

Mortgage-Backed Securities and the Financial Crisis of 2008: a Post Mortem

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Outline

Post Mortem

post mortem: an examination of a dead body to determine the cause of death.

What we do

Questions:

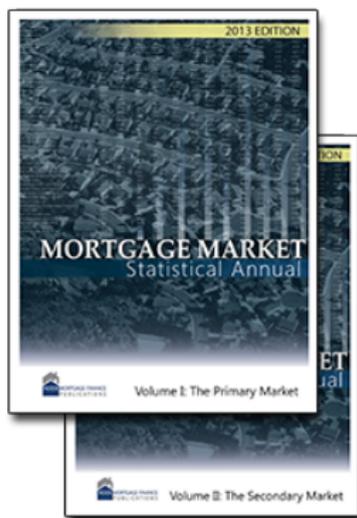
- ▶ What were the losses and returns on non-agency RMBS, in particular those rated AAA?
- ▶ How did the ex-ante rating compare to their ex-post performance?
- ▶ Role of house price boom and bust for RMBS performance?

Approach:

- ▶ Create new data set of 143 thousand RMBS bonds.
- ▶ Obtain their ratings, their characteristics, their payoff stream.
- ▶ Calculate losses, returns.
- ▶ Compare to ratings.
- ▶ Compare to house price booms and busts, state-by-state.

Data Collection

- ▶ We needed to find a source that had some information about the universe of securities
- ▶ Mortgage Market Statistical Annual



- ▶ 2013 Edition had information on all non-agency MBS deals issued between 2006 and 2012
- ▶ About 50 pages of tables. 2824 deals.

A sample table from the Stats Annual

Non-Agency MBS Activity 2007

(Dollars in Millions)

Date	Deal Name	Amount	Support	Collateral	MBS Type	Subprime	Manager
10-Jan-07	Citigroup Mortgage Loan Trust 2007-WFHE1	\$434.22	Sub	FRM/ARM	BC	x	Citi
11-Jan-07	WaMu Asset-Backed Certificates 2007-HE1	\$1,360.34	Sub	FRM/ARM	BC	x	WaMu
12-Jan-07	Harborview NIM CI-7 Corp.	\$5.70	NIM	NIM	BC	x	RBS GC
12-Jan-07	SACO Mortgage Trust 2007-1	\$246.02	Sub	CES	2nd	x	BS
15-Jan-07	Washington Mutual WMABS 2007-HE1	\$276.90	Sub	FRM/ARM	BC	x	WaMu
16-Jan-07	MASTR Adjustable Rate Mortgages Trust 2007-1	\$2,099.43	Sub	ARM	Ait A		UBS
16-Jan-07	Option One Mortgage Loan Trust 2007-1	\$1,749.86	Sub	FRM/ARM	BC	x	LB
17-Jan-07	Bear Stearns ABS Trust 2007-SD1	\$279.82	Sub	FRM/ARM	SD	x	BS
17-Jan-07	Carrington Mortgage Loan Trust 2007-RFC1	\$857.27	Sub	FRM/ARM	BC	x	Citi
18-Jan-07	Option One Mortgage Securities Re-NIM 2007-1	\$75.00	NIM	NIM	BC	x	RBS GC
19-Jan-07	GSAMP Trust Series 2007-SEA1	\$127.55	Sub	FRM/ARM	SD	x	GS
19-Jan-07	IndyMac INDX NIM CI-2	\$35.76	NIM	NIM	Ait A		RBS GC
19-Jan-07	Morgan Stanley ABS Capital 2007-NC1	\$1,214.38	Sub	FRM/ARM	BC	x	MA
19-Jan-07	Option One Mortgage Loan Trust 2007-FXD1	\$817.69	Bond	FRM30	BC	x	BA
19-Jan-07	SABR Trust 2007-NC1	\$816.82	Sub	FRM/ARM	BC	x	BC
19-Jan-07	SASCO NIM 2006-BC6	\$48.40	NIM	NIM	BC	x	LB
19-Jan-07	Soundview CI-22 NIM, Series 2006-EQ2	\$36.80	NIM	NIM	BC	x	RBS GC
19-Jan-07	Washington Mutual NIM Trust 2007-HE1	\$10.81	NIM	NIM	BC	x	WaMu
22-Jan-07	Soundview CI-21 NIM, Series 2006-WF2	\$67.90	NIM	NIM	BC	x	RBS GC
22-Jan-07	WaMu Mortgage PTC 2007-HY1	\$3,041.31	Sub	ARM	Prime		WaMu
23-Jan-07	Banc of America Funding 2007-NIM1	\$10.79	NIM	NIM	Ait A		BA
23-Jan-07	Countrywide Home Loan Trust 2006-BC5N	\$28.87	NIM	NIM	BC	x	CSC
23-Jan-07	GSAMP 2006-FM3-N	\$31.22	NIM	NIM	BC	x	GS
23-Jan-07	IXIS Real Estate Capital Trust 2007-HE1	\$778.31	Sub	FRM/ARM	BC	x	MS
23-Jan-07	Merrill Lynch SURF 2007-BC1	\$789.11	Sub	FRM/ARM	BC	x	ML
23-Jan-07	SHARPS NIM 2006-NC2N	\$23.02	NIM	NIM	BC	x	DB
23-Jan-07	SHARPS NIM 2007-OA1N	\$25.69	NIM	NIM	BC	x	DB
23-Jan-07	WaMu Mortgage PTC 2007-OA1	\$1,100.05	Sub	ARM	Prime		WaMu
24-Jan-07	Accredited Mortgage Loan Trust 2007-1	\$755.52	Sub	FRM/ARM	BC	x	LB
24-Jan-07	BSSP NIM Trust 2007-N1 (BSMF 2006-SL6)	\$28.63	NIM	NIM	BC	x	BS
24-Jan-07	BSSP NIM Trust 2007-N1 (SACO 2007-1)	\$13.23	NIM	NIM	2nd		BS
24-Jan-07	ChaseFlex Trust 2007-1	\$450.01	Sub	FRM30	Ait A		JPM
24-Jan-07	CMO Holdings III Ltd. 2007-N1	\$93.58	NIM	NIM	BC	x	BS
24-Jan-07	CWAI T 2006-OC11N	\$29.70	NIM	NIM	Ait A		CSC

Data Collection on Bloomberg

- ▶ Searched for the 2824 deals from the Stats Annual
- ▶ Searched also for related deals (for example by name of financial institution) ▶ Deal Example
- ▶ Once we find a deal, we look back at all deals with similar name. Goal: get the universe of deals. Total: 8615 deals
▶ Old Deal Example
- ▶ For each deal, get tranches (securities, bonds) ▶ Tranches Example
- ▶ Total: 143232 bonds. Principal: 5.7 trillion \$.
- ▶ Per bond: obtain 93 variables plus losses and cash flows
▶ Security
- ▶ Challenge: Bloomberg places a limit on how much information can be downloaded per month:
 - ▶ Max out below 15 thousand securities per month.
 - ▶ We have more than 140 thousand securities

⇒ It took more than a year to collect all the data

Bloomberg Deal Search I

WFMB 2007 Mtge
<Menu> for series list

95 Options

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Mortgage

View All Classes

25 Series

	CF	Series	Pricing Date	Collateral	Net Cpn	WAC	WAM	Orig Bal at Iss
1)	*	2007 - AR10	12/21/07	Whole ARM	6.30	6.561	21Y 4M	357,537,982
2)	*	2007 - AR3	3/21/07	Whole ARM	5.88	6.143	20Y 8M	488,796,716
3)	*	2007 - AR4	8/27/07	Whole ARM	2.86	3.116	20Y 11M	421,914,996
4)	*	2007 - AR5	10/23/07	Whole ARM	6.14	6.395	21Y 1M	604,977,737
5)	*	2007 - AR6	10/24/07	Whole ARM	2.79	3.049	21Y 1M	1,399,536,070
6)	*	2007 - AR7	11/20/07	Whole ARM	2.83	3.092	21Y 3M	1,116,803,961
7)	*	2007 - AR8	11/26/07	Whole ARM	2.82	3.077	21Y 2M	435,434,104
8)	*	2007 - AR9	11/26/07	Whole ARM	6.21	6.471	21Y 3M	508,489,333
9)	*	2007 - 1	1/11/07	Whole 30yr	6.01	6.272	20Y 6M	600,991,640
10)	*	2007 - 2	2/26/07	Whole 30yr	5.98	6.236	20Y 7M	1,505,652,587
11)	*	2007 - 3	3/27/07	Whole 30yr	6.01	6.272	20Y 7M	1,354,453,990
12)	*	2007 - 4	3/26/07	Whole 30yr	5.99	6.245	20Y 8M	1,800,061,020
13)	Pd	2007 - 5	4/25/07	Wh 30y Relo	5.61	5.866	21Y 3M	461,281,364
14)	*	2007 - 6	4/25/07	Whole 30yr	5.95	6.215	20Y 9M	700,312,919
15)	*	2007 - 7	5/25/07	Whole 30yr	5.93	6.191	20Y 10M	5,100,122,414
16)	*	2007 - 8	6/28/07	Whole 30yr	5.95	6.208	20Y 10M	2,750,025,945
17)	Pd	2007 - 9	6/25/07	Wh 30y Relo	5.67	5.926	18Y 3M	751,843,367
18)	*	2007 - 10	6/28/07	Whole 30yr	6.01	6.275	20Y 11M	1,700,746,270
19)	*	2007 - 11	7/26/07	Whole 30yr	6.00	6.261	21Y 0M	3,954,809,375

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Bloomberg Deal Search II

WFMB5 Mtge

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View All Classes

								249 Series	
	CF	Series	Pricing Date	Collateral	Net Cpn	WAC	WAM	Orig Bal at Iss	
1)	+	2004 - CC	12/13/04	Whole ARM	2.84	3.098	18Y 6M	300,216,725	
2)	+	2004 - D	4/12/04	Whole ARM	2.97	3.351	17Y 9M	357,876,502	
3)	+	2004 - DD	12/15/04	Whole ARM	2.83	3.093	18Y 6M	600,082,218	
4)	+	2004 - E	4/22/04	Whole ARM	3.08	3.339	17Y 10M	320,489,949	
5)	+	2004 - EE	12/21/04	Whole ARM	2.87	3.125	17Y 11M	1,583,069,043	
6)	+	2004 - F	5/13/04	Whole ARM	2.91	3.295	17Y 10M	400,536,041	
7)	+	2004 - G	5/17/04	Whole ARM	2.87	3.127	17Y 8M	417,087,401	
8)	+	2004 - H	5/20/04	Whole ARM	2.88	3.141	17Y 11M	458,184,853	
9)	+	2004 - I	6/14/04	Whole ARM	2.83	3.093	17Y 3M	1,651,759,021	
10)	+	2004 - J	6/24/04	Whole ARM	2.74	3.001	18Y 0M	426,419,494	
11)	+	2004 - K	6/14/04	Whole ARM	2.76	3.017	18Y 0M	1,216,697,217	
12)	+	2004 - L	6/23/04	Whole ARM	2.78	3.037	18Y 1M	457,327,472	
13)	+	2004 - M	7/26/04	Whole ARM	2.75	3.009	18Y 1M	800,536,770	
14)	+	2004 - N	7/26/04	Whole ARM	2.73	2.990	18Y 1M	1,200,723,373	
15)	+	2004 - O	7/19/04	Whole ARM	2.74	3.003	18Y 1M	700,153,218	
16)	+	2004 - P	8/11/04	Whole ARM	2.74	3.004	18Y 1M	1,522,920,382	
17)	+	2004 - Q	8/12/04	Whole ARM	2.74	3.003	18Y 2M	677,971,620	
18)	+	2004 - R	8/26/04	Whole ARM	2.74	3.000	18Y 2M	641,321,384	
19)	+	2004 - S	8/26/04	Whole ARM	2.78	3.043	17Y 10M	1,777,319,714	

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Bloomberg List of Securities (Tranches)

99 Options										View All Classes
WFMB 2007-10 WELLS FARGO MORTGAGE BACKED SECURITIES TRUST										61 Classes
Template	SSA	CF	Class	Orig(000)	Curr(000)	Cpn	Ort/AL	Orig Hty/Cusip	Tranche Description	
1)	Y	IA1		300,000	50,104	6.000	5.71	7/25/37 949837AA6	PT, SSNR, AS	
2)	Y	IA2		50,000	672	6.000	2.59	7/25/37 949837AB4	SEQ, SSNR, AS	
3)	Y	IA3		11,446	3,577	6.000	5.24	7/25/37 949837AC2	SEQ, AS	
4)	Y	IA4		15,709	4,910	6.000	9.43	7/25/37 949837AD0	SEQ, AS	
5)	Y	IA5		101,994	13,363	6.000	3.99	7/25/37 949837AE8	PAC(11), SSNR, AS	
6)	Y	IA6		71,354	23,714	6.000	11.97	7/25/37 949837AF5	PAC(11), SSNR, AS	
7)	Y	IA7		29,719	3,278	6.000	3.85	7/25/37 949837AG3	PAC(22), AS	
8)	Y	IA8		59,907	4,715	6.000	3.02	7/25/37 949837AH1	DRB, SUP, AS	
9)	Y	IA9		19,969	1,572	6.000	3.02	7/25/37 949837AJ7	ARB, SUP, AS	
10)	Y	IA10		100,000	12,263	5.900	3.92	7/25/37 949837AK4	AD, PAC(11), AS	
11)	Y	IA11		1,667	204	6.000	3.92	7/25/37 949837AL2	IO, IHTL	
12)	Y	IA12		19,158	6,367	6.000	7.77	7/25/37 949837AM0	AD, PAC(11), SSNR, AS	
13)		IA13		11,609	0	6.000	0.94	7/25/37 949837AM8	Z, SUP, AS	
14)	Y	IA14		47,121	3,164	1.146	3.12	7/25/37 949837AP3	FLT, SUP, AD, AS	
15)	Y	IA15		7,854	527	35.124	3.12	7/25/37 949837AQ1	IVV, SUP, AD, AS	
16)	Y	IA16		12,505	2,544	6.000	5.74	7/25/37 949837AR9	AD, SEQ, AS	
17)	Y	IA17		20,117	6,283	6.000	9.99	7/25/37 949837AS7	AD, SEQ, AS	
18)	Y	IA18		13,814	6,040	6.000	15.33	7/25/37 949837AT5	Z, SEQ, SSNR, AS	
19)	Y	IA19		40,085	848	6.000	2.99	7/25/37 949837AU2	PAC(11), SSNR, AS	
20)	Y	IA20		51,693	17,180	6.000	7.79	7/25/37 949837AV0	PAC(11), SSNR, AS	
21)	Y	IA21		57,686	710	6.000	2.34	7/25/37 949837AM8	SUP, AS	
22)	Y	IA22		40,000	6,681	0.946	5.71	7/25/37 949837AX6	FLT, PT, SSNR, AS	
23)	Y	IA23		4,516	956	36.324	7.17	7/25/37 949837AY4	IVV, PAC(11), AS	
24)	Y	IA24		2,150	90	36.324	2.66	7/25/37 949837AZ1	IVV, SUP, AS	

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Bloomberg Security Example

WFMB 2007-10 1A1

94.751419 / 94.878708

CUSIP 949837AA6

Yield 8.299/8.237

As of 14 Jun

Prepay 500PSA

WAL 2.71

Collateral 98.9% WH30 6.0%

BVAL

WFMB 2007-10 1A1 Mtge Send

Page 1/5 Security Description

CUSIP 949837AA6 6.287(252)108 US RMBS

Buy Sell

1) Bond Summary 2) Group Summary 3) Comments 4) Structural Summary 5) Overview

Issuer Wells Fargo Mortgage Backed Securities Trust	6) Pro CF »	7) Docs CF »	8) Servicer Wells Fargo Bank (100.0%)
Series 07-10 Class 1A1 Mty	07/25/2037 14) ISIN US949837AA62	17) Lead Mgr	UBS
10) Class Description PT, SSNR, AS	FIGI BBG000B86PBS	18) Trustee	HSBC Bank

Current	
Bal USD	50,104,214
Fct (May 16)	0.167013861
Cpn (May 16)	6.00000%
Class/Grp Pct	23.52%
Beg Accrue	05/01/2016
End Accrue	05/31/2016
Cum Loss	1,772,701
11) Cr Supp	0.00%

Original	
Bal USD	300,000,333
WAL	5.71Yrs@ 300 PSA
1st Coupon	6.00000%
Class/Grp Pct	21.28%
1st Pay	07/25/2007
1st Settle	06/28/2007
Dated Date	06/01/2007
Priced	06/28/2007

Payment Details	
Next Pay	06/27/2016
Rcd Date	05/31/2016
Pay Day	25th
Frequency	12
Pay Delay	24 Days
Day Count	30/360
Calendar	US
Call	10% Collat Call

Rating	Curr	Orig
Fitch	D	AAA
HDY	Caa2	Aaae

Additional Information	
Clearstream, DTC Book Entry, DTC Same Day, Euroclear, TRACE, SMIIEA	
Min Size	25,000
Increment	1

	Jun16	May	Apr	Mar	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul15
Fctr		0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21
Cpn	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
VPR		27.66	15.57	18.63	19.38	16.36	21.25	8.89	30.57	14.79	19.41	29.22
CDR		3.29	10.08	2.24	7.42	0.00	4.09	14.06	2.41	4.71	11.21	5.38
SEV		19.96	38.60	69.49	6.79		15.53	50.81	13.22	21.58	8.43	44.44
D60-		12.5	12.6	13.4	12.5	12.7	12.8	12.9	13.9	13.6	13.5	13.3

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Data specs: (Distr.:min, max, mean, 25th, 50th,75th)

Security Identification

Cusip ID

Deal Name

Deal Manager

Issuer Company

Security Classification

Deal Type (eg. CMBS, RMBS)

Collateral Type (Home, Auto, Student)

Collateral Type (ARM vs FRM)

Agency Backed (yes, no)

Agency (Fannie Mae, Freddie Mac)

Dates

Issue Date

Pricing Date

Maturity Date

Security Description

Bond type (e.g. Floater, i Only)

Tranche Subordination Description

Coupon Type (e.g. Fixed, Floating)

Coupon Frequency (e.g. Monthly)

Coupon Index Rate (e.g. 3M-libor)

Credit Rating

Current and Original Ratings (5 ag.)

Other Security Characteristics

Credit Support at Issuance

Original Principal Amount

Collateral Description

Mortg.Purp.(% Equ. Takeout, Refin.)

LTV Distr..

Credit Score Distr.

Mortgage Size Distr.

MBS metrics 1: w. av. coupon

MBS metrics 2: w. av. Life

MBS metrics 3:w. av. maturity

Fraction of ARM and FRM

Occup. (% own, inv., vac.)

Geographic Information

Fraction of mortg. in top 5 states

Cash Flow and Losses

Monthly Interest, Principal Paym.

Monthly Outstanding balance

Monthly Losses

What we find

Seven facts:

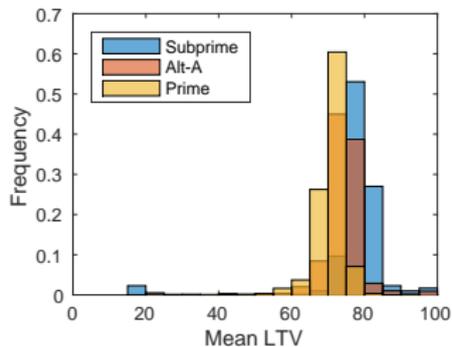
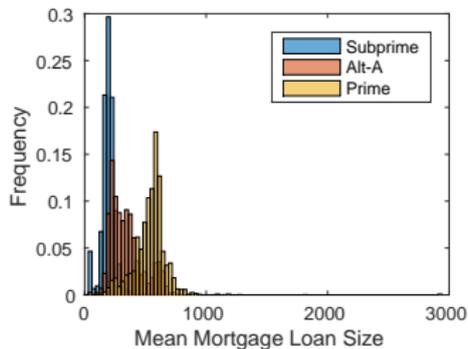
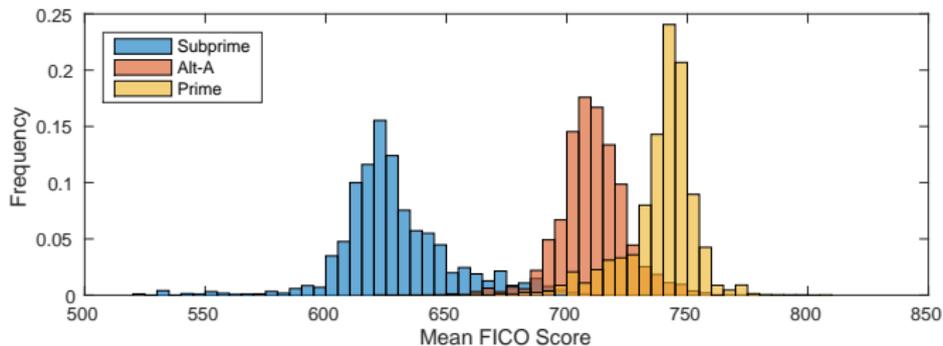
1. The bulk of these securities was rated AAA.
2. AAA securities did ok: on average, their total cumulated losses up to 2013 are under six percent. Their rate of return was above 2 percent.
3. The subprime AAA-rated RMBS did particularly well.
4. The bulk of the losses were concentrated on a small share of all securities.
5. Later vintages did worse than earlier vintages, but not subprime-AAA.
6. Mis-ratings modest for AAA.
7. Controlling for home price bust, a home price boom was good for repayments.

Together, these facts call into question the conventional narrative, that improper ratings of RMBS were a major factor in the financial crisis of 2008.

Fact 1: The bulk of these securities was rated AAA.

Rating	MBS Bonds		Principal Amount	
	No.	Pct.	(\$ Billion)	Pct.
AAA	65,590.0	56.8	4,535.1	86.9
AA	13,298.0	11.5	297.0	5.7
A	13,355.0	11.6	212.3	4.1
BBB	13,062.0	11.3	118.4	2.3
BB	6,096.0	5.3	40.1	0.8
B	3,865.0	3.3	13.6	0.3
CCC	66.0	0.1	0.3	0.0
CC	22.0	0.0	0.6	0.0
C	51.0	0.0	3.3	0.1
Rated	115,405.0	81.2	5,220.5	91.7
Not Rated	26,774.0	18.8	472.1	8.3

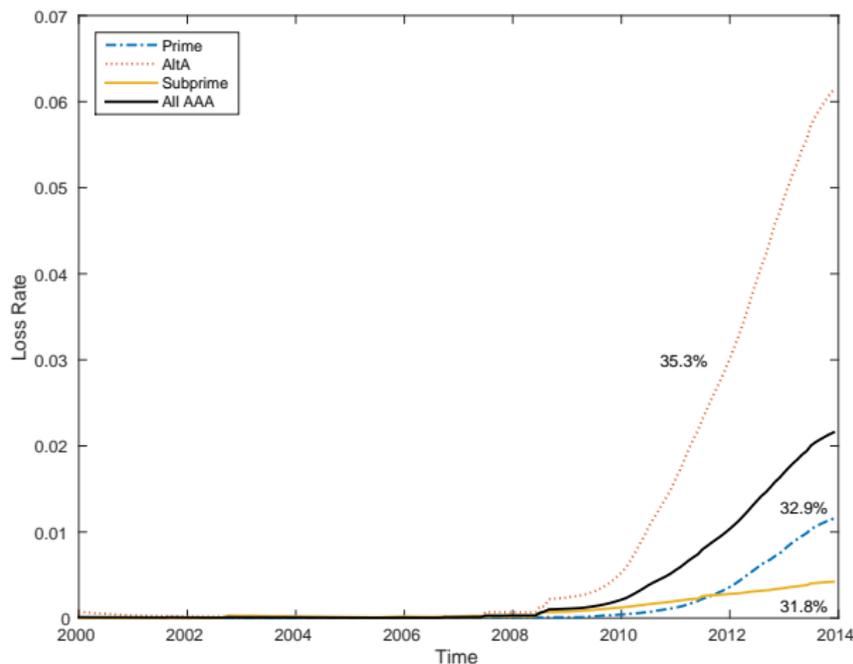
FICO scores vs Prime, Alt-A, Subprime



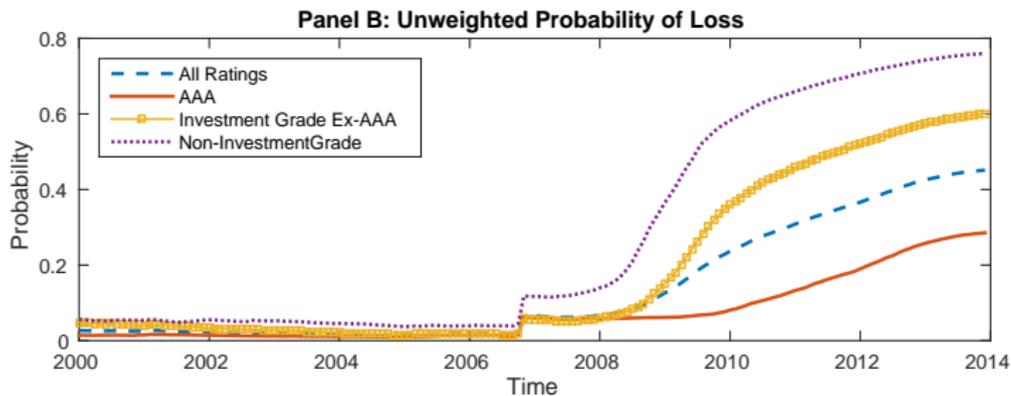
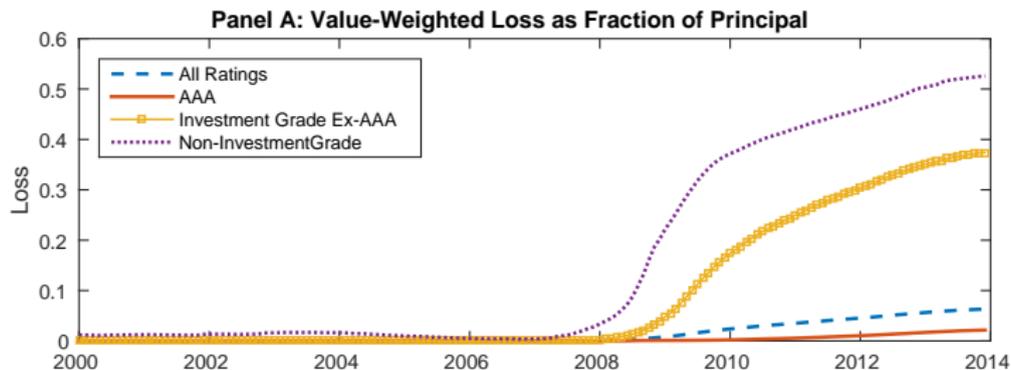
Losses on AAA securities

Fact 2: AAA securities did ok: on average, their total cumulated losses up to 2013 are under six percent. Their rate of return was above 2 percent.

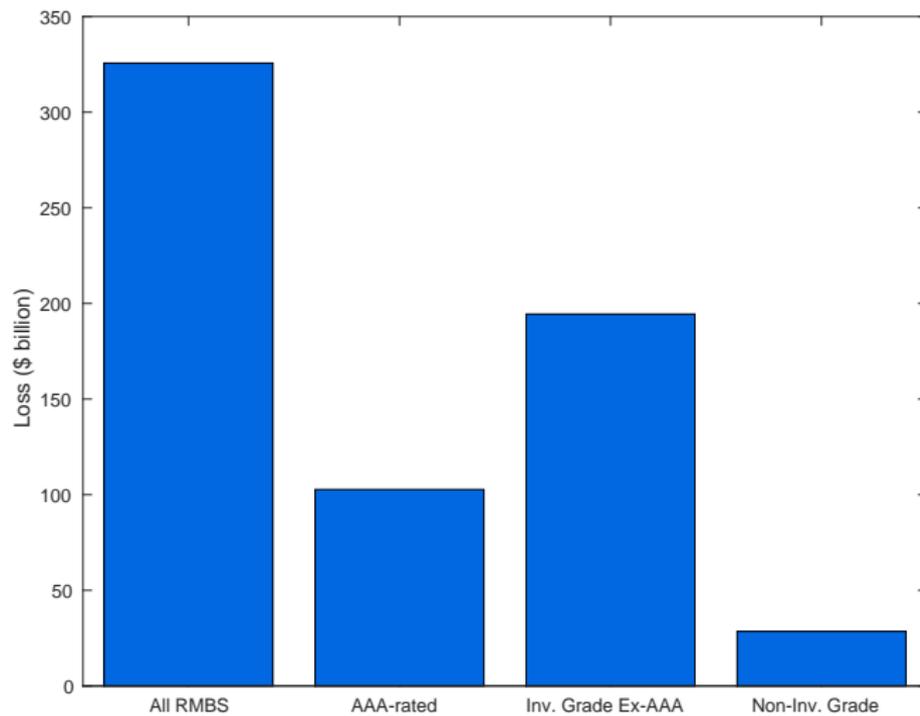
Fact 3: The subprime AAA-rated RMBS did particularly well



Losses on all RMBS



Dollar Amount of Losses in Non-Agency RMBS



Cash flow example

Example

Deal	JPALT 2006-S1
Security Name	JPALT 2006-S2 A7 Mtge
Security ID	46627MEX1
Original Rating	AAA

Year	2006	2007	2008	2009	2010	2011	2012	2013
Coupon Rate	6.17	6.17	6.17	6.17	6.17	6.17	6.17	6.17
Interest Payments	1,421	2,131	2,131	2,108	1,989	1,212	524	61
Principal Payment	-	-	-	1,247	1,365	1,174	430	96
Loss	-	-	-	-	4,844	14,039	7,550	3,802
Balance	34,547	34,547	34,547	33,300	27,091	11,878	3,898	-

Returns 1

$$P_0 = \sum_{t=1}^T \frac{i_t + p_t}{(1+r)^t} + \frac{TV_T}{(1+r)^T} \quad (1)$$

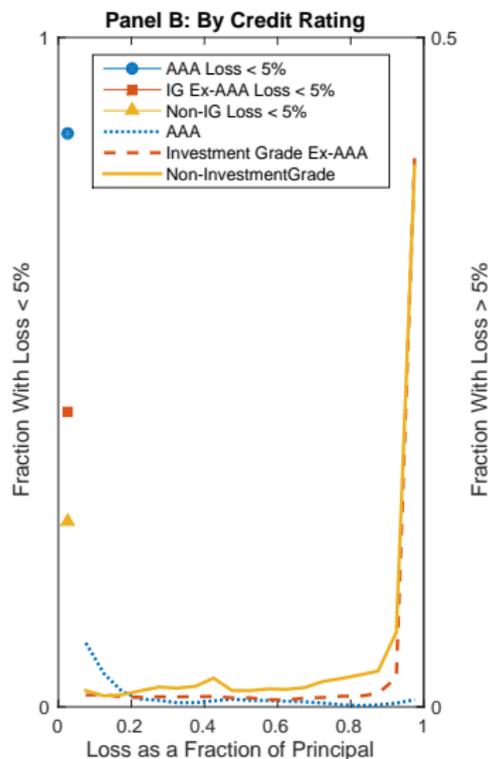
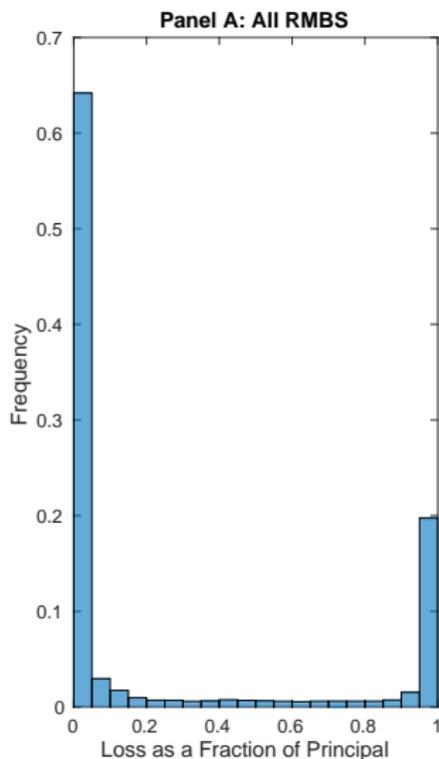
Returns 2

Return Statistic	80% TV	90% TV	100% TV
By Credit Rating			
AAA	2.44	2.89	3.31
AA	-7.90	-7.01	-6.21
A	-10.92	-10.10	-9.35
BBB	-13.56	-12.80	-12.11
Inv. Grade Ex AAA	-9.01	-8.15	-7.38
By Type of Mortgage			
AAA Prime	3.61	3.98	4.33
AAA SubPrime	1.61	2.14	2.62
AAA AltA	1.37	2.01	2.61

Returns 3

Return Statistic	80% TV	90% TV	100% TV
Fixed Rate MBS			
AAA Prime Fixed	4.25	4.56	4.84
AAA SubPrime Fixed	4.86	4.96	5.04
AAA AltA Fixed	3.64	4.13	4.58
Floating Rate MBS			
AAA Prime Floating	3.03	3.45	3.83
AAA SubPrime Floating	1.45	1.97	2.44
AAA AltA Floating	0.42	1.12	1.76

Fact 4: The bulk of the losses were concentrated on a small share of all securities.



Fact 5: Later vintages did worse than earlier vintages.

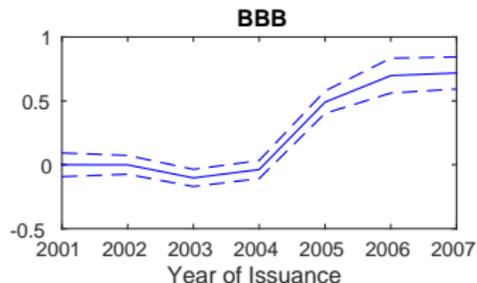
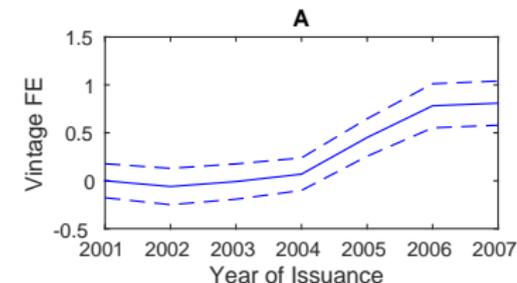
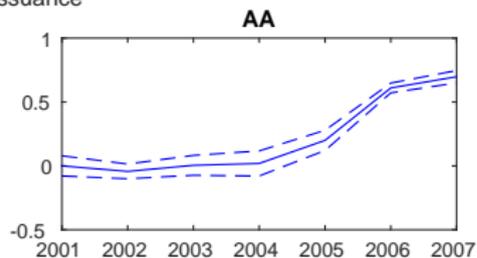
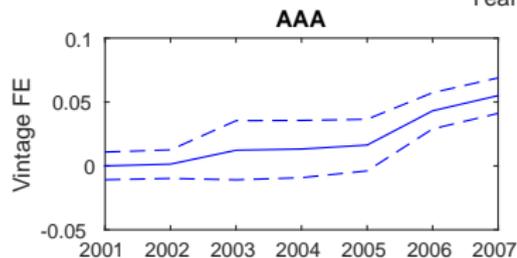
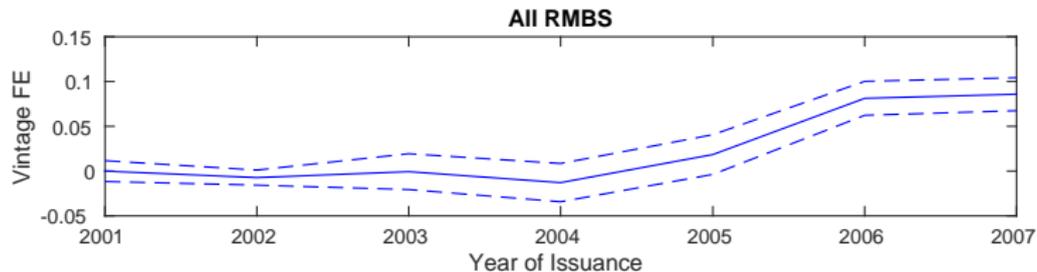
Principal-Weighted Losses in RMBS and Credit Ratings:

Rating	Full Sample	Before 2003	2003 - 2005	2006-2008
AAA	0.0218***	0.0002	0.0034***	0.0483***
AA	0.3096***	0.001	0.1180***	0.5091***
A	0.3620***	0.0055***	0.2000***	0.6572***
BBB	0.4480***	0.0334***	0.3152***	0.6655***
BB	0.4923***	0.0653***	0.4886***	0.5136***
B	0.5812***	0.0938***	0.6989***	0.5619***
CCC	0.7360***	0.4125***	0.4102***	0.9465***
CC	0.2036***	0.1364	0.0251	0.2005***
C or Below	0.3863***	0.0661***	0.6607***	0.3604***
Observations	93,902	19,230	38,381	36,291
R-squared	0.3217	0.0852	0.2972	0.485

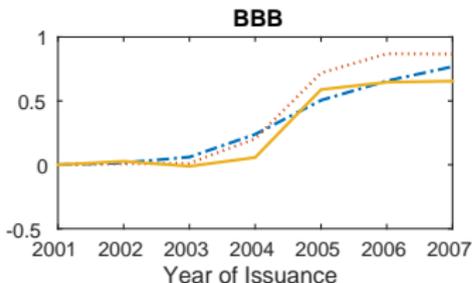
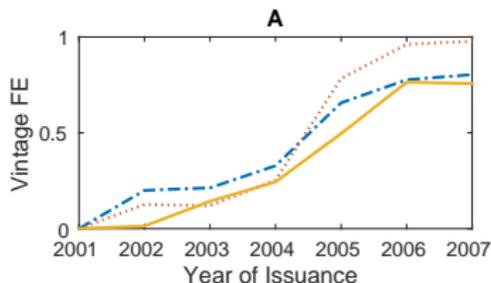
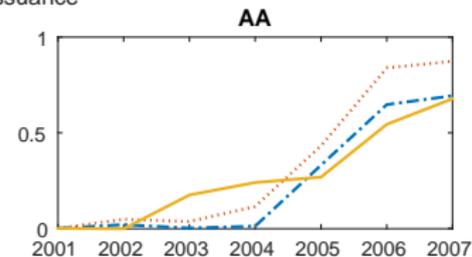
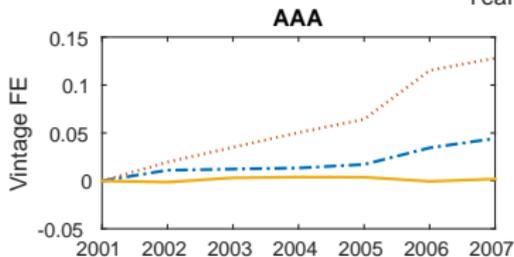
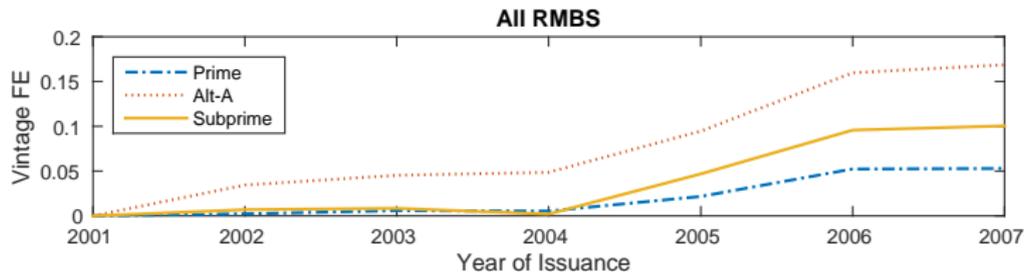
Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Fact 5: Vintage FE for Weighted Losses increased ...



... though AAA-Subprime did **not** do worse over time.



Fact 6: “Misratings”

Compare actual loss rate

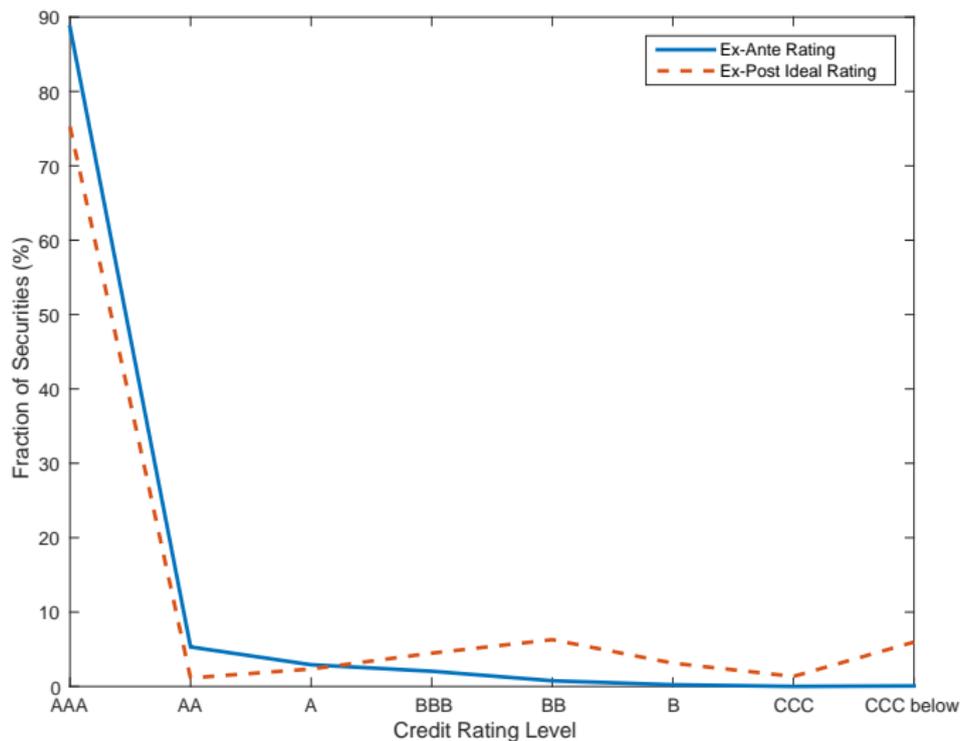
$$\text{lossrate}_{i,T} = L_{i,T} / \text{Principal}_{i,T}$$

to expected loss rate in table by Moody's.

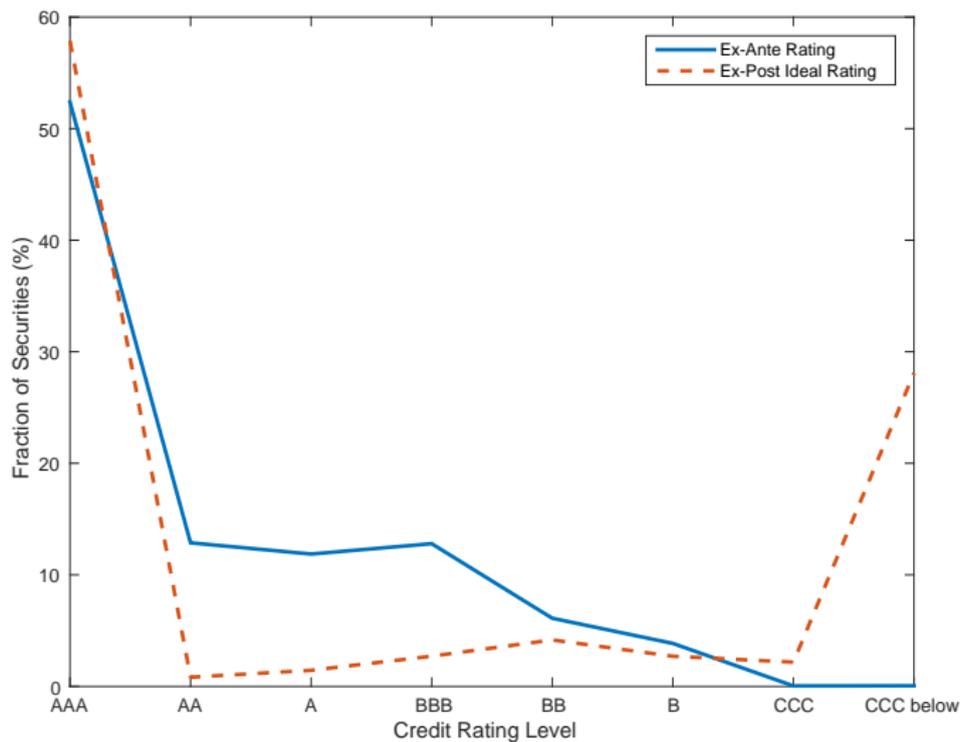
Moody's Table

Rating	Year									
	1	2	3	4	5	6	7	8	9	10
Aaa	0.000028%	0.000110%	0.000390%	0.000990%	0.001600%	0.002200%	0.002860%	0.003630%	0.004510%	0.005500%
Aa1	0.000314%	0.001650%	0.005500%	0.011550%	0.017050%	0.023100%	0.029700%	0.036850%	0.045100%	0.055000%
Aa2	0.000748%	0.004400%	0.014300%	0.025850%	0.037400%	0.048950%	0.061050%	0.074250%	0.090200%	0.110000%
Aa3	0.001661%	0.010450%	0.032450%	0.055500%	0.078100%	0.100650%	0.124850%	0.149600%	0.179850%	0.220000%
A1	0.003196%	0.020350%	0.064350%	0.103950%	0.143550%	0.181500%	0.223300%	0.264000%	0.315150%	0.385000%
A2	0.005979%	0.038500%	0.122100%	0.189750%	0.256850%	0.320650%	0.390500%	0.455950%	0.540100%	0.660000%
A3	0.021368%	0.082500%	0.198000%	0.297000%	0.401500%	0.500500%	0.610500%	0.715000%	0.836000%	0.990000%
Baa1	0.049500%	0.154000%	0.308000%	0.456500%	0.605000%	0.753500%	0.918500%	1.083500%	1.248500%	1.430000%
Baa2	0.093500%	0.258500%	0.456500%	0.660000%	0.869000%	1.083500%	1.325500%	1.567500%	1.782000%	1.980000%
Baa3	0.231000%	0.577500%	0.940500%	1.309000%	1.677500%	2.035000%	2.381500%	2.733500%	3.063500%	3.355000%
Ba1	0.478500%	1.111000%	1.721500%	2.310000%	2.904000%	3.437500%	3.883000%	4.339500%	4.779500%	5.170000%
Ba2	0.858000%	1.908500%	2.849000%	3.740000%	4.625500%	5.373500%	5.885000%	6.413000%	6.957500%	7.425000%
Ba3	1.545500%	3.030500%	4.328500%	5.384500%	6.523000%	7.419500%	8.041000%	8.640500%	9.190500%	9.713000%
B1	2.574000%	4.609000%	6.369000%	7.617500%	8.866000%	9.839500%	10.521500%	11.126500%	11.682000%	12.210000%
B2	3.938000%	6.418500%	8.552500%	9.971500%	11.390500%	12.457500%	13.205500%	13.832500%	14.421000%	14.960000%
B3	6.391000%	9.135500%	11.566500%	13.222000%	14.877500%	16.060000%	17.050000%	17.919000%	18.579000%	19.195000%
Caa	14.300000%	17.875000%	21.450000%	24.134000%	26.812500%	28.600000%	30.387500%	32.175000%	33.962500%	35.750000%

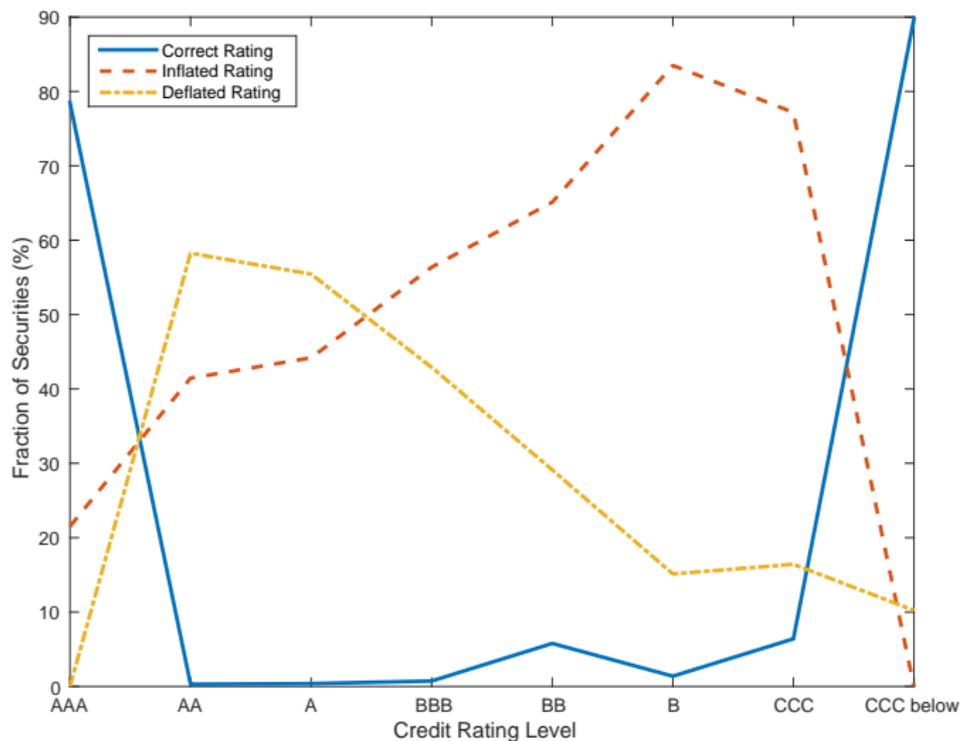
Ex-Ante vs Ex-Post Rating Based on Moodys Ideal Table



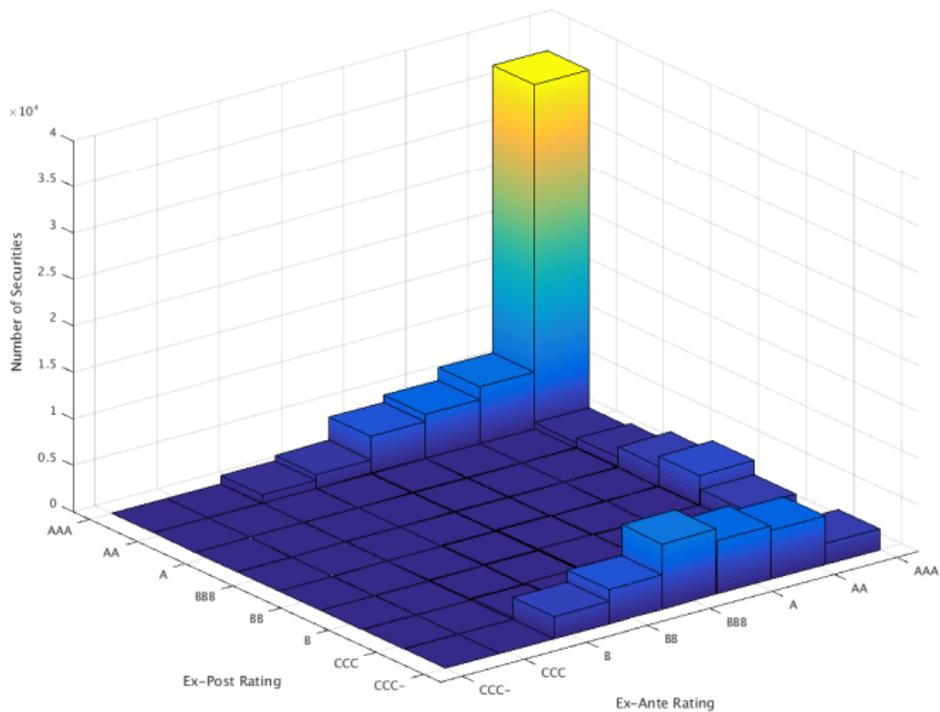
Ex-Ante vs Ex-Post Rating: Unweighted



Ex-Ante vs Ex-Post Rating Based on Moodys Ideal Table



“Misratings”



Fact 7: Loss-Rates and House Price Boom/Busts



$$lossrate_{i,T} = \beta_{MA}\omega_{i,MA} + \beta_{IL}\omega_{i,IL} + \dots + \beta_X X_i + \epsilon_i$$

where $\omega_{i,MA}$ is the fraction of principal invested in the state MA, etc.. (with only five of these weights nonzero), and where X_i are controls.

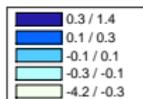
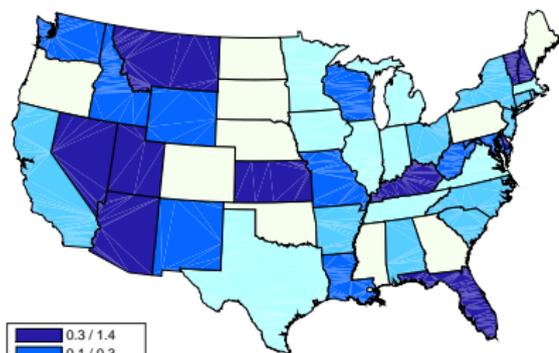


$$lossrate_{i,T} = = \beta^{boom}(\omega_{i,MA}\Delta^{boom}P_{MA} + \omega_{i,IL}\Delta^{boom}P_{IL} + \dots) + \beta^{bust}(\omega_{i,MA}\Delta^{bust}P_{MA} + \omega_{i,IL}\Delta^{bust}P_{IL} + \dots) + \dots$$

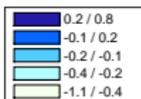
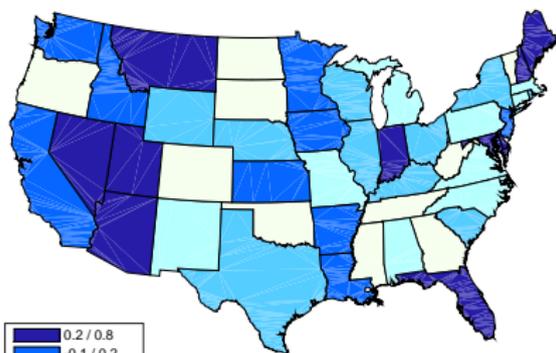
where $\Delta^{boom}P_{MA}$ is the percent change of house prices during the boom, 2000-2006, $\Delta^{bust}P_{MA}$ is the percent change during the bust 2006-2009, etc..

State-Level Dummies for Loss Rates

with Controls

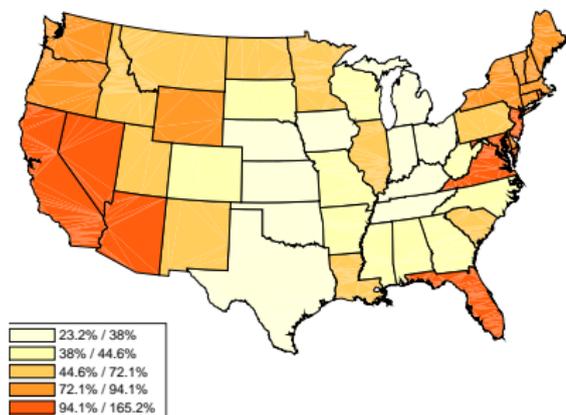


without Controls

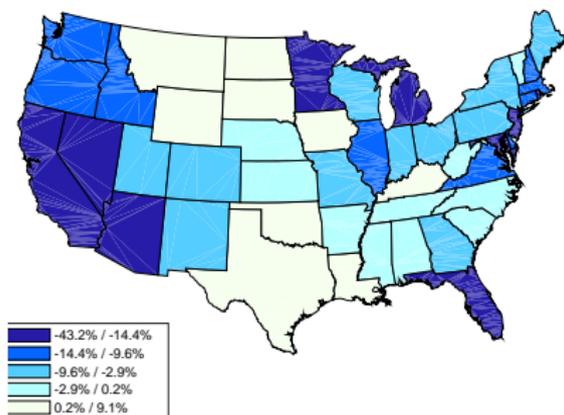


State-Level House Price Boom and Bust

Boom: 2000-Q1 to 2006-Q4



Bust: 2006-Q4 to 2009-Q4



House Prices and Loss Rates

	(1)	(2)	(3)	(4)	(5)
ΔHP 2000-2006	0.073*** (0.003)		-0.218*** (0.010)		-0.178*** (0.012)
ΔHP 2006-2009		-0.203*** (0.006)	-0.63*** (0.021)		-0.532*** (0.020)
Price Reversal				-0.238***	

Controls	No	No	No	No	Yes
Observations	93,902	93,902	93,902	93,902	71,316
R-squared	0.0059	0.0107	0.0156	0.0128	0.4345

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

“Price Reversal” = ΔHP 2006-2009/ ΔHP 2000-2006

House Prices and Loss Rates per Cohort, no controls

	2001	2002	2003	2004	2005	2006	2007
Δ HP 2000-2006:							
	-0.001	0.001	-0.006	-0.028***	-0.145***	-0.183***	-0.417***
	(0.005)	(0.004)	(0.005)	(0.010)	(0.024)	(0.031)	(0.031)
Δ HP 2006-2009:							
	0.001	0.006	-0.013	-0.077***	-0.403***	-0.665***	-1.112***
	(0.011)	(0.009)	(0.009)	(0.020)	(0.048)	(0.061)	(0.062)
R^2	0.000	0.000	0.000	0.002	0.006	0.014	0.027
N	4290	5734	9159	11839	17383	20797	14352

Standard errors in parentheses

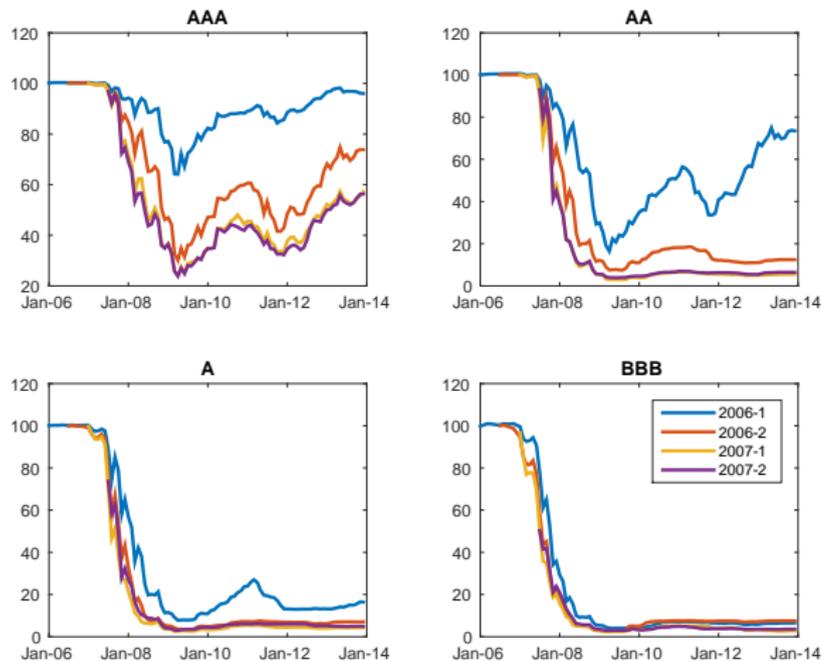
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

House Prices and Loss Rates per Cohort, with controls

	2001	2002	2003	2004	2005	2006	2007
Δ HP 2000-2006	-0.000 (0.006)	-0.009 (0.006)	-0.015*** (0.006)	-0.029** (0.011)	-0.067** (0.029)	-0.151*** (0.021)	-0.392*** (0.029)
Δ HP 2006-2009	0.005 (0.011)	-0.004 (0.010)	-0.019** (0.009)	-0.042** (0.018)	-0.286*** (0.042)	-0.479*** (0.037)	-1.016*** (0.051)
AA	0.000	0.003	0.000	0.014***	0.218***	0.676***	0.647***
A	0.017***	0.011***	0.007***	0.072***	0.407***	0.841***	0.514***
BBB	0.054***	0.051***	0.048***	0.163***	0.598***	0.834***	0.511***
BB	0.040***	0.035***	0.221***	0.378***	0.520***	0.536***	0.534***
B	0.051***	0.092***	0.351***	0.541***	0.878***	0.520***	0.875***
CCC	0.000	0.000	0.154**	0.269***	0.520***	0.980*	0.943***
CC	0.000	0.000	0.004	0.001	0.051	0.939	0.585***
Alt-A	-0.002*	-0.000	0.002**	0.010***	0.036***	0.064***	0.050***
Prime	-0.002*	-0.001	0.001	0.011***	0.017***	0.005	-0.007*
R^2	0.112	0.125	0.366	0.404	0.456	0.693	0.496
N	2445	3128	6252	8321	13047	20394	14076

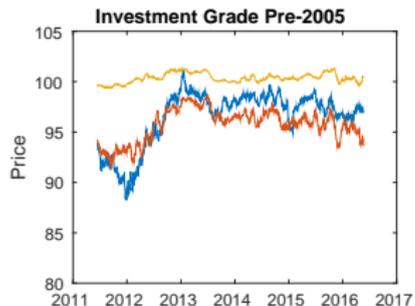
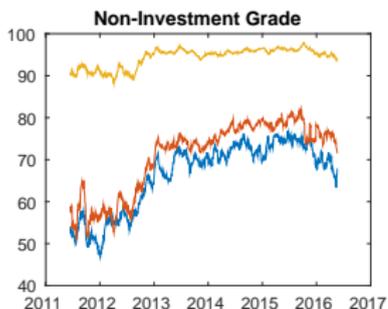
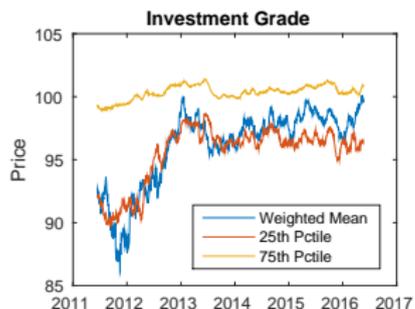
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Prices? Market ABX-indices for Subprime RMBS ...



ABX.HE indexes by Markit. Each line represents a vintage of subprime RMBS and the Index. Each panel shows the evolution of prices over time by credit rating. These indexes are constructed based on 20 deals.

... vs FINRA Survey



Summary statistics of daily transaction prices collected by the Financial Industry Regulatory Authority from May 2011 through May 2016 on Non-Agency MBS. Top: Investment Grade vs Non-Investment Grade. Bottom: vintages for Investment Grade. 22-day moving averages, principal weighted average and 25th and 75th percentiles.

Conclusions

Seven facts:

1. The bulk of these securities was rated AAA.
2. AAA securities did ok: on average, their total cumulated losses up to 2013 are under six percent. Their rate of return was above 2 percent.
3. The subprime AAA-rated RMBS did particularly well.
4. The bulk of the losses were concentrated on a small share of all securities.
5. Later vintages did worse than earlier vintages, but not subprime-AAA.
6. Mis-ratings modest for AAA.
7. Controlling for home price bust, a home price boom was good for repayments.

Together, these facts call into question the conventional narrative, that improper ratings of RMBS were a major factor in the financial crisis of 2008.