

Online Appendices

“Did Credit Rating Agencies Make Unbiased Assumptions on CDOs?”

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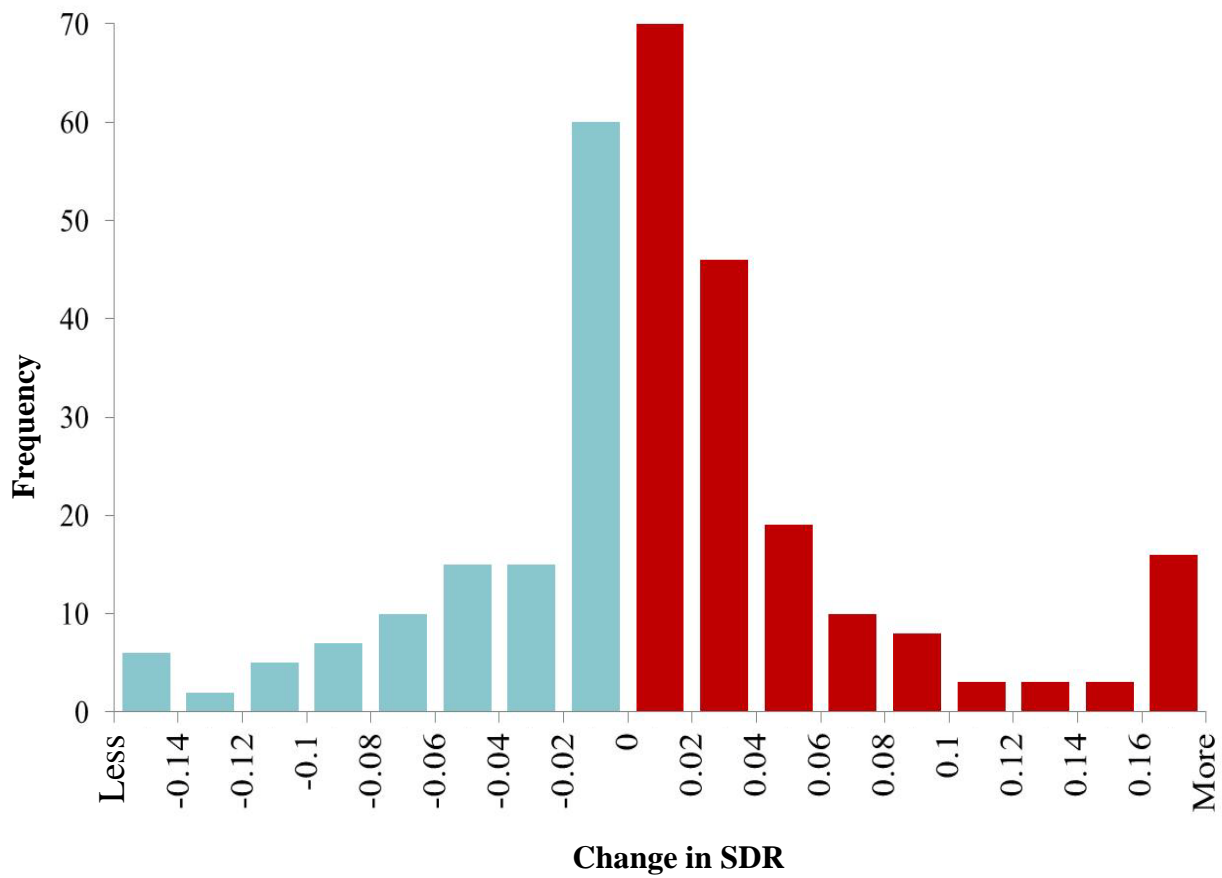


Figure OA.1 Histogram of Changes in SDR between First Surveillance and Issuing Reports

Notes: Illustrated is a histogram for changes in scenario default rate (SDR) from rating assignment reports to first surveillance reports. The reporting gap is within 180 days. The sample covers 298 CDOs issued between 2002 and 2007.

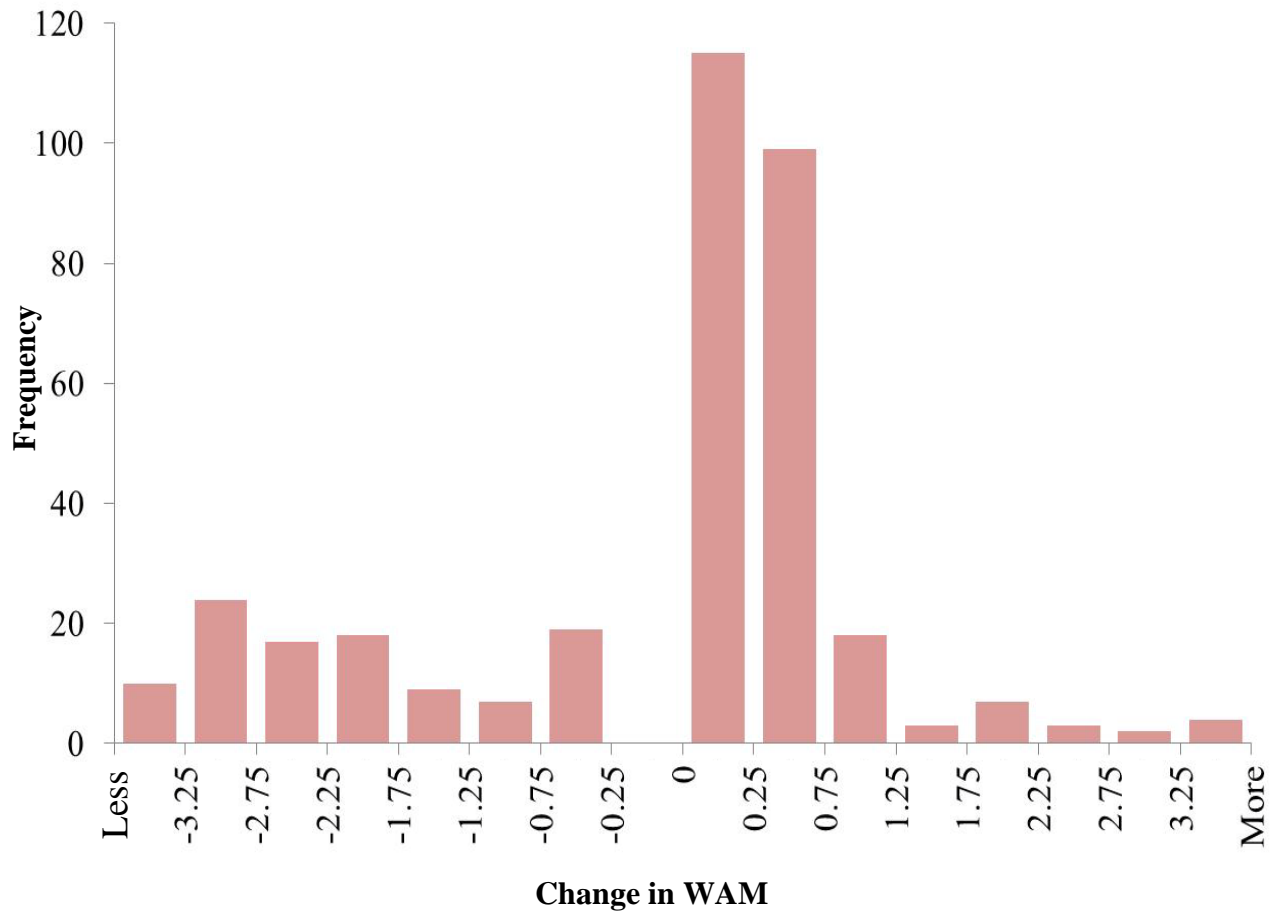


Figure OA.2 Histogram of Changes in WAM between First Surveillance and Issuing Reports

Notes: Illustrated is a histogram for changes in collateral weighted average maturity (WAM) from rating assignment reports to first surveillance reports. The reporting gap is within 180 days. The sample covers 355 CDOs issued between 2002 and 2007.

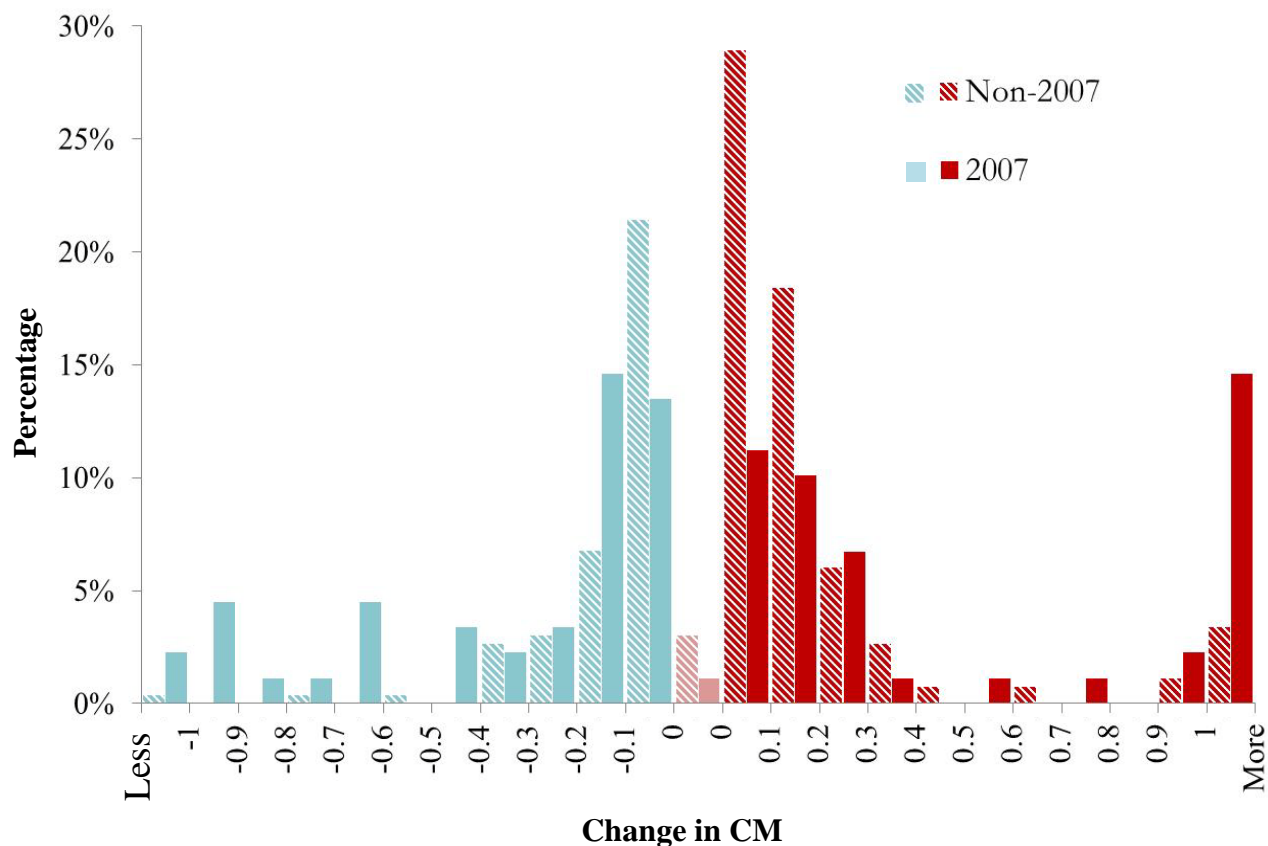


Figure OA.3 Histogram of Changes in Correlation Measure with 2007 and Non-2007 Distinction

Notes: Illustrated is a histogram for changes in collateral correlation measure (CM) from rating assignment reports to first surveillance reports. The reporting gap is within 180 days. Striped bars are for CDOs closed before 2007. Solid bars are for CDOs closed in 2007. The sample covers 355 CDOs issued between 2002 and 2007.

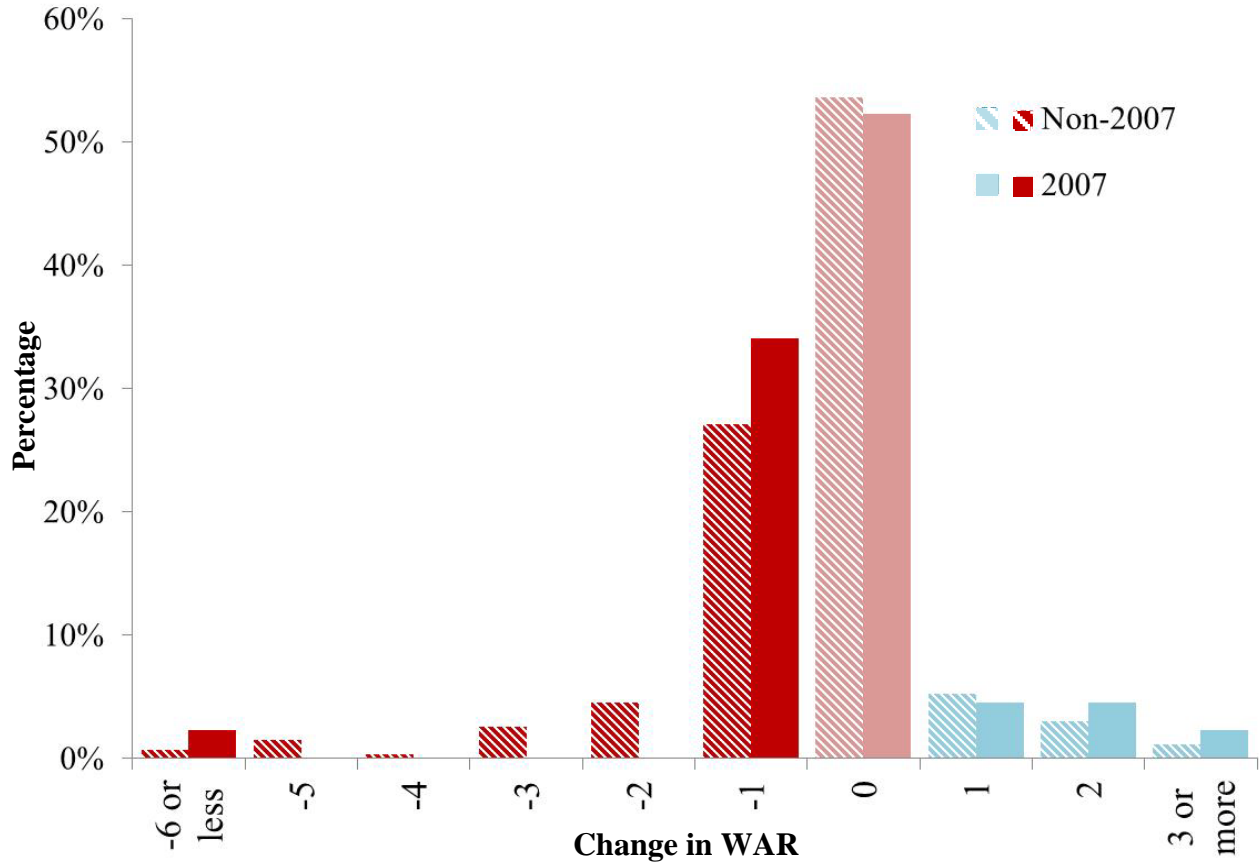


Figure OA.4 Histogram of Changes in Weighted Average Rating with 2007 and Non-2007 Distinction

Notes: Illustrated is a histogram for changes in collateral weighted average rating (WAR) from rating assignment reports to first surveillance reports. The reporting gap is within 180 days. Striped bars are for CDOs closed before 2007. Solid bars are for CDOs closed in 2007. The sample covers 353 CDOs issued between 2002 and 2007.

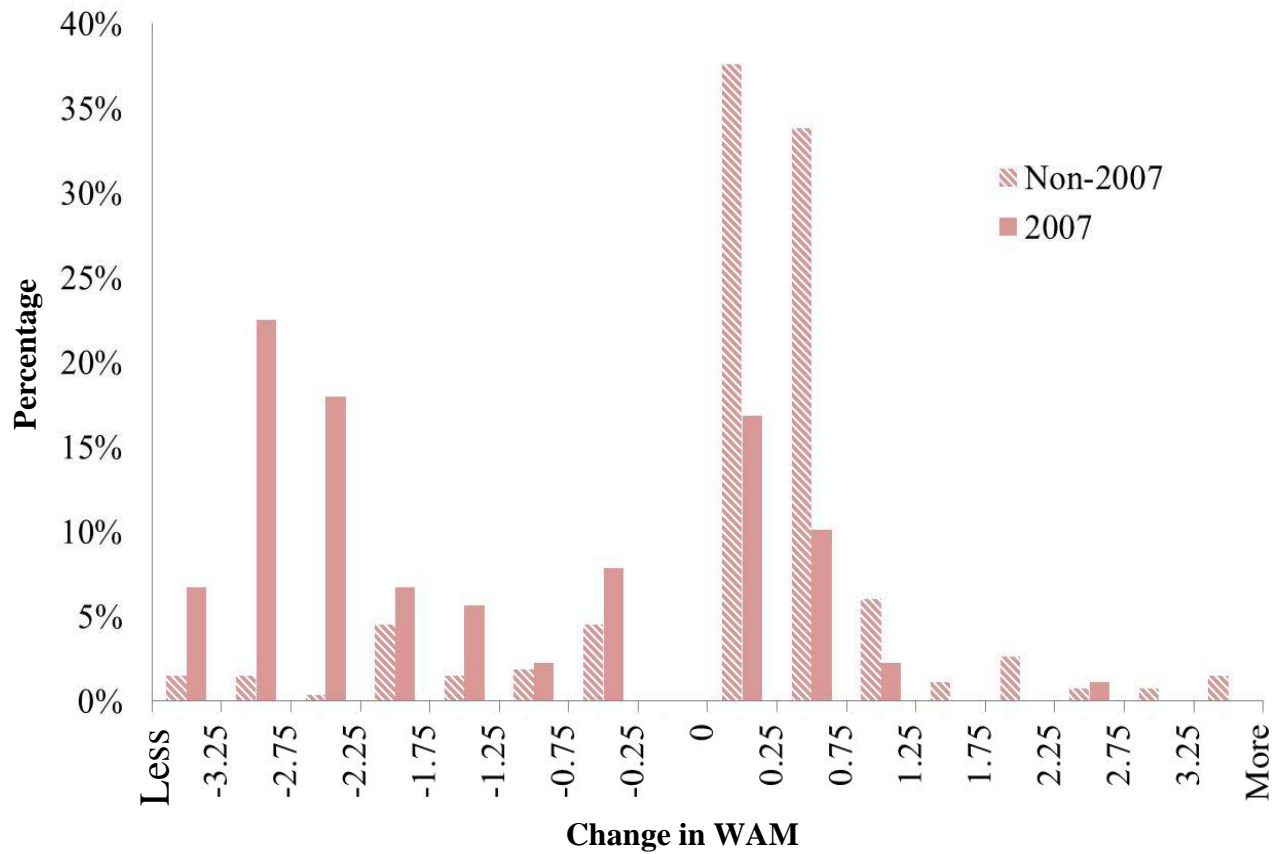


Figure OA.5 Histogram of Changes in WAM with 2007 and Non-2007 Distinction

Notes: Illustrated is a histogram for changes in collateral weighted average maturity (WAM) from rating assignment reports to first surveillance reports. The reporting gap is within 180 days. Dark purple bars are for CDOs closed before 2007. Light red bars are for CDOs closed in 2007. The sample covers 355 CDOs issued between 2002 and 2007.

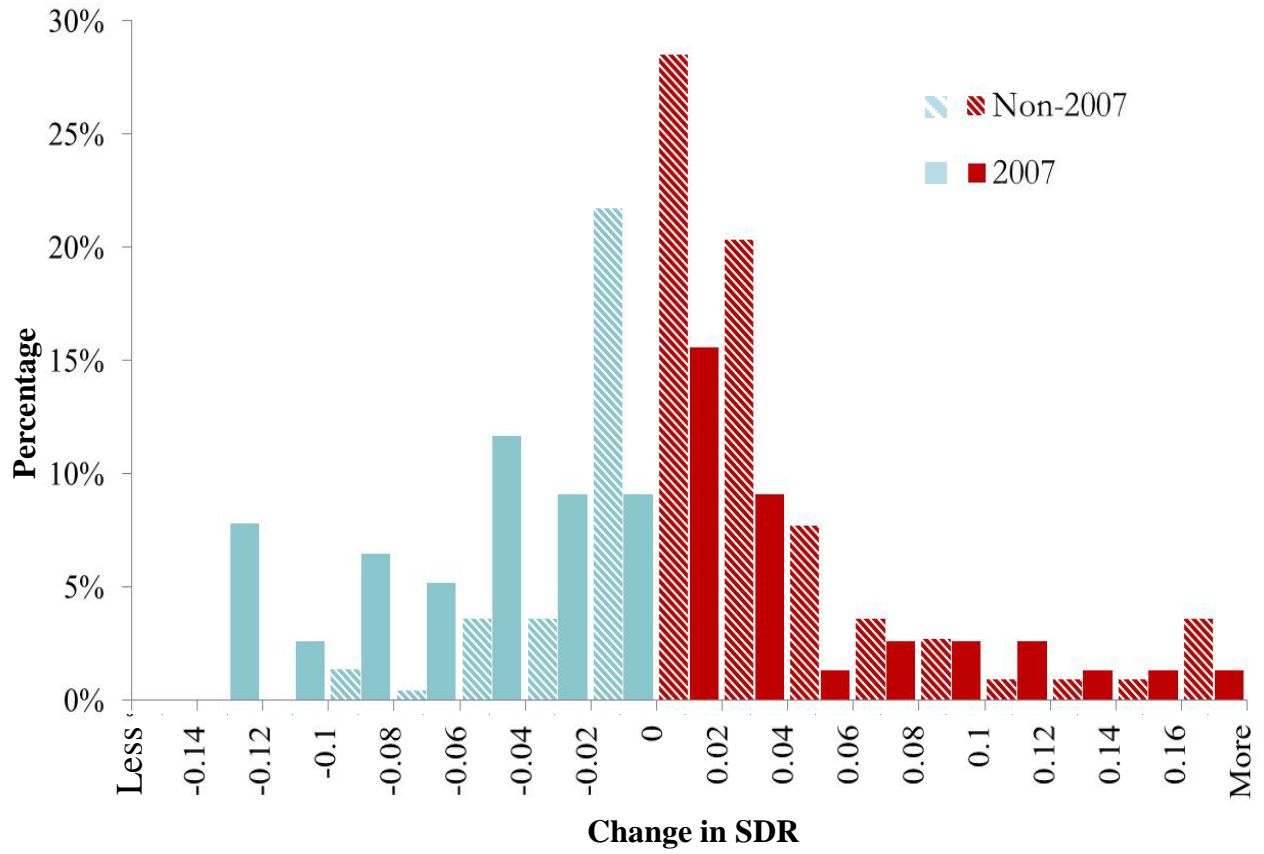


Figure OA.6 Histogram of Changes in Scenario Default Rate with 2007 and Non-2007 Distinction

Notes: Illustrated is a histogram for changes in scenario default rate (SDR) from rating assignment reports to first surveillance reports. The reporting gap is within 180 days. Striped bars are for CDOs closed before 2007. Solid bars are for CDOs closed in 2007. The sample covers 298 CDOs issued between 2002 and 2007.

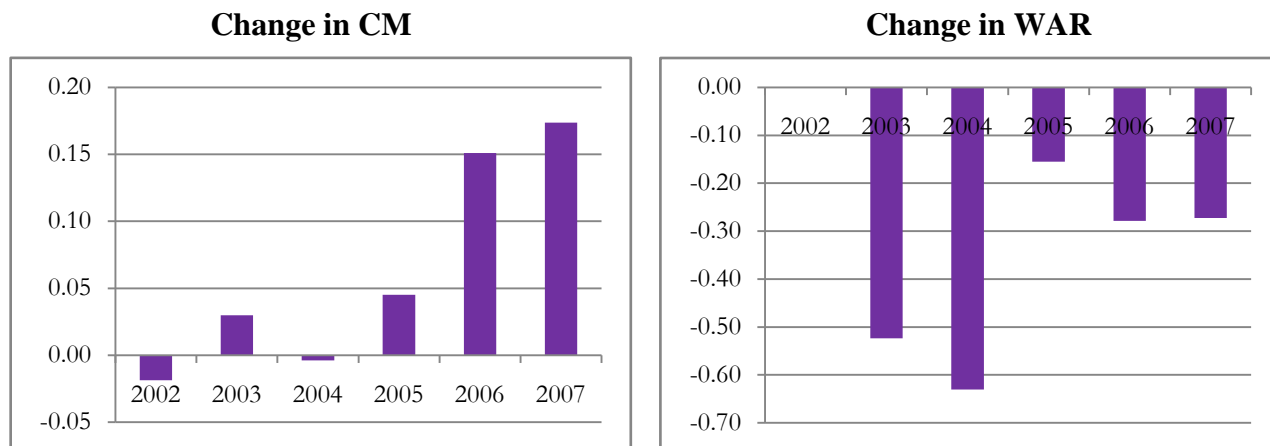


Figure OA.7 Time-Series of Changes in CM and WAR

Notes: Illustrated is a histogram for changes in collateral correlation measure (CM) on the left panel and changes in weighted average rating (WAR) on the right panel from rating assignment reports to first surveillance reports. The reporting gap is within 180 days. The sample covers 355 CDOs issued between 2002 and 2007.

Table OA.1
Changes in Assumptions and Outputs from Rating Assignment to First Surveillance
(No 180 Day Restriction On Reporting Gap)

Notes: This table presents summary statistics for the changes in the collateral assumptions and outputs from rating assignment reports to first surveillance reports. First row reports changes in the default correlation measure (CM) assumption. Second row reports changes in the weighted average rating (WAR) assumption. Third row reports changes in weighted average maturity (WAM). . Fourth row reports changes in scenario default rate (SDR). CM changes, WAM changes, and SDR changes are in difference WAR changes are in number of notches. Column ‘p-val’ tests the likelihood of the positive/negative split relative to a null of p=.5. Sample CDOs are issued between 2002 and 2007.

	N	Mean	t-stat	Median	% Positive	% Negative	p-val
Δ Correlation Measure	595	0.149	(5.06)	0.06	63.5%	34.5%	0.0000
Δ Weighted Average Rating	591	-0.645	(-8.14)	0.00	8.8%	41.5%	0.0000
Δ Weighted Average Maturity	595	0.215	(2.86)	0.30	69.1%	30.9%	0.0000
Δ Scenario Default Rate	468	0.029	(6.53)	0.01	64.3%	35.7%	0.0000

Table OA.2
Stratified Changes in Assumptions and Outputs from Rating Assignment to First Surveillance

Notes: This table presents summary statistics for the changes in the collateral assumptions and outputs from rating assignment reports to first surveillance reports. The sample is stratified by ramp-up fraction in Panel A, reporting gap in Panel B, issuing year in Panel C, and CDO type in Panel D. The reporting time gap is within 180 days. Sample CDOs are issued between 2002 and 2007. The first row reports changes in the default correlation measure (CM) assumption. The second row reports changes in the weighted average rating (WAR) assumption. CM changes are in raw units. WAR changes are in number of notches. Column ‘p-val’ tests the likelihood of the positive/negative split relative to a null of p=.5.

Panel A: Ramp-Up Percentage															
	0%-75%					76%-95%					96%-100%				
	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val
Δ CM	54	-0.01	(-0.28)	46.3/48.1	1.0000	84	0.24	(2.68)	58.3/40.5	0.1239	218	0.10	(1.72)	61.0/35.8	0.0002
Δ WAR	54	-0.20	(-1.80)	9.3/24.1	0.0963	84	-0.36	(-2.51)	11.9/39.3	0.0006	216	-0.43	(-3.78)	9.3/38.9	0.0000

Panel B: Time Between Reports										
	3-6 Months					0-3 Months				
	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val
Δ CM	206	0.12	(2.22)	62.1/35.9	0.0002	149	0.11	(1.61)	53.7/43.0	0.2112
Δ WAR	204	-0.56	(-5.29)	7.8/38.2	0.0000	149	-0.13	(-1.11)	12.8/34.9	0.0001

Panel C: Non-2007 and 2007										
	Non-2007					2007				
	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val
Δ CM	266	0.09	(2.38)	62.0/35.0	0.0000	89	0.20	(1.57)	48.3/50.6	0.9152
Δ WAR	265	-0.42	(-4.57)	9.4/37.0	0.0000	88	-0.26	(-1.66)	11.4/36.4	0.0009

Panel D: Types															
	ABS CDOs					CLOs					CDO ²				
	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val
Δ CM	138	0.41	(5.24)	66.7/31.9	0.0000	201	-0.07	(-1.58)	54.7/41.8	0.0724	11	0.04	(0.29)	45.5/54.5	1.0000
Δ WAR	136	-0.39	(-2.07)	17.6/37.5	0.0024	201	-0.37	(-7.84)	4.5/37.8	0.0000	11	-0.45	(-0.92)	18.2/27.3	1.0000

Table OA.3

Stratified Changes in Assumptions and Outputs from Rating Assignment to First Surveillance: WAM and SDR

Notes: This table presents summary statistics for the changes in the collateral assumptions and outputs from rating assignment reports to first surveillance reports. Sample is stratified by ramp-up fraction in Panel A, reporting gap in Panel B, issuing year in Panel C, and CDO type in Panel D. The first row reports changes in the weighted average maturity (WAR) assumption. Sample CDOs are issued between 2002 and 2007. The second row reports changes in scenario default rate (SDR). Column ‘p-val’ tests the likelihood of the positive/negative split relative to a null of p=.5.

Panel A: Ramp-Up Percentage															
	0%-75%					76%-95%					96%-100%				
	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val
Δ WAM	54	-0.28	(-1.52)	57.4/42.6	0.3409	84	-0.35	(-1.89)	58.3/41.7	0.1557	218	-0.25	(-2.63)	63.8/35.3	0.0000
Δ SDR	47	0.00	(-0.27)	53.2/46.8	0.7709	73	0.02	(2.07)	58.9/41.1	0.1597	179	0.02	(3.06)	61.5/37.4	0.0015
Panel B: Time Between Reports															
	3-6 Months					0-3 Months									
	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val					
Δ WAM	206	-0.12	(-1.24)	69.4/30.6	0.0000	149	-0.50	(-3.84)	51.7/48.3	0.7433					
Δ SDR	175	0.02	(3.02)	61.7/38.3	0.0024	123	0.01	(1.72)	56.9/43.1	0.1488					
Panel C: Non-2007 and 2007															
	Non-2007					2007									
	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val					
Δ WAM	266	0.15	(2.01)	74.4/25.6	0.0000	89	-1.55	(-9.72)	24.7/75.3	0.0000					
Δ SDR	221	0.02	(6.35)	69.2/30.8	0.0000	77	0.00	(-0.31)	32.5/67.5	0.0028					
Panel D: Types															
	ABS CDOs					CLO					CDO ²				
	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val	N	Mean	t-stat	+/- (%)	p-val
Δ WAM	138	0.42	(5.82)	83.3/16.7	0.0000	201	-0.76	(-6.94)	48.8/51.2	0.7779	11	0.25	(0.32)	54.5/45.5	1.0000
Δ SDR	119	0.05	(5.84)	73.1/26.9	0.0000	164	-0.01	(-1.66)	50.6/49.4	0.9378	11	0.01	(0.42)	63.6/36.4	0.5488

Table OA.4**Regressing Changes in SDR on Changes in CM, WAR, WAM**

Notes: This table presents regression results with changes in scenario default rate (SDR) as the dependent variable. Independent variables are changes in correlation measure (CM), changes in weighted average rating (WAR), and changes in weighted average maturity (WAM). Reported are coefficient estimates and t-statistics in parentheses. Sample CDOs are issued between 2002 and 2007. The left panel is for ordinary least square (OLS) regressions and the right panel for median quantile regressions with bootstrapped standard errors. Changes are measured if the surveillance reports are within 180 days of rating reports.

	OLS			Median Quantile Regression		
	(1)	(2)	(3)	(4)	(5)	(6)
Change in CM	0.052 (3.69)	0.056 (3.45)	0.049 (3.14)	0.065 (9.59)	0.079 (10.22)	0.072 (6.28)
Change in WAR		-0.020 (-3.17)	-0.021 (-3.33)		-0.018 (-5.16)	-0.019 (-5.27)
Change in WAM			0.017 (5.78)			0.015 (3.92)
Intercept	0.009 (2.14)	0.002 (0.42)	0.006 (1.40)	0.004 (1.79)	-0.002 (-1.02)	-0.001 (-0.43)
Number of Obs.	298	296	296	298	296	296
Adjusted R ²	0.303	0.420	0.511	0.191	0.249	0.307

Table OA.5
Regressing Changes in SDR on Changes in CM, WAR, WAM
(No 180 Days Restriction On Reporting Gap)

Notes: This table presents regression results with changes in scenario default rate (SDR) as the dependent variable. Independent variables are changes in correlation measure (CM), changes in weighted average rating (WAR), and changes in weighted average maturity (WAM). Sample CDOs are issued between 2002 and 2007. Reported are coefficient estimates and t-statistics in parentheses. The left panel is for ordinary least square (OLS) regressions and the right panel for median quantile regressions with bootstrapped standard errors.

	OLS			Median		
	(1)	(2)	(3)	(4)	(5)	(6)
Change in CM	0.074 (4.71)	0.067 (4.70)	0.059 (4.27)	0.080 (7.01)	0.082 (15.80)	0.073 (10.88)
Change in WAR		-0.025 (-8.41)	-0.022 (-7.23)		-0.019 (-7.67)	-0.018 (-6.31)
Change in WAM			0.013 (5.77)			0.010 (4.02)
Intercept	0.017 (3.65)	0.002 (0.39)	0.000 (0.05)	0.005 (2.31)	0.000 (-0.15)	-0.004 (-2.16)
Number of Obs.	468	466	466	468	466	466
Adjusted R ²	0.355	0.577	0.631	0.206	0.331	0.371

Table OA.6
Rating Assumption Changes Predicting AAA Downgrading
(All Observations Have SDR Change Data)

Notes: This table reports ordered logistic regression results. The dependent variable is the number of notches downgraded from the initial AAA ratings. CDOs are issued between 2002 and 2007. Independent variables are changes, from rating assignment to first surveillance, in the default correlation measure (CM) assumption, the weighted average rating (WAR) assumption, the weighted average maturity (WAM) assumption, and scenario default rate (SDR). Reported are odds ratios and z-statistics in parenthesis. Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in CM	7.26 (5.63)			3.47 (3.52)			4.55 (3.50)	
Change in WAR		1.19 (0.93)			1.22 (1.51)		1.18 (1.32)	
Change in WAM			1.54 (5.00)			1.41 (3.09)	1.20 (1.49)	
Change in SDR								830.09 (3.33)
ABS CDO				17.68 (8.28)	31.73 (10.25)	21.42 (8.91)	20.61 (8.76)	19.35 (8.59)
CDO ²				5.30 (1.72)	7.70 (1.90)	4.21 (1.30)	4.53 (1.45)	5.82 (1.77)
Year 2004				0.35 (-1.12)	0.28 (-1.25)	0.29 (-1.30)	0.34 (-1.15)	0.31 (-1.21)
Year 2005				1.67 (0.68)	1.39 (0.40)	1.42 (0.46)	1.52 (0.57)	1.71 (0.69)
Year 2006				2.89 (1.42)	3.39 (1.51)	3.07 (1.51)	2.95 (1.52)	2.86 (1.38)
Year 2007				2.46 (1.17)	3.13 (1.40)	4.85 (2.05)	3.80 (1.77)	3.19 (1.48)
Number of Obs.	298	296	298	294	292	294	292	294
Adjusted R ²	0.058	0.003	0.026	0.156	0.149	0.146	0.175	0.147

Table OA.7
Rating Assumption Changes Predicting AAA Downgrading
(No 180 Days Restriction On Reporting Gap)

Notes: This table reports ordered logistic regression results. The dependent variable is the number of notches downgraded from the initial AAA ratings. Sample CDOs are issued between 2002 and 2007. Independent variables are changes, from rating assignment to first surveillance, in the default correlation measure (CM) assumption, the weighted average rating (WAR) assumption, the weighted average maturity (WAM) assumption, and scenario default rate (SDR). Reported are odds ratios and z-statistics in parenthesis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in CM	3.64 (9.62)			2.09 (5.53)			2.12 (5.26)	
Change in WAR		0.91 (-1.86)			0.99 (-0.21)		1.01 (0.18)	
Change in WAM			1.23 (5.13)			1.12 (2.06)	1.04 (0.71)	
Change in SDR								66.02 (3.64)
ABS CDO				14.83 (10.99)	21.09 (13.04)	17.79 (12.24)	15.50 (11.02)	16.77 (11.37)
CDO ²				3.45 (1.44)	3.88 (1.44)	3.16 (1.31)	3.35 (1.41)	4.10 (1.71)
Year 2004				1.08 (0.17)	1.02 (0.04)	1.03 (0.06)	1.09 (0.17)	1.10 (0.15)
Year 2005				1.94 (1.59)	1.91 (1.43)	2.02 (1.60)	1.98 (1.63)	2.75 (1.81)
Year 2006				2.99 (2.70)	3.55 (2.88)	3.85 (3.14)	3.18 (2.81)	4.83 (2.80)
Year 2007				2.34 (1.96)	2.74 (2.19)	3.39 (2.66)	2.72 (2.22)	4.50 (2.57)
Number of Obs.	590	586	590	572	568	572	568	452
Pseudo R ²	0.040	0.002	0.010	0.118	0.110	0.108	0.123	0.133

Table OA.8**Rating Assumption Changes Predicting AAA Downgrading: Different Models**

Notes: This table reports ordered probit, plain probit, and OLS regression results. Sample CDOs are issued between 2002 and 2007. The dependent variable is the number of notches downgraded from the initial AAA ratings. Independent variables are changes, from rating assignment to first surveillance, in the default correlation measure (CM) assumption, the weighted average rating (WAR) assumption, the weighted average maturity (WAM) assumption, and scenario default rate (SDR). Changes are measured if the surveillance reports are within 180 days of rating reports. Reported are coefficients and z-statistics or t-statistics in parenthesis.

	Ordered Probit		Plain Probit		OLS	
	(1)	(2)	(3)	(4)	(5)	(6)
Change in CM	0.371 (3.91)		0.384 (2.56)		0.998 (2.56)	
Change in SDR		4.032 (3.54)		2.889 (2.49)		11.711 (3.53)
ABS CDO	1.691 (10.1)	1.702 (9.31)	0.871 (5.27)	1.013 (5.61)	11.544 (16.89)	11.026 (14.82)
CDO ²	0.934 (1.98)	1.092 (2.31)	0.033 (0.08)	0.202 (0.48)	7.553 (2.95)	7.807 (3.11)
Year 2004	-0.398 (-1.03)	-0.506 (-1.22)	-0.205 (-0.59)	-0.483 (-1.18)	-1.420 (-0.83)	-1.341 (-0.71)
Year 2005	0.296 (0.89)	0.340 (0.97)	0.667 (2.09)	0.538 (1.43)	1.069 (0.70)	1.880 (1.09)
Year 2006	0.541 (1.66)	0.622 (1.81)	0.553 (1.79)	0.371 (1.02)	3.471 (2.48)	4.353 (2.67)
Year 2007	0.470 (1.40)	0.678 (1.89)	0.265 (0.83)	0.203 (0.54)	3.486 (2.52)	4.560 (2.85)
Intercept			-0.498 (-1.71)	-0.541 (-1.54)	-1.126 (-0.86)	-1.986 (-1.29)
Number of Obs.	349	294	349	294	349	294
Pseudo R ²	0.132	0.148	0.147	0.173	0.572	0.568

Table OA.9**Rating Assumption Changes Predicting AAA Downgrading: Hazard Model**

Notes: This table reports Cox proportional hazard model regression results. Sample CDOs are issued between 2002 and 2007. The dependent variable is the number of notches downgraded from the initial AAA ratings. Independent variables are changes, from rating assignment to first surveillance, in the default correlation measure (CM) assumption, the weighted average rating (WAR) assumption, the weighted average maturity (WAM) assumption, and scenario default rate (SDR). Changes are measured if the surveillance reports are within 180 days of rating reports. Reported are hazard ratios and z-statistics in parenthesis.

	(1)	(2)	(3)	(4)	(5)	(6)
Change in CM	2.550 (6.84)			2.899 (7.91)		2.086 (4.04)
Change in WAR		1.135 (2.04)		1.019 (0.35)		
Change in WAM			1.061 (0.81)	0.978 (-0.33)		
Change in SDR					349.894 (5.23)	13.015 (1.45)
ABS CDO	2.349 (4.90)	3.080 (6.88)	2.817 (6.04)	2.539 (5.14)	2.722 (5.68)	2.500 (4.98)
CDO ²	1.260 (0.47)	1.238 (0.44)	1.175 (0.33)	1.300 (0.54)	1.358 (0.65)	1.366 (0.66)
Number of Obs.	306	304	306	304	284	284

Table OA.10**OLS of AAA Spreads on Changes in CM, WAR, and SDR**

Notes: This table reports OLS regression results. The dependent variable is yield spreads of AAA-rated CDO tranches. Independent variables are changes, from rating assignment to first surveillance, in the default correlation measure (CM) assumption, the weighted average rating (WAR) assumption, the weighted average maturity (WAM) assumption, and scenario default rate (SDR). Changes are measured if the surveillance reports are within 180 days of rating reports. Reported are coefficients and t-statistics in parenthesis. Sample CDOs are issued between 2002 and 2007.

	(1)	(2)	(3)	(4)	(5)	(6)
Change in CM	-2.24 (-1.65)		-1.25 (-1.68)		0.73 (0.33)	
Change in WAR		-8.28 (-1.02)		-7.85 (-1.15)	-7.91 (-1.13)	
Change in SDR						1.28 (0.09)
ABS CDO			-11.49 (-1.22)	-15.32 (-1.55)	-15.69 (-1.54)	-12.27 (-1.28)
CLO			-13.68 (-1.45)	-16.39 (-1.68)	-16.38 (-1.68)	-13.90 (-1.47)
CDO ²			112.70 (1.06)	107.91 (1.10)	107.94 (1.10)	112.74 (1.07)
Intercept	33.32 (8.96)	29.94 (23.69)	41.94 (4.48)	42.00 (4.48)	42.04 (4.48)	42.08 (4.47)
Number of Obs.	258	256	258	256	256	238
Adjusted R ²	0.001	0.042	0.145	0.182	0.182	0.145