



Did Subjectivity Play a Role in CDO Credit Ratings?

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The Crisis and CDOs

CDOs and other like securities (MBS) helped...

1. Fuel Housing Bubble and LBO boom

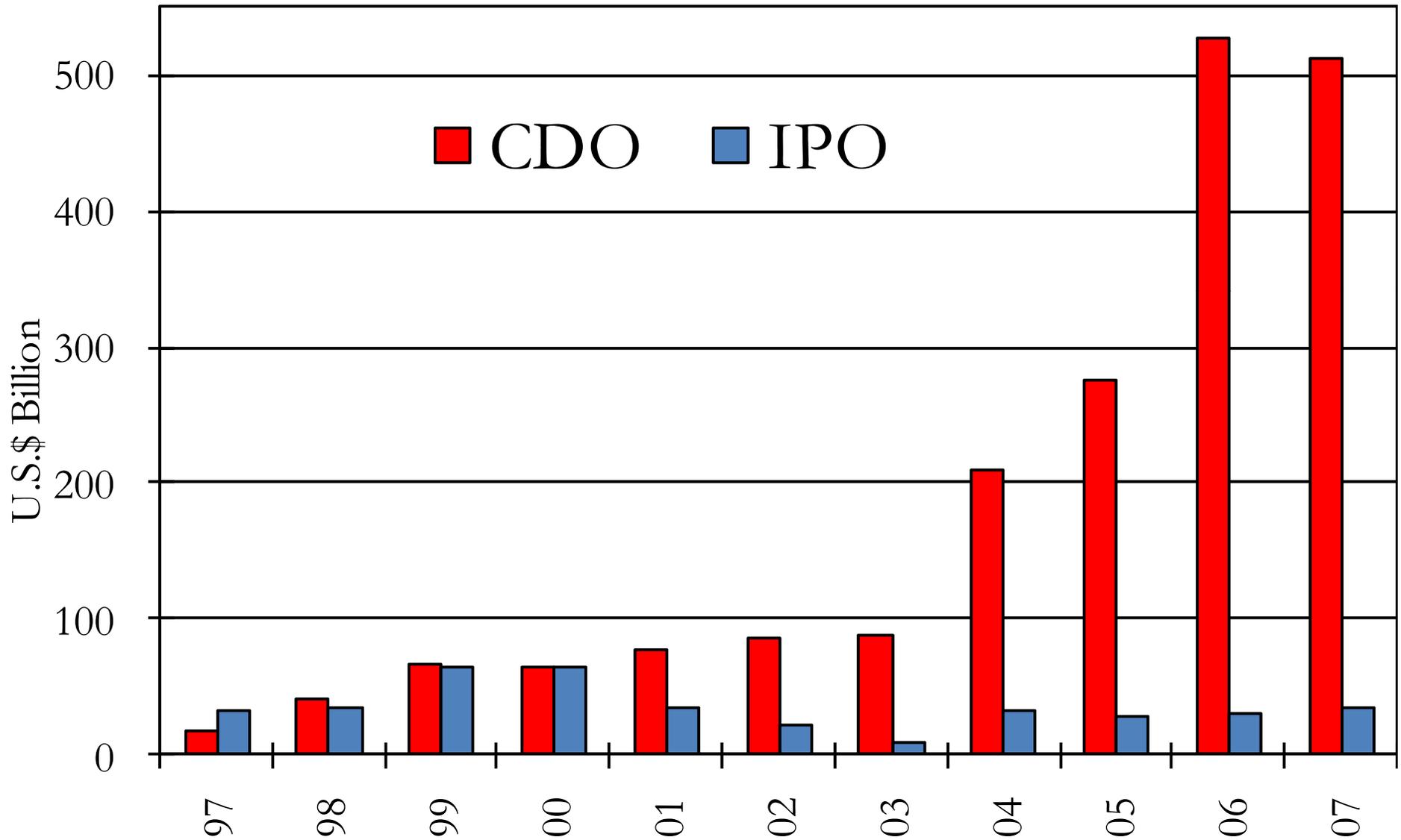
- MBS, Deng, Gabriel, and Sanders (2009)
- LBO boom, Shivdasani and Wang (2009) and Benmelech, Dlugov, and Ivashina (2009)

2. Cripple the banking system

- Survey, Brunnermeier (2009)



Dollar Value of CDO and IPO Issuance





The Debate

- 1. Rating agencies did their best, but used bad practices...**
 - Used the wrong model
 - Underestimated correlation risk
 - Didn't consider the correlated nature of the risk
- 2. Credit rating agencies did not do their best**
 - Did rating agencies follow their standards and procedures?
 - Or, did they issue inflated ratings
- What lessons to draw from the crisis?**
 - Distinction between mispricing and bad incentive is important for understanding what to fix
 - Stulz (2008)



Some say Credit rating agencies issued inflated ratings...

- “Credit rating agencies contributed significantly to the recent market turmoil by underestimating the credit risk”
 - President’s Working Group (Treasury, Fed, SEC, CFTC), March 2008
- “I view the **ratings agencies** as one of the key culprits...The **banks** could not have done what they did without the complicity of the ratings agencies.”
 - Joseph Stiglitz, a Nobel laureate economist at Columbia University, September, 2008
- Only ‘evidence’ is a few stories from people on the street. tails.

Rating Agencies Statements



- “there is no evidence of any misconduct by our analysts or that the fundamental integrity of our ratings process has been compromised. Indeed, the SEC itself concluded that it found no evidence during its examination that S&P had compromised its standards to please issuers.”
 - **Deven Sharma, President of S&P** (Direct quotes from testimony before U.S. House of Representatives Committee on Oversight and Government Reform on Oct 22, 2008)
- “Generalizations regarding integrity, independence and risk management amount to no more than puffery”
 - **Moody’s said in court papers**
(http://www.bloomberg.com/apps/news?pid=20601039&refer=columnist_weil&sid=aQzRB3sWOivE#)

Main Findings



1. 'Out-of-model' adjustment:

- a) There is a difference between CRA model and actual ratings
- b) The difference is positive.
- c) It is hard to explain with determinants like manager quality
- d) When CDO model gives low AAA, CDO receives a larger adjustment
- e) Adjustment predicts future downgrading

2. Rating criterion deviation:

- a) Prior to April 2007, 93% of AAA securities were AA;
 - b) New CDOs issued after April 2007, 91% AAAs were AAA;
 - c) Old CDO ratings follow old standard after April 2007
- ❖ Value of 1&2 is large: \$94 mm per CDO; \$86 bn for 916 CDOs



Potential Problems with Credit Ratings

- **Improperly modeled correlations**
- **Didn't consider Catastrophe**
 - Coval, Jurek, and Stafford (2009 AER)
- **Model risk**
 - Coval, Jurek, and Stafford (2009 JEP)
- **Their model implementation was problematic due to poor inputs**
 - Keys et al (QJE 2008), Mian and Sufi (QJE 2008), Ben-David (2008)
- **Going beyond the model...**
- **Did rating agencies follow the standards and procedures they had in place?**

Other Closely Related Literature



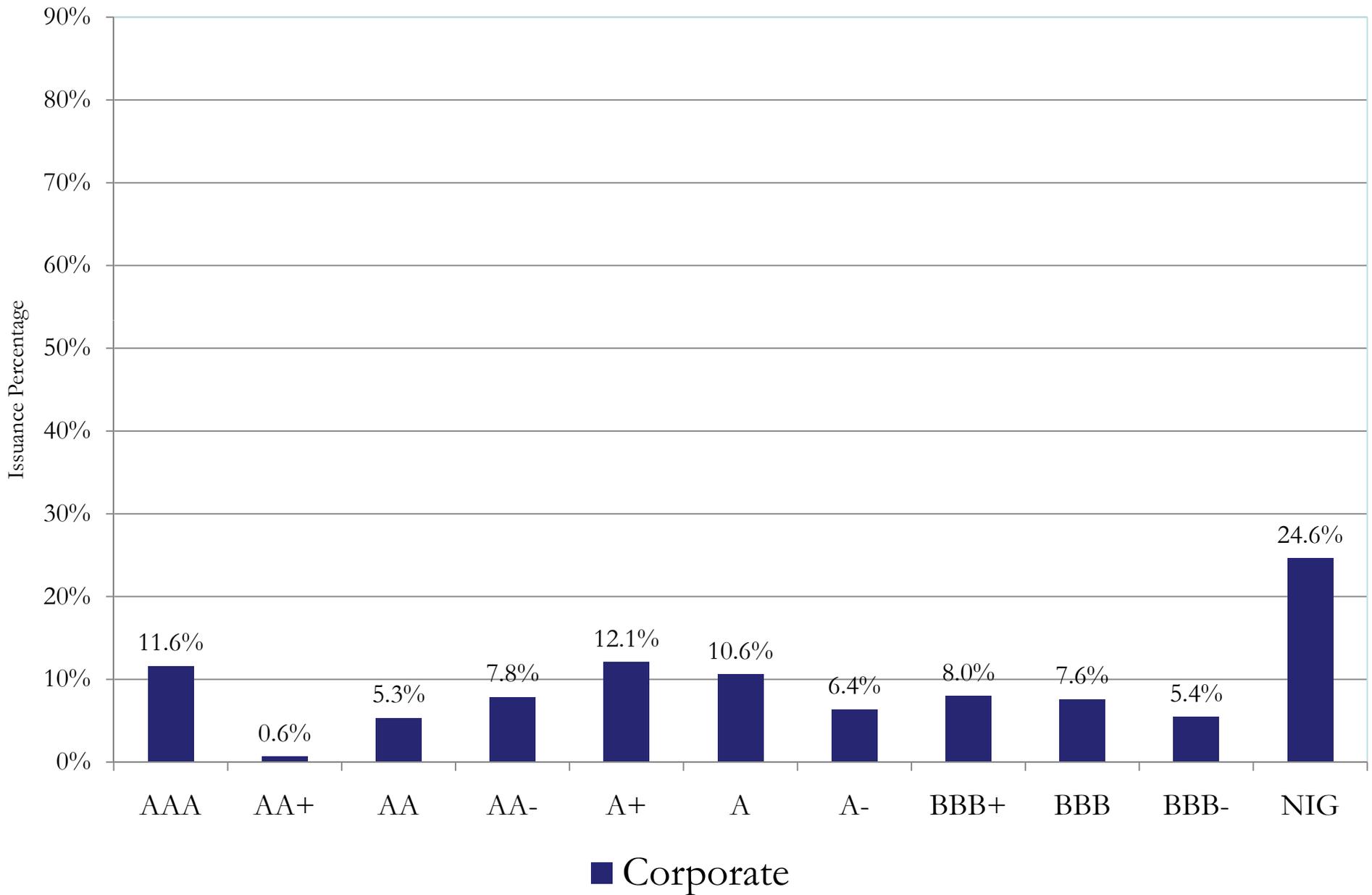
- **CDOs**
 - Longstaff and Rajan (2008 JF)
 - Benmelech and Dlugosz (2009 JME, 2009 Macro)
- **Effects of CDOs**
 - Deng, Gabriel, and Sanders (2009), Shivdasani and Wang (2009), Benmelech, Dlugosz, and Ivashina (2009); Ivashina and Sun (2009)
- **CMOs and MBS**
 - Ashcraft and Schuermann (2008), An, Deng, and Sanders (2008), Davidson, Sanders, Wolff, and Ching (2008), Ashcraft, Goldsmith-Pinkham, and Vickery (2009)
- **Credit Ratings:**
 - Skreta and Veldkamp (2009 JME), Bolton, Freixas, and Shapiro (2009), Mathis, McAndrews, and Rochet (2009), Opp and Opp (2009), Sangiorgi, Sokobin, and Spatt (2009)
 - Blume, Lim, and MacKinlay (1998 JF), Jorion, Shi, and Zhang (2009 RAS), Bongaerts, Cremers, and Goetzmann, (2009)



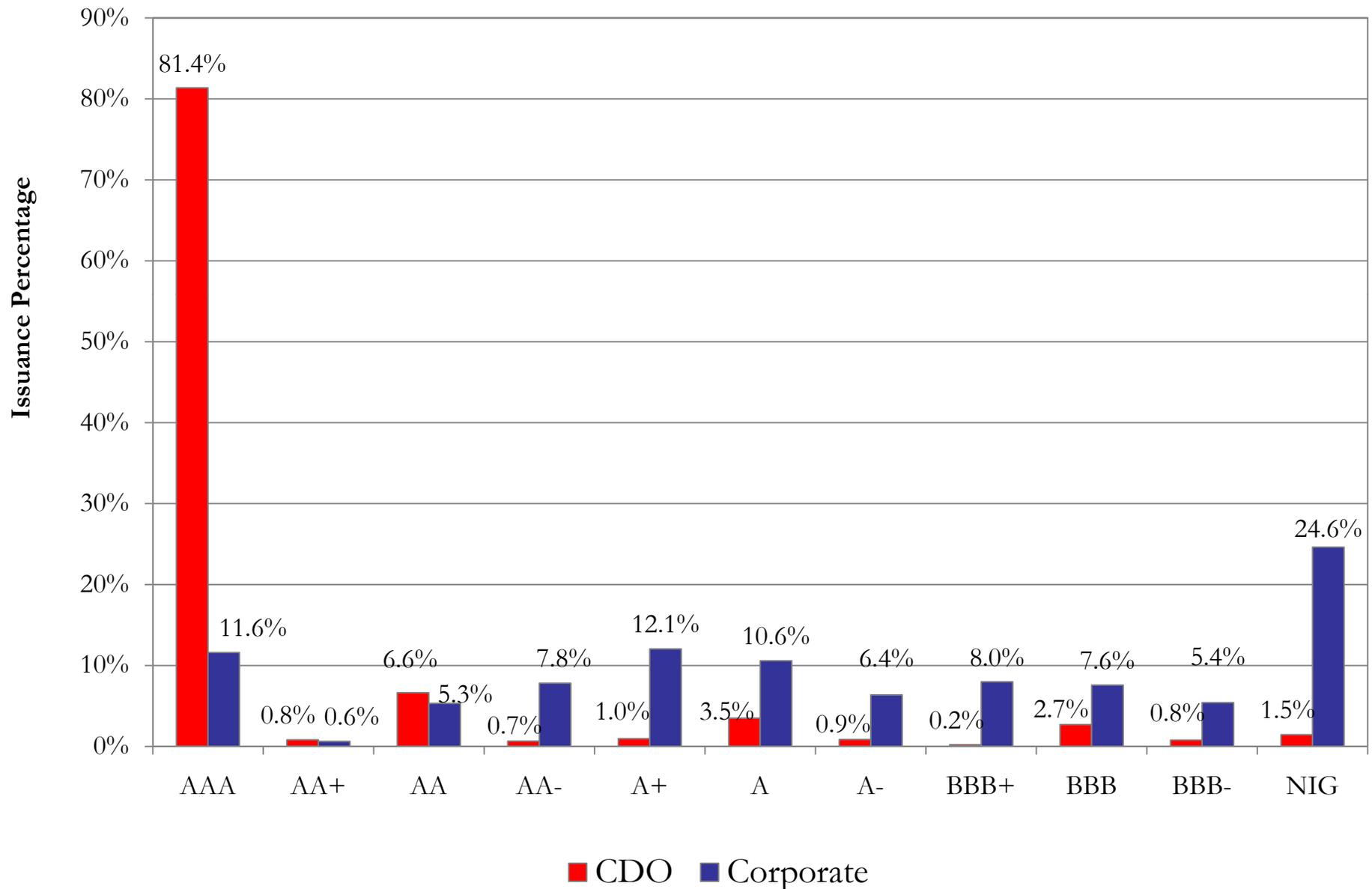
CDO Data

- **From one of top two rating agencies**
 - Previously available for subscription
- **Deal information**
 - Structure and rating (e.g., % AAA); parties involved
 - Asset characteristics
- **Presale, new-issue reports; rating history**
- **Rating model information**
 - Inputs (e.g., default risk criterion)
 - Outputs (e.g., % eligible for AAA)
- **Final sample: 916 CDOs (~37% of market)**

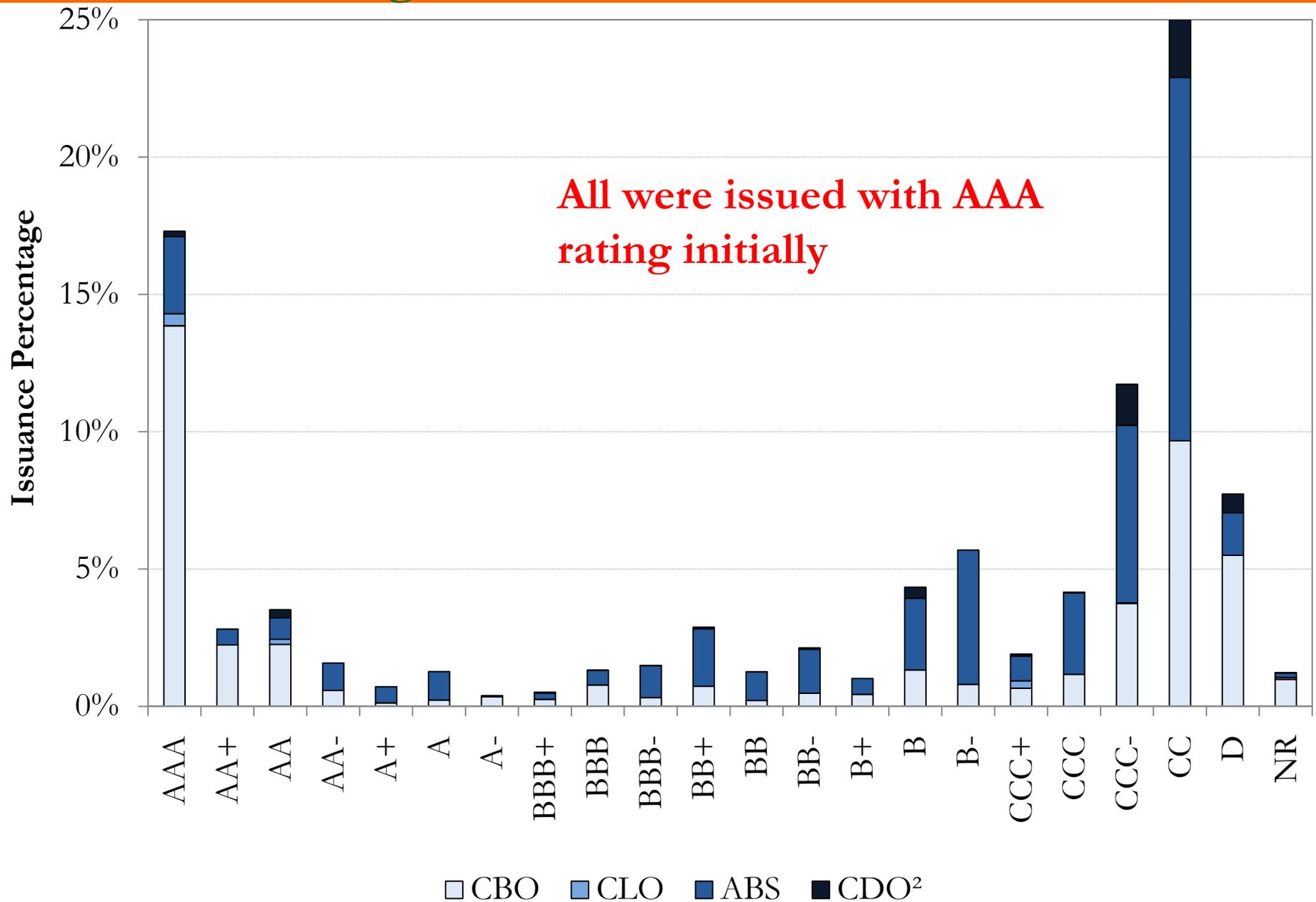
Corporate Credit Rating Distribution: 1997 to 2007



Credit Rating Distribution: 1997-2007



December 2008 (Active) Rating Distribution for Original AAA Rated CDO Tranches



CDO Characteristics



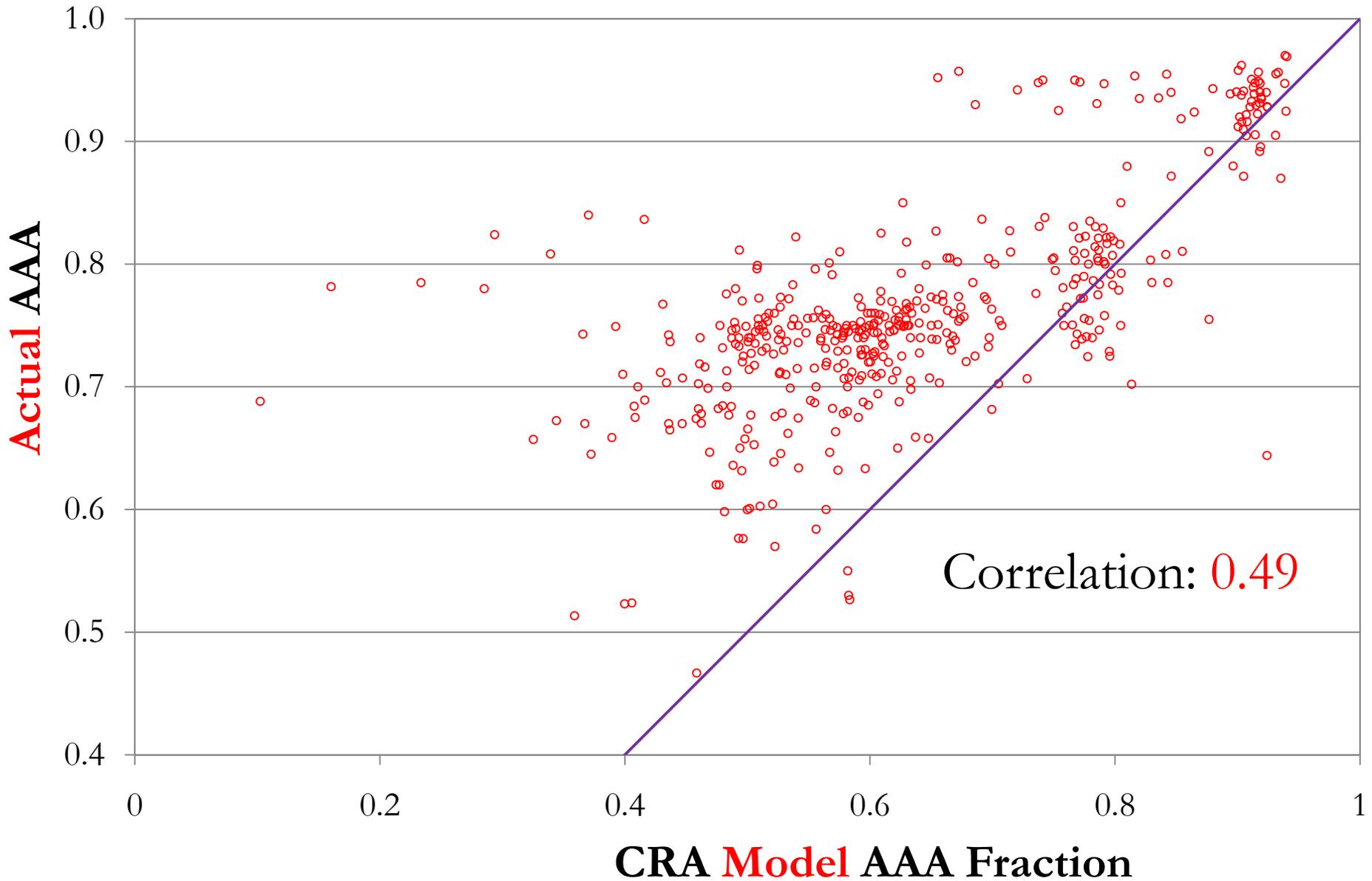
Variables	All	
	Initial	Cont'd
#. Obs.	916	2506
Col. Rating	BB+	BB
Correlation	0.42	0.40
Col. Maturity(Years)	6.45	6.06
Col. Size (\$millions)	634.3	547.2
#. Assets	218.3	230.2
#. Obligors	130.0	133.5
Synthetic Dummy	0.14	0.08
<u>AAA Fraction (SS)</u>	0.755	0.76
Overcollateralization	1.00	0.94
Insurance Dummy	0.06	0.08
Liquidity Dummy	0.23	0.25

1a. “Out-of-Model” Adjustment?



Variables	All	CBO	CLO	ABS CDO	CDO ²
#. Obs.	916	96	393	373	54
1- AAA SDR = Fraction AAA					
<u>CRA Model</u>	0.63	0.62	0.57	0.72	0.57
<u>Actual AAA</u>	0.75	0.73	0.73	0.8	0.72
<u>CRA Adjustment</u>	0.12	0.10	0.16	0.08	0.15
Year	≤2004	2005	2006	2007	
Adjustment	8.3%	9.7%	12.8%	18.2%	

1b. Actual AAA vs. CRA CDO Model AAA Fraction



1c. Explaining Adjustments



Explicability Comparison: Link to Asset Fundamentals

	CRA Model	Actual AAA
	Initial	Initial
Col. Def. Prob.	-1.98 (-12.15)	0.86 (3.56)
Avg. Col. Rating	-0.02 (-19.54)	-0.01 (-8.21)
Correlation	-0.46 (-25.62)	-0.12 (-4.32)
Adj. R ²	0.83	0.29



Trying to Explain the CRA AAA Adjustment

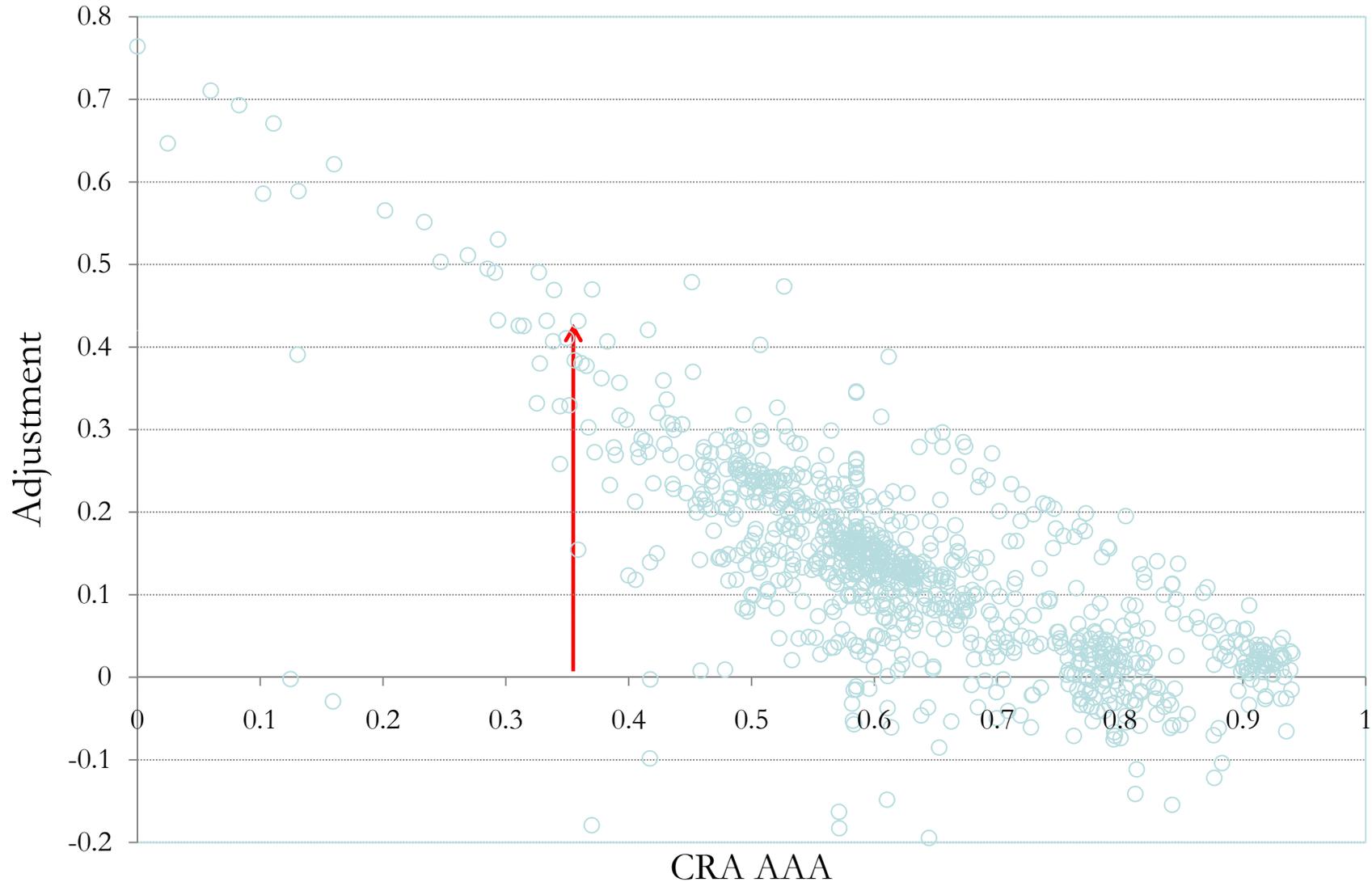
Dependent Variable: **AAA Adjustment**

	(1)	(2)
<u>Log(Mgr Deals)</u>	0.010 (2.21)	0.012 (2.82)
Overcollateralization		-0.079 (-10.07)
Insurance Dummy		0.034 (1.83)
Liquidity Dummy		-0.005 (-0.43)
Adjusted R ²	0.005	0.112

Economic determinants bear little relation to the adjustment.

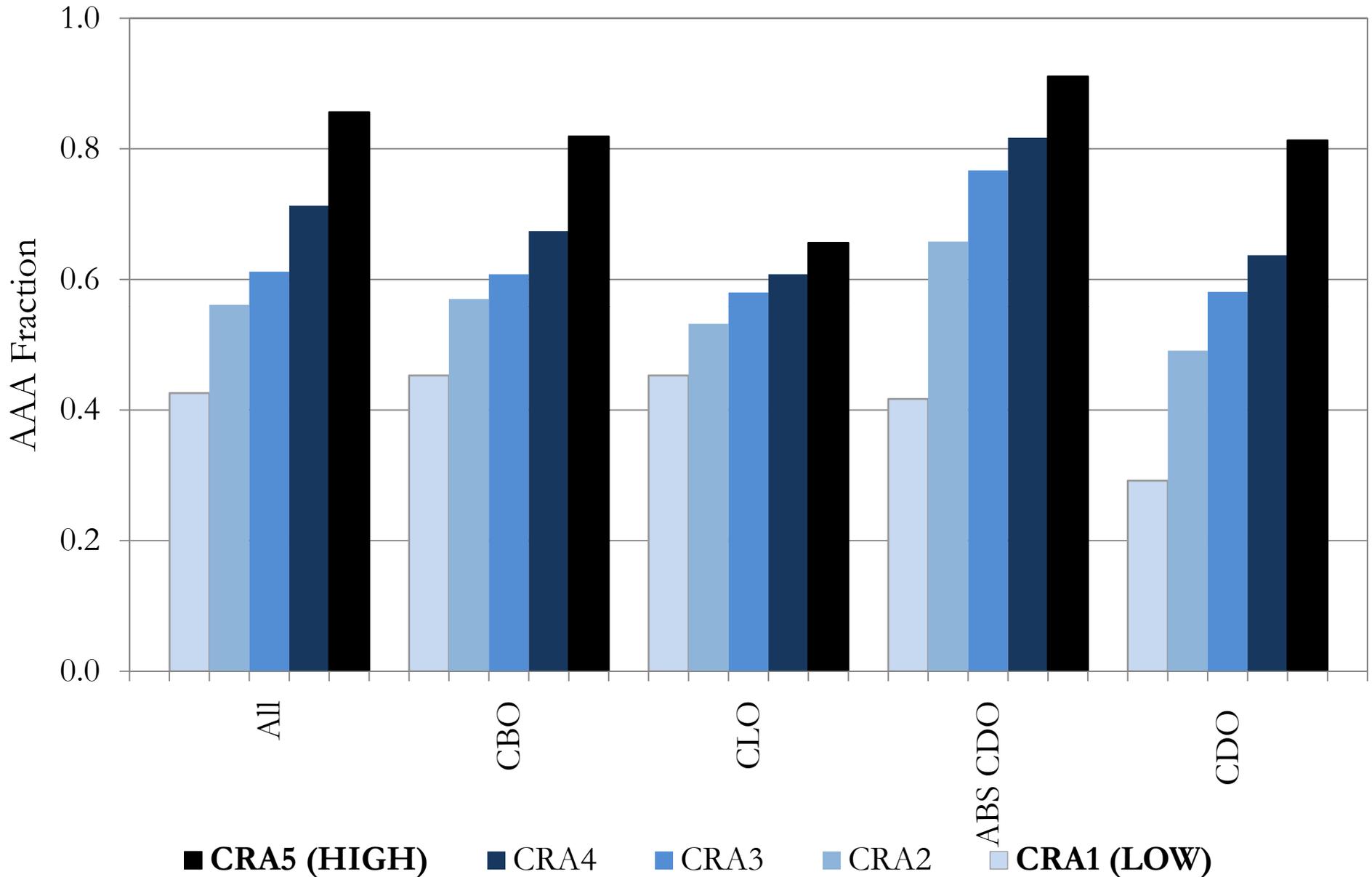


1d. CRA Model Predicts AAA Fraction



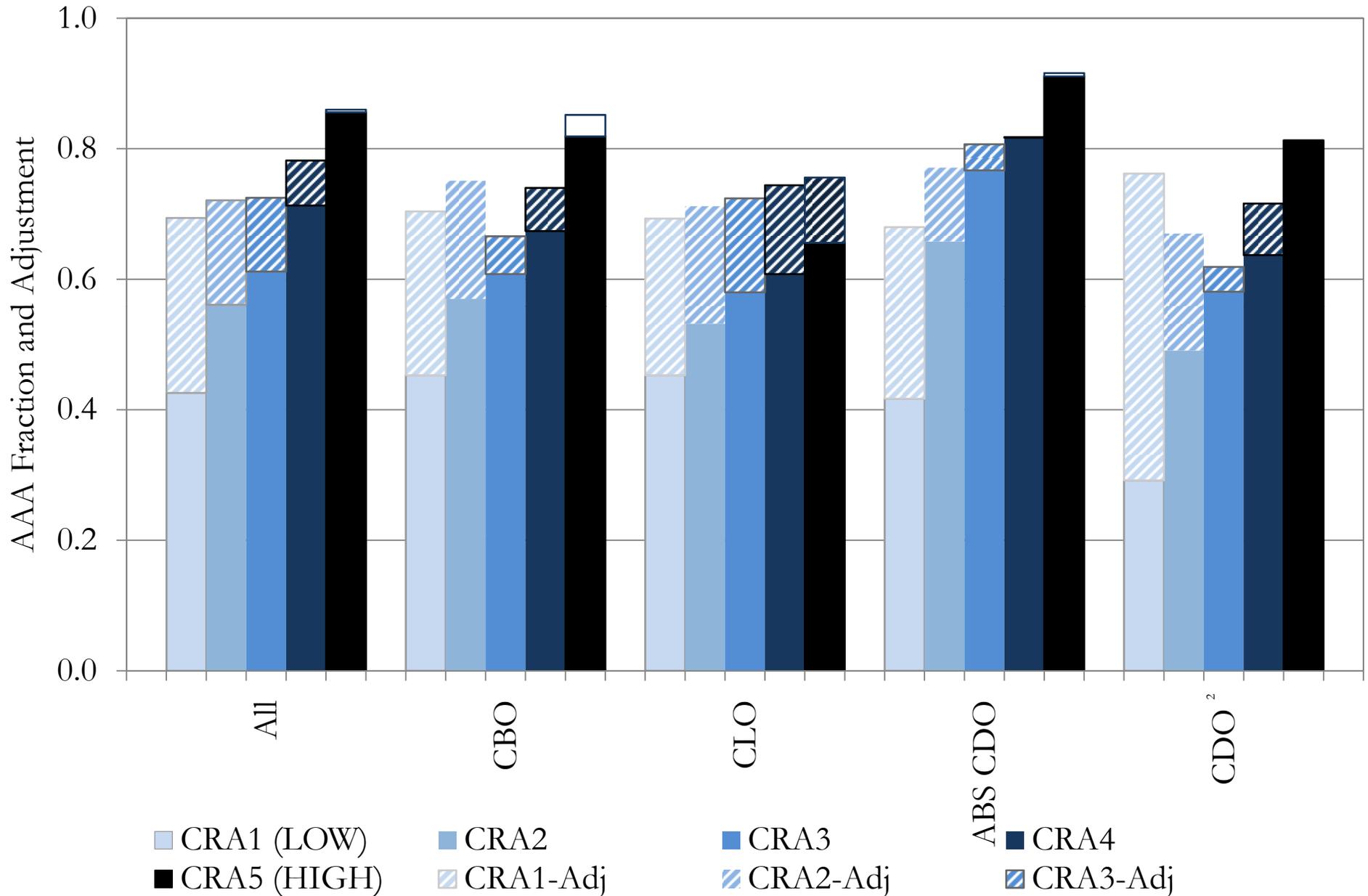
Lowest model AAA receives highest adjustment

1d. CRA Model Predicted AAA Fraction





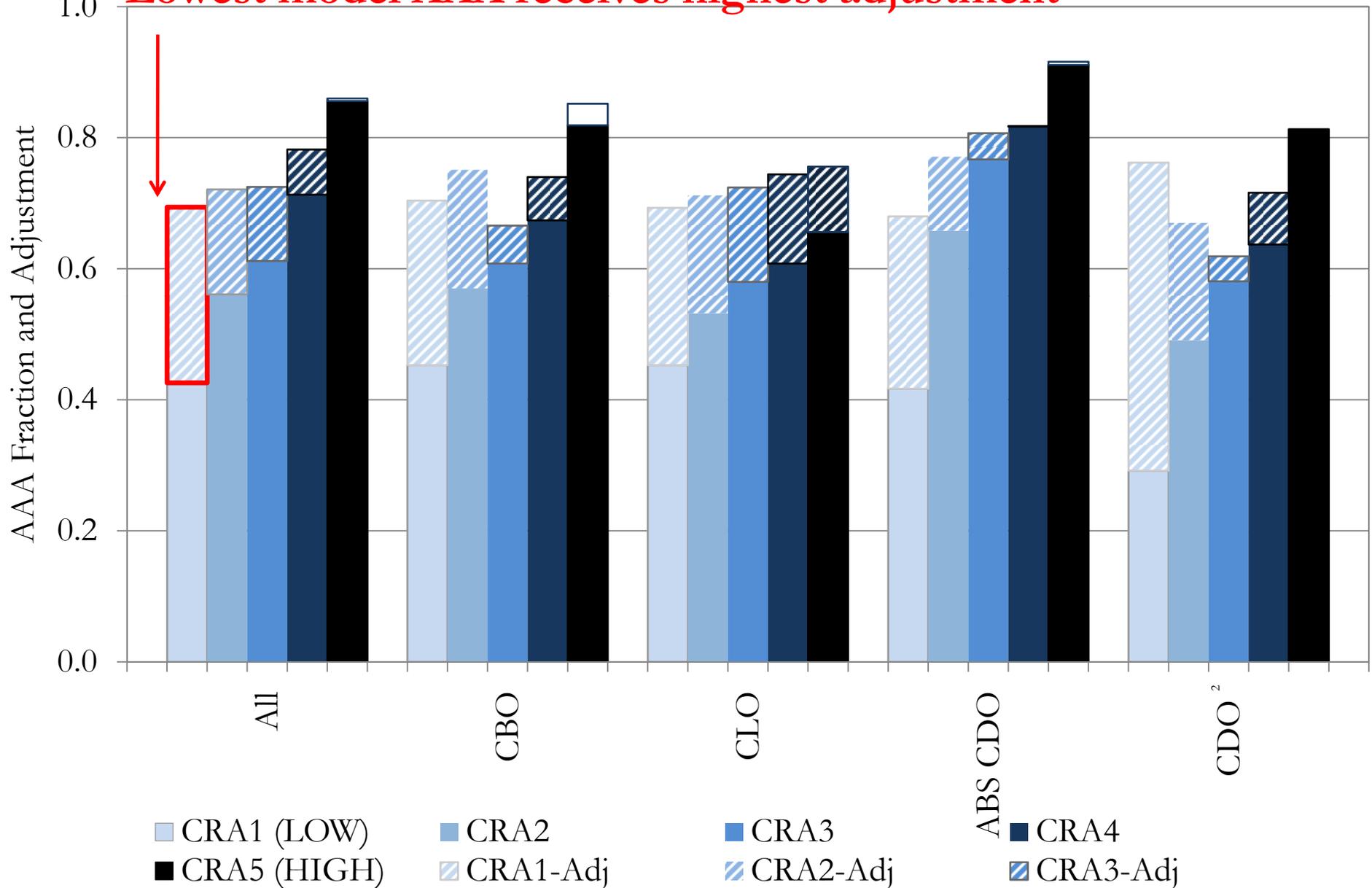
1d. Actual AAA Fraction





Actual AAA Fraction

Lowest model AAA receives highest adjustment





1d. Trying (again) to Explain the CRA AAA Adjustment

Dependent Variable: AAA Adjustment

	(1)	(2)	(3)	(4)
Log(Mgr Deals)	0.010 (2.21)	0.012 (2.82)		0.007 (2.44)
Overcollateralization		-0.079 (-10.07)		-0.061 (-11.00)
Insurance Dummy		0.034 (1.83)		0.040 (3.10)
Liquidity Dummy		-0.005 (-0.43)		0.006 (0.75)
CRA AAA			-0.642 (-30.18)	-0.618 (-30.83)
Adjusted R ²	0.005	0.112	0.503	0.569

1e. Predicting Downgrades



Ordered logit regression for notches downgraded

<u>AAA Adjustment</u>	25.587 (6.66)	6.796 (3.60)
CLO	2.505 (2.70)	2.716 (2.16)
ABS CDO	60.098 (11.28)	87.323 (9.83)
CDO ²	36.207 (6.90)	43.123 (6.07)
Multiple CRAs		0.688 (-1.46)
Pseudo R ²	0.143	0.190

1e. Predicting Downgrades



Ordered logit regression for notches downgraded

<u>AAA Adjustment</u>		25.587 (6.66)	6.796 (3.60)
	Initial		
	adjustment		
	predicts		
	subsequent		
	downgrading.		
CLO		2.505 (2.70)	2.716 (2.16)
ABS CDO		60.098 (11.28)	87.323 (9.83)
CDO ²		36.207 (6.90)	43.123 (6.07)
Multiple CRAs			0.688 (-1.46)
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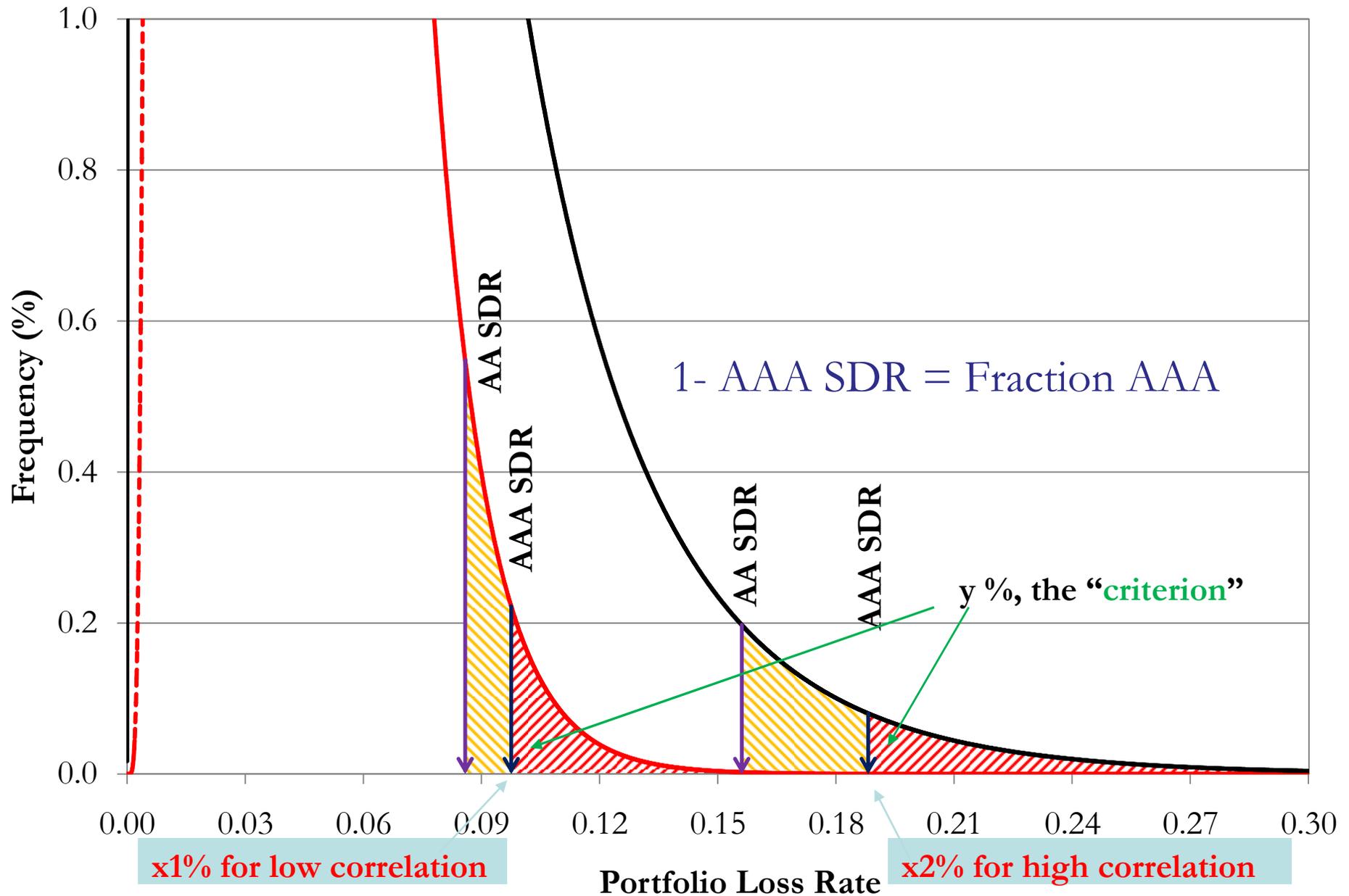
2. AAA Default Risk Criteria

	Maturity (Years)									
	1	2	3	4	5	6	7	8	9	10
Fitch	0.00%	0.00%	0.01%	0.02%	0.03%	0.05%	0.08%	0.11%	0.15%	0.19%
Moody	0.0001 %	0.0002 %	0.0007 %	0.0018 %	0.0029 %	0.0040 %	0.0052 %	0.0066 %	0.0082 %	0.0100 %
S&P	0.000 %	0.009 %	0.030 %	0.065 %	0.118 %	0.190 %	0.285 %	0.405 %	0.552 %	0.728 %

Default Risk Analysis Step 2:



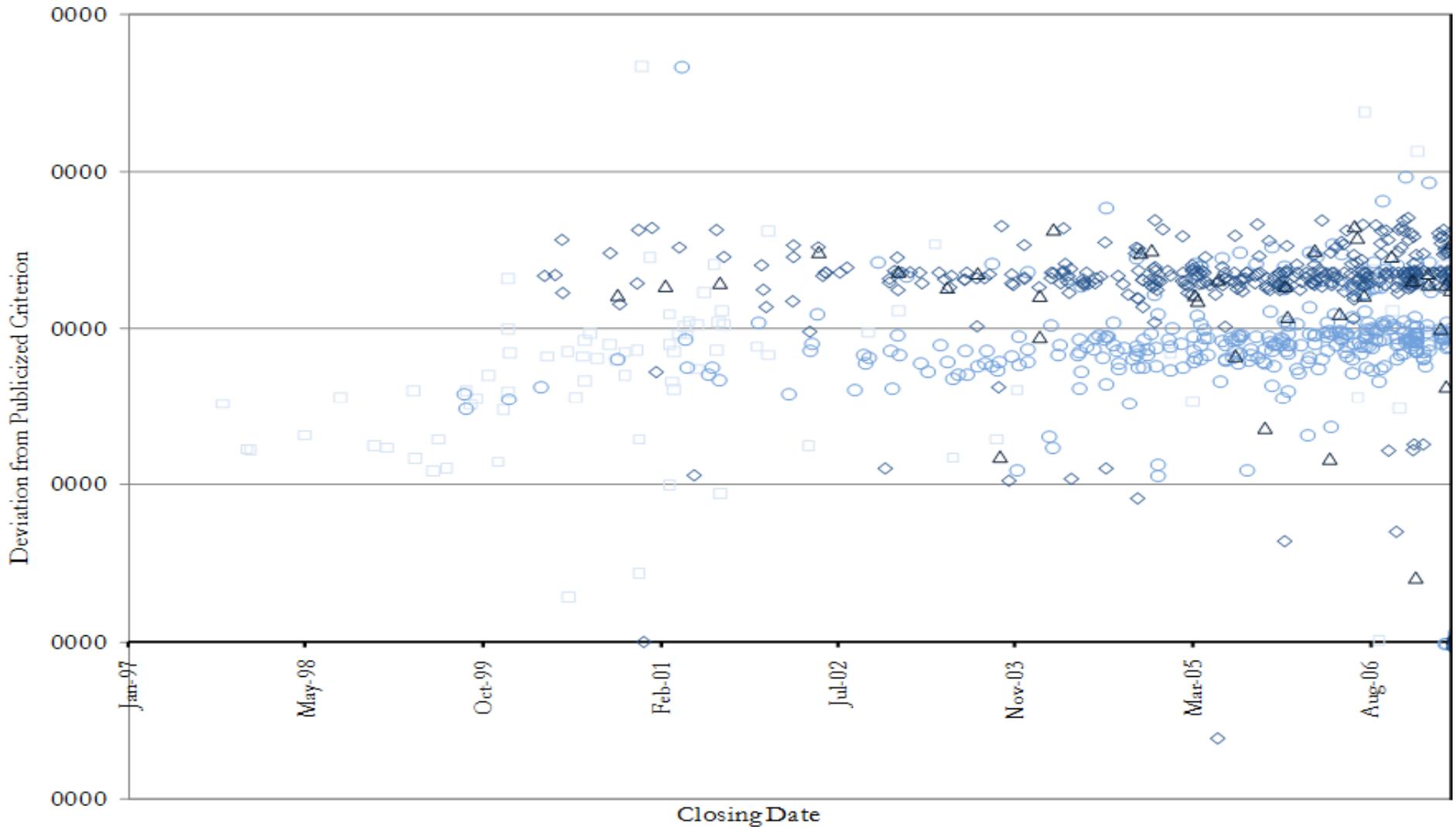
Mapping Default Criterion to Scenario Default Rate



Criterion Deviation in First Surveillance Report, for AAA CDOs



Issued 1997-Mar. 07



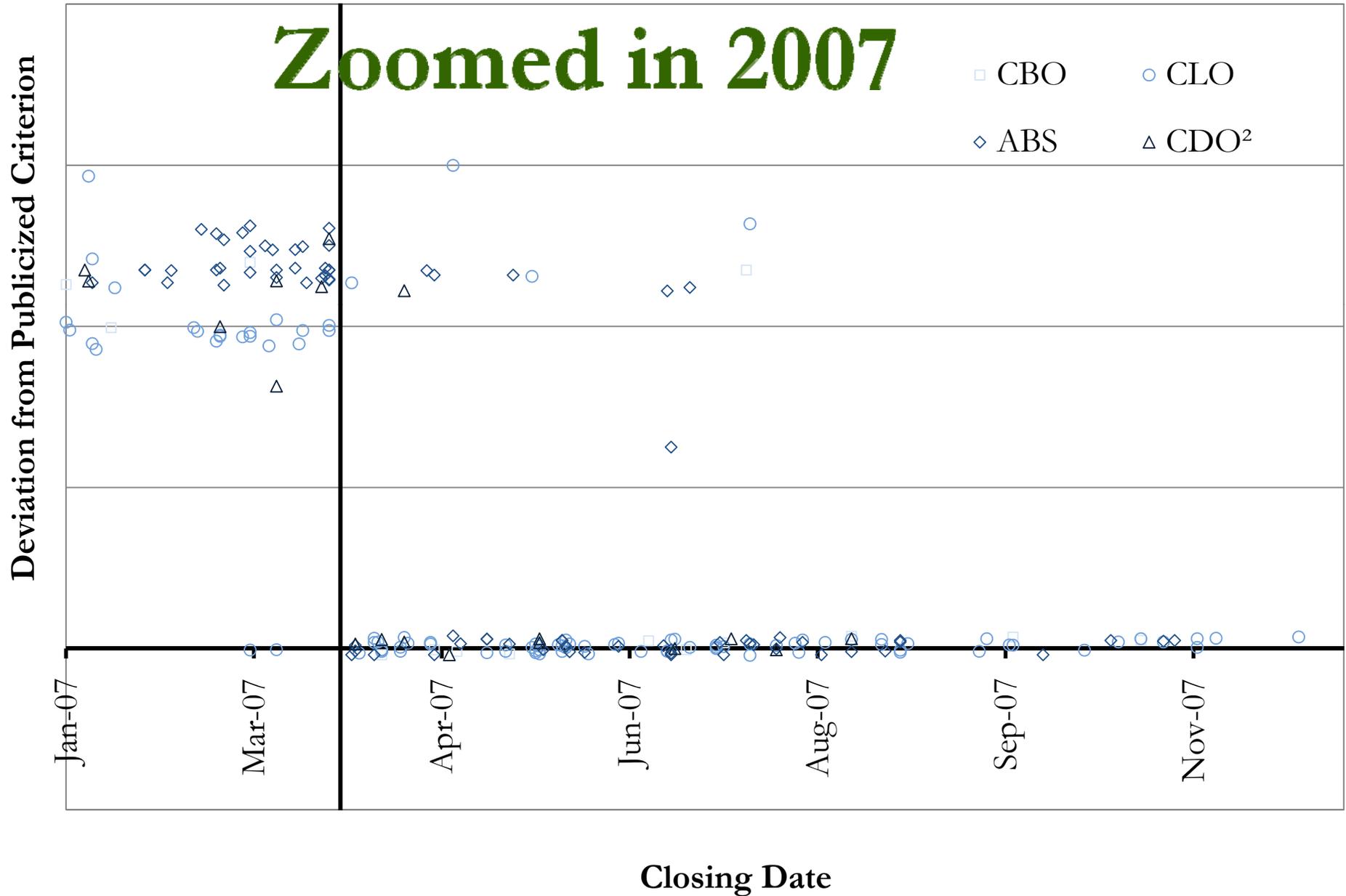
2a. Criterion Deviation in First Surveillance Report, for AAA CDOs



Issued 1997-2007

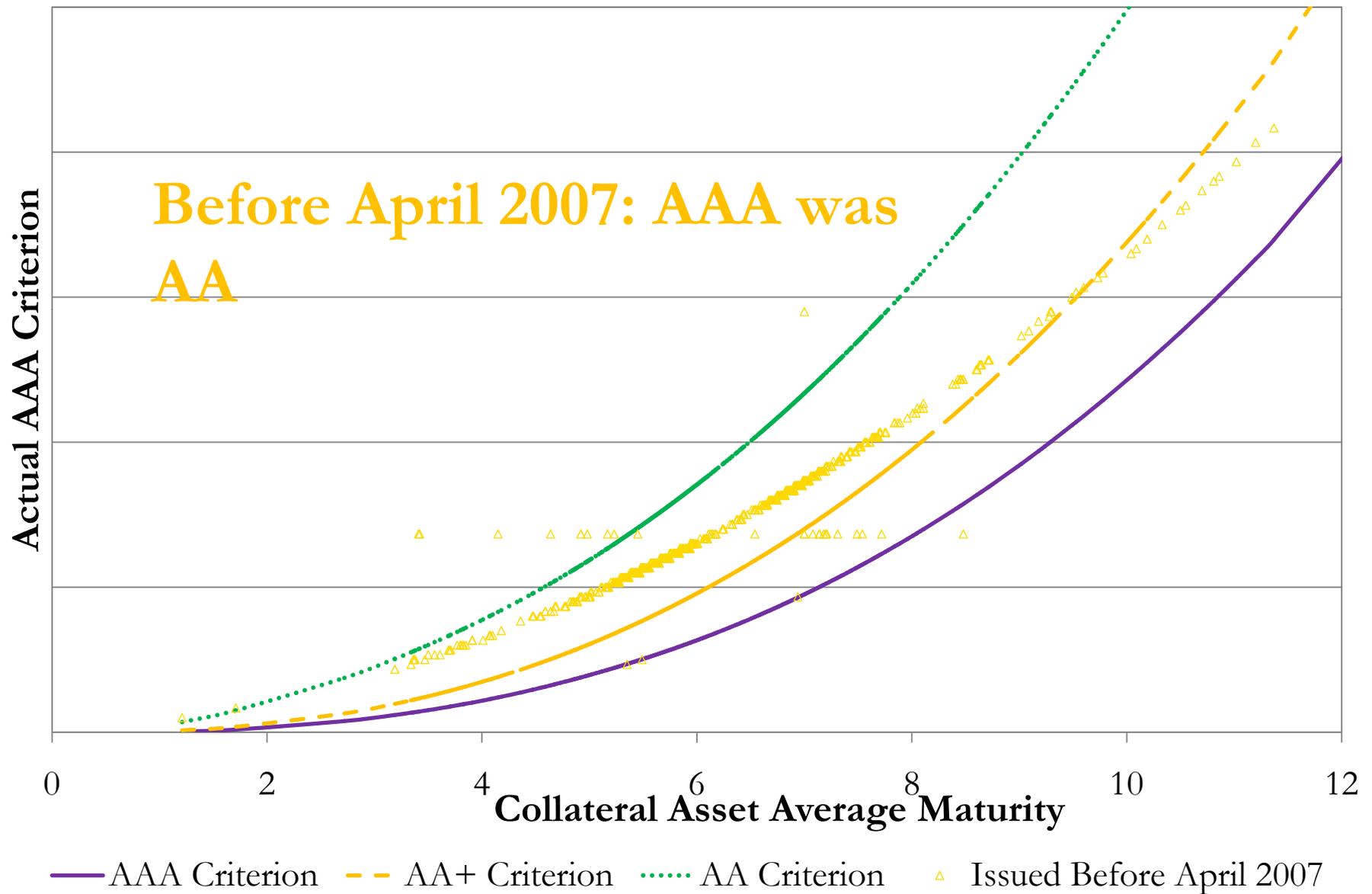


No Deviation after April 2007



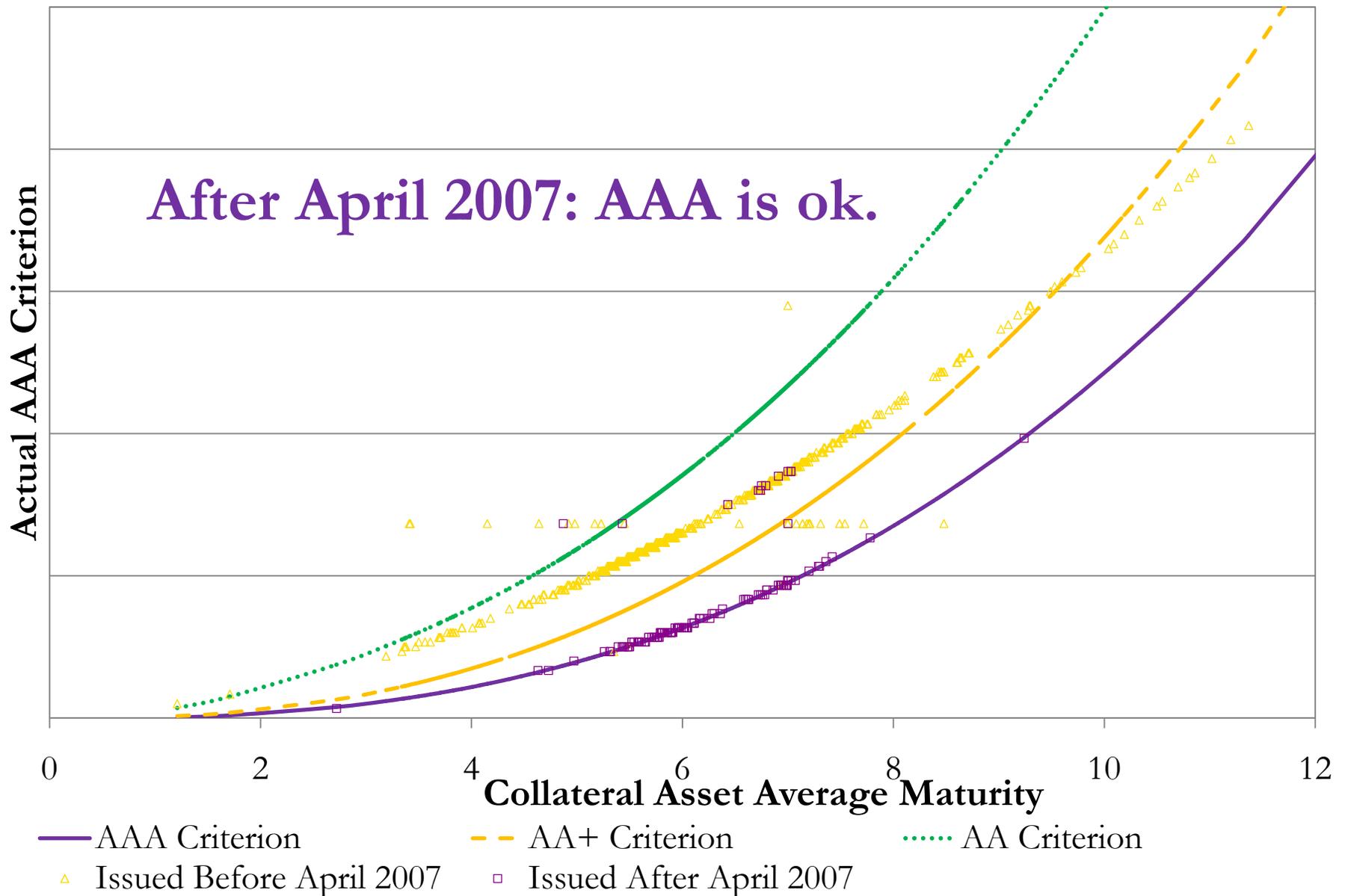
Publicized and Actual CDO AAA Credit Rating

Default Criterion

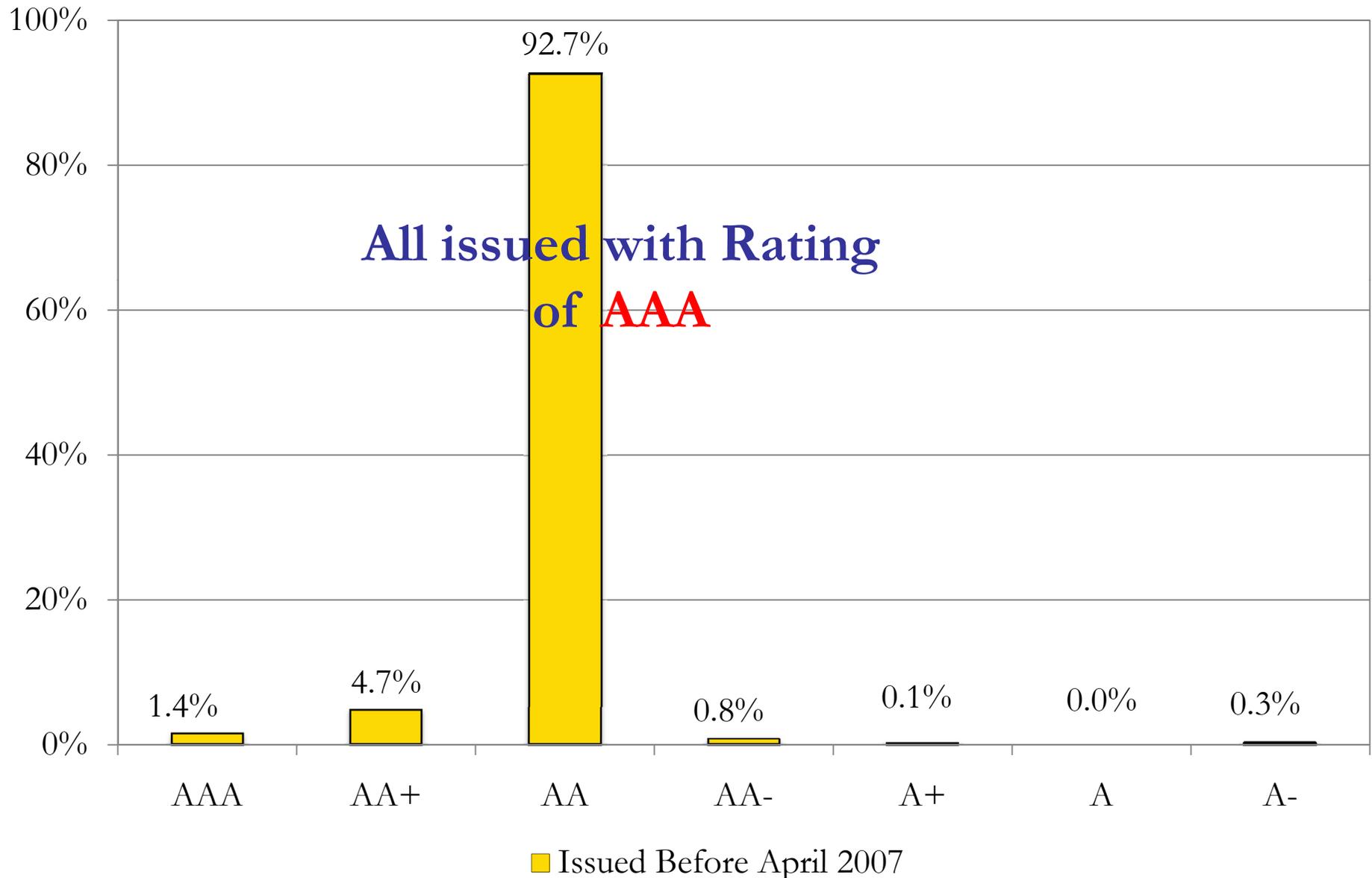


Publicized and Actual CDO AAA Credit Rating

Default Criterion

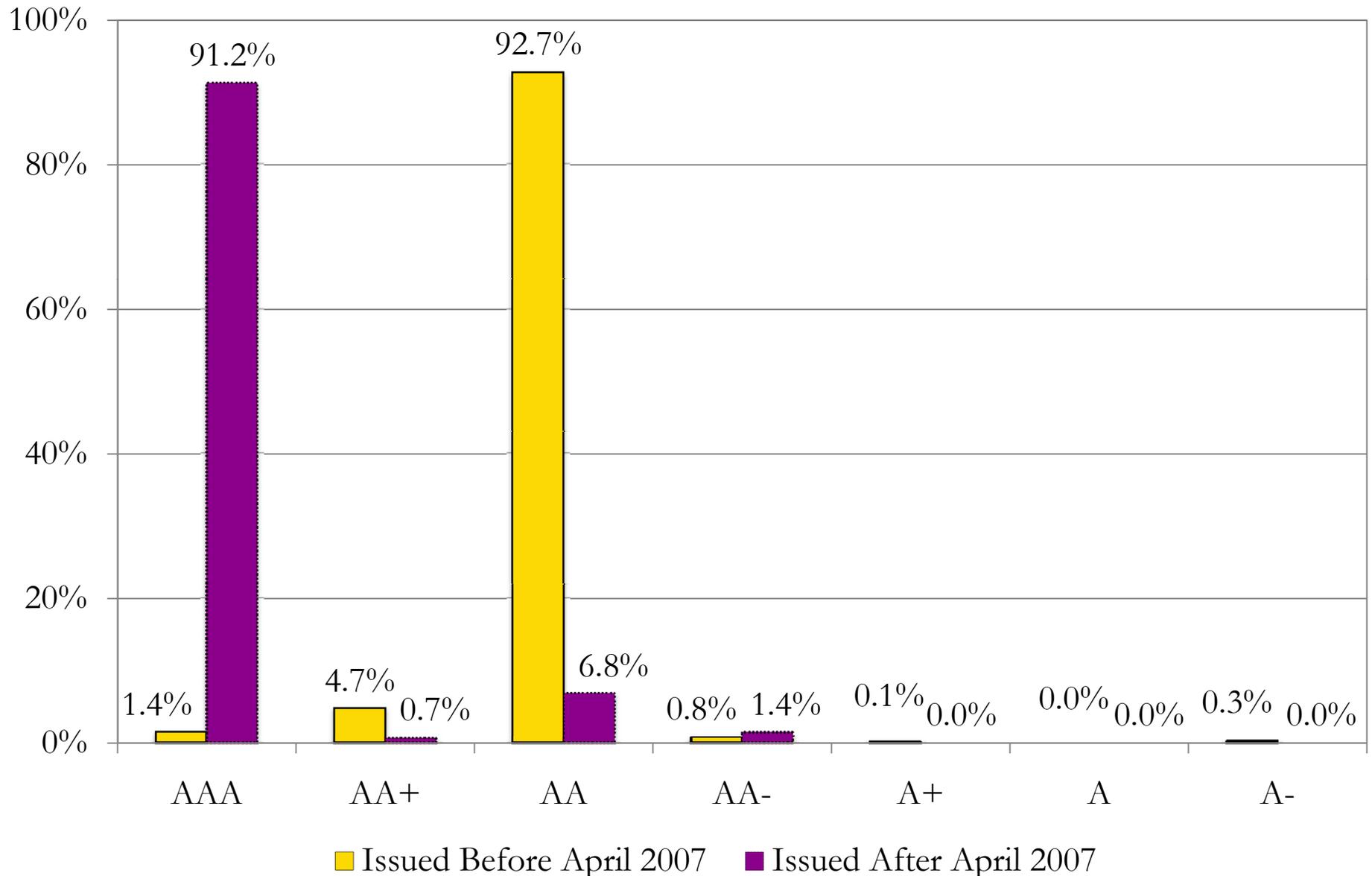


Credit Quality Distribution According to Publicized AAA Criterion for CDO Tranches with Initial AAA Rating



Credit Quality Distribution According to Publicized AAA

Criterion for CDO Tranches with Initial AAA Rating



Continuing Ratings

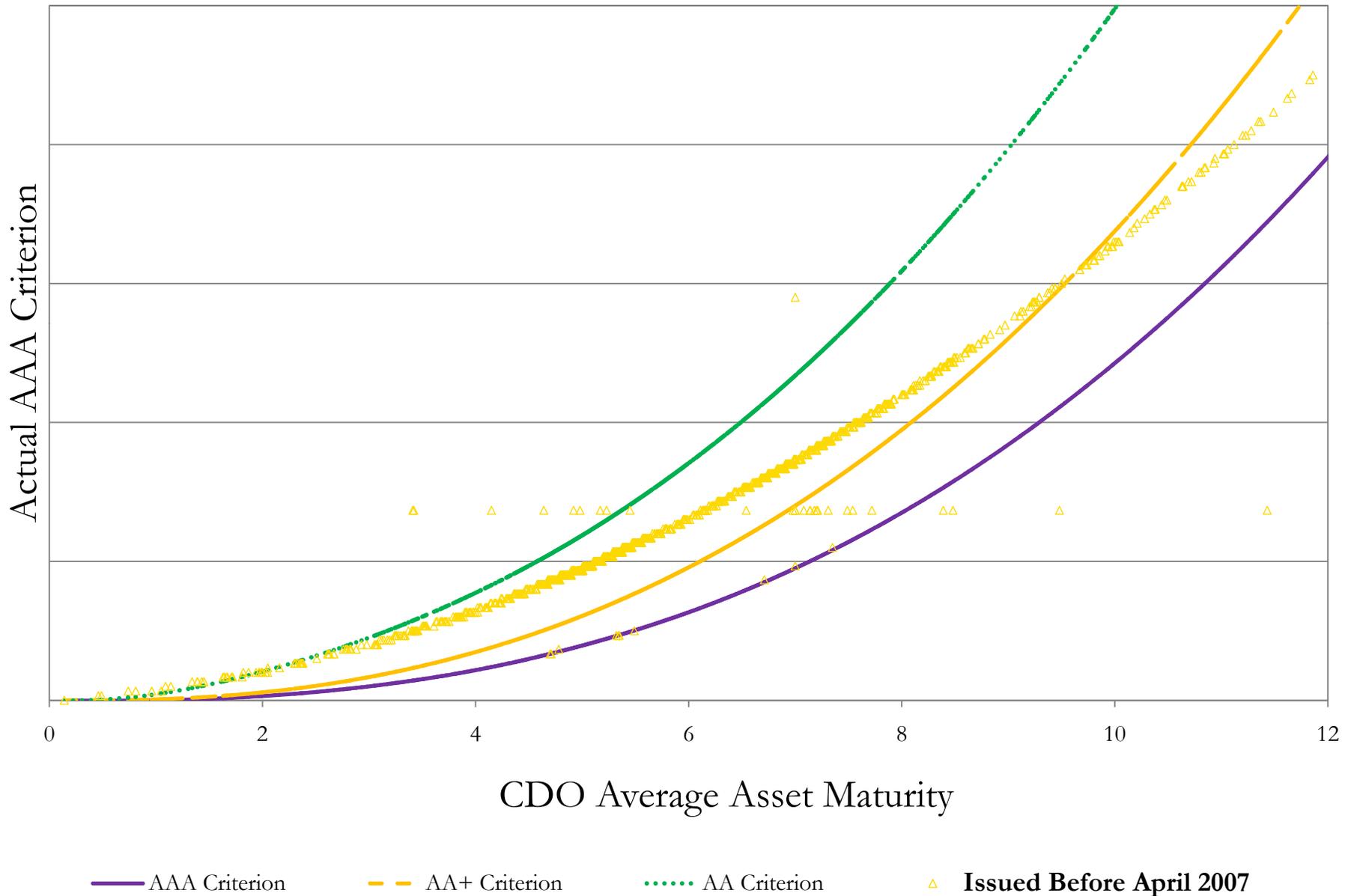


- For CDOs issued **before** April 2007...
- When the criterion changed, did the criterion change on these CDOs in subsequent Continuing Ratings reports?
 - No.
- New CDOs used the new default Criterion
- Old CDOs used old default criterion
- Two criterion simultaneously?

2c. Continuing Ratings



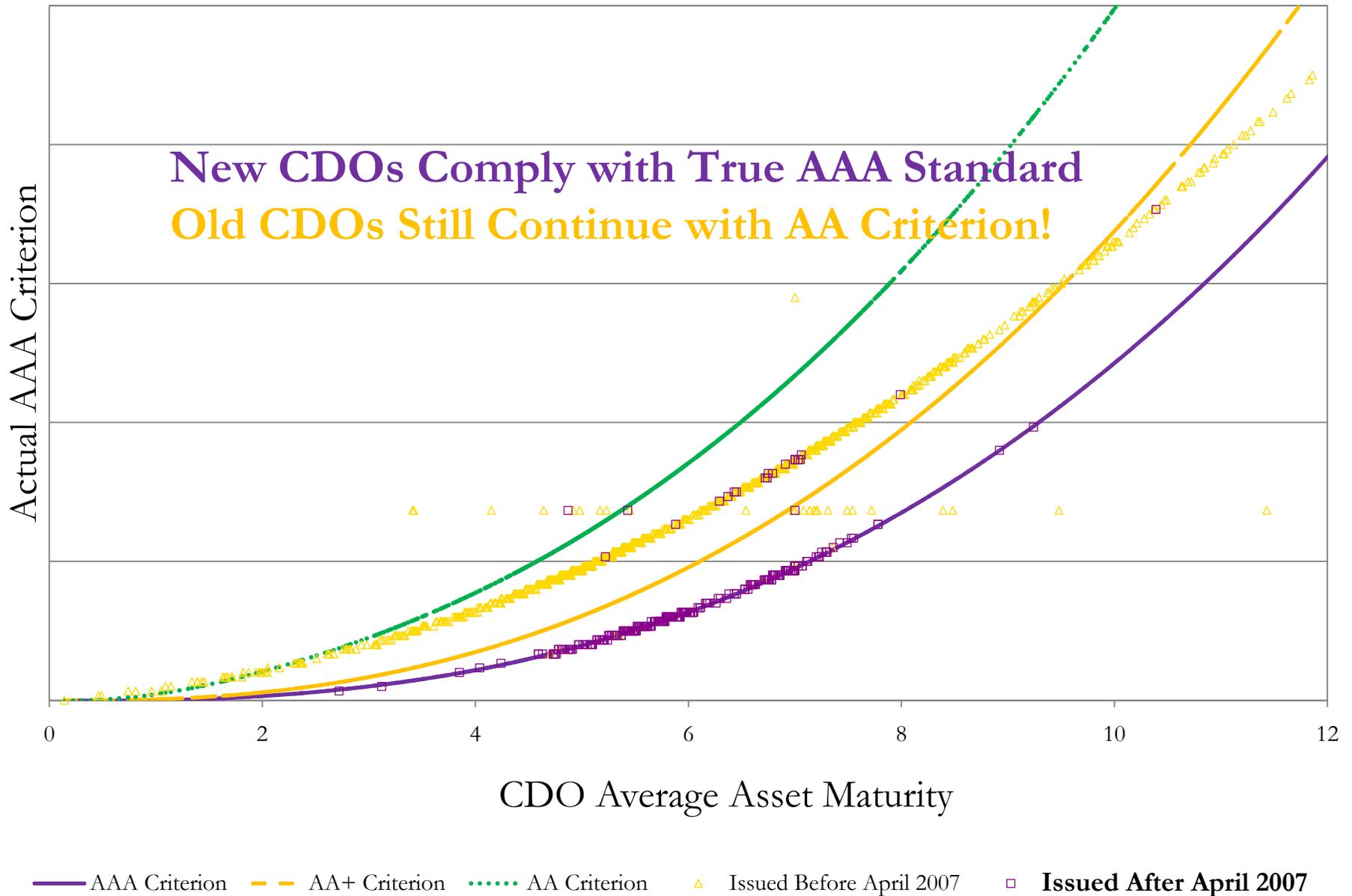
April 2007 to September 2008



2c. Continuing Ratings



April 2007 to September 2008



Value Inflation: CDO AAA Value Difference Relative to Rating from Alternative Models



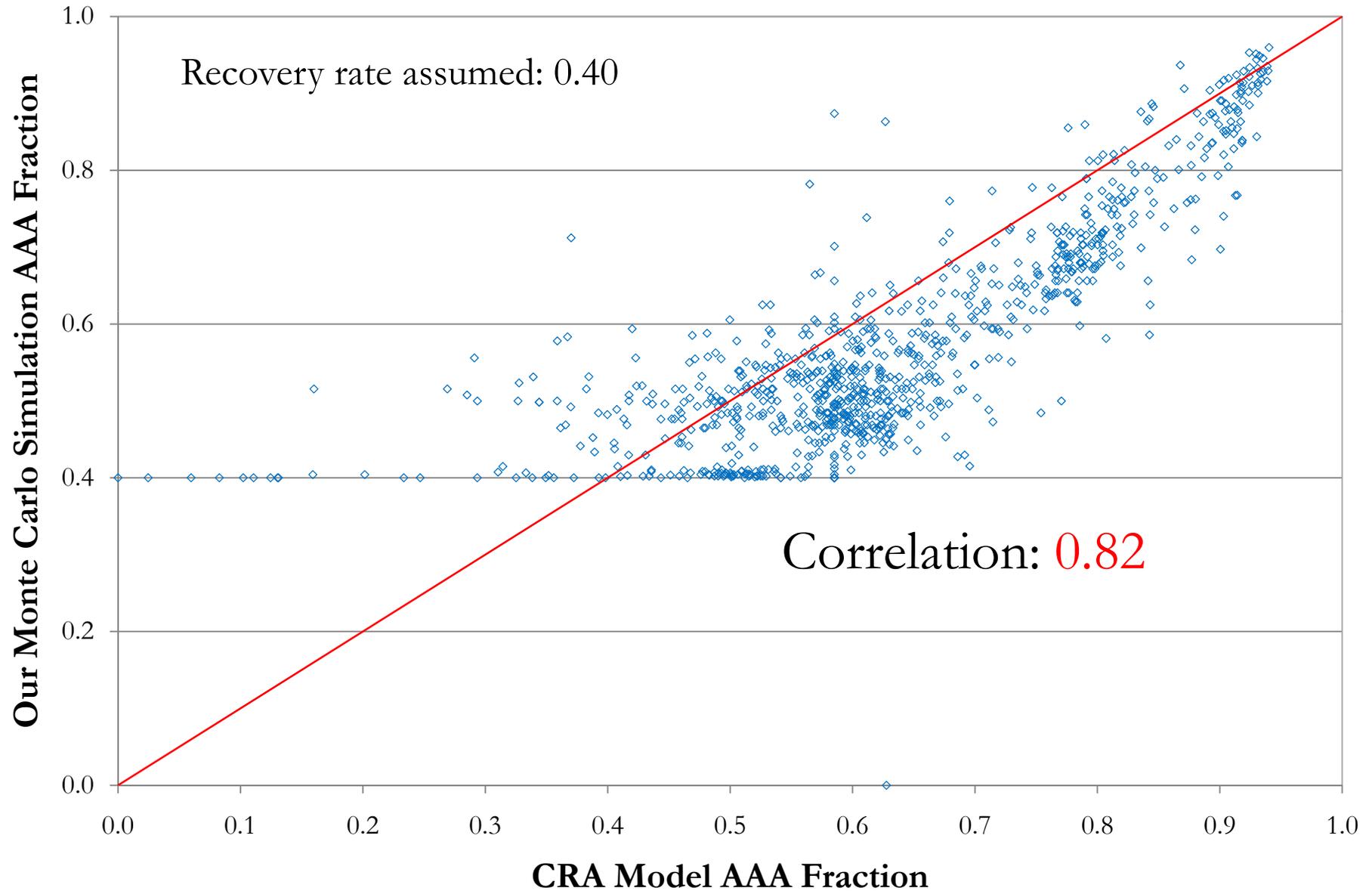
Variables	Monte Carlo Simulation	Vasicek Model
#. Of CDOs	All	All
<u>Model Rating</u>	916	916
AAA Spread	BBB	A
Model Rating Spread	0.33	0.33
<u>Spread Dif (%)</u>	2.89	1.90
<u>Value Dif (\$ millions)</u>	2.56	1.57
<u>Sample Dif (\$ billions)</u>	94.13	42.23
Dif in AAA Portion	86.22	38.68
Dif in CDO Portion	0.20	0.09
Dif in CDO Portion	0.15	0.07



Can the CRA Model be Understood?

- **Did the CRA use a standard model?**
- **How well can we approximate the CRA model?**
- **Use a simple Gaussian Copula Model Simulation**
 - Take CRA inputs as given
 - Limitation: Do not have the Recovery rate
 - Assume 40%
- **Obtain correlation of 0.82 with the CRA model**
- **Correlation with Actual AAA is only 0.45**

Can CRA Model be Understood?



Value of the Subjectivity



- **AAA is re-rated by our MC Simulation model accounting for**
 - Adjustment
 - Criterion deviation
- **Historical CDO price information is taken**
- **Difference between model rating and actual rating is connected to a total value effect using duration relation**



Conclusion

- **AAA ‘Out-of-model’ adjustment:**
 - Significant; not easily explained; predictive of downgrade
- **Criterion deviation:**
 - Widespread before April 2007; no change for old CDOs
- **Valuation effect for AAA re-rating**
 - \$94mm per deal; \$86bn for our 916 CDOs
- **Implications:**
 - Ratings Agencies making process **more qualitative**
 - CRA direct model outputs were more understandable and accurate than actual ratings
 - Making rating process more qualitative is a wrong reform