regulatory-capital arbitrage appears to have driven CMBS investment strategies prior to the financial crisis – these strategies increased the leverage of these firms and their susceptibility to even minor shocks to fundamentals.