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Finance as Social Science
The Subprime Example

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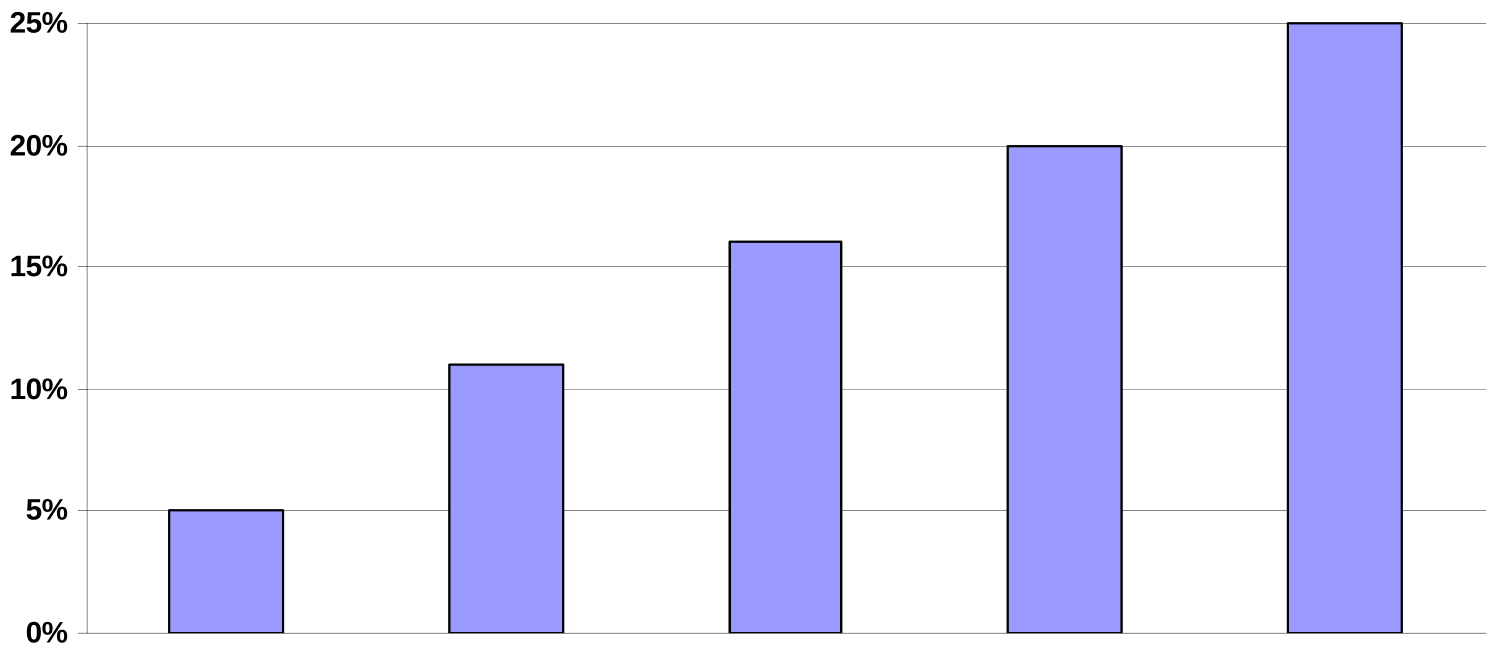
SECTION 1

Subprime Mortgage Loan Losses

Predicting 2006 Subprime Mortgage Loan Losses

- Multi Factor Regression aka the “Physics Model” => 5% losses
- Social Science Model Dec 2006: Default Timing Curve Model => 11% losses
- Social Science Model Oct 2007: Shutdown Model => 16% losses
- Social Science Model Nov 2007: Higher LGD => 20% losses
- Social Science Model Apr 2008: Still Higher LGD => 25% losses



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The Failure of the Physics Model

- Explanatory variables: FICO, LTV, HPA, Payment Shock, Debt to income, income verification
- Mortgage application data was inaccurate
- “Soft” unreported underwriting variables deteriorated
- Explanatory variables were out of the range of historical observation
- The multiplicative effects of explanatory variables were out of the range of historical observation

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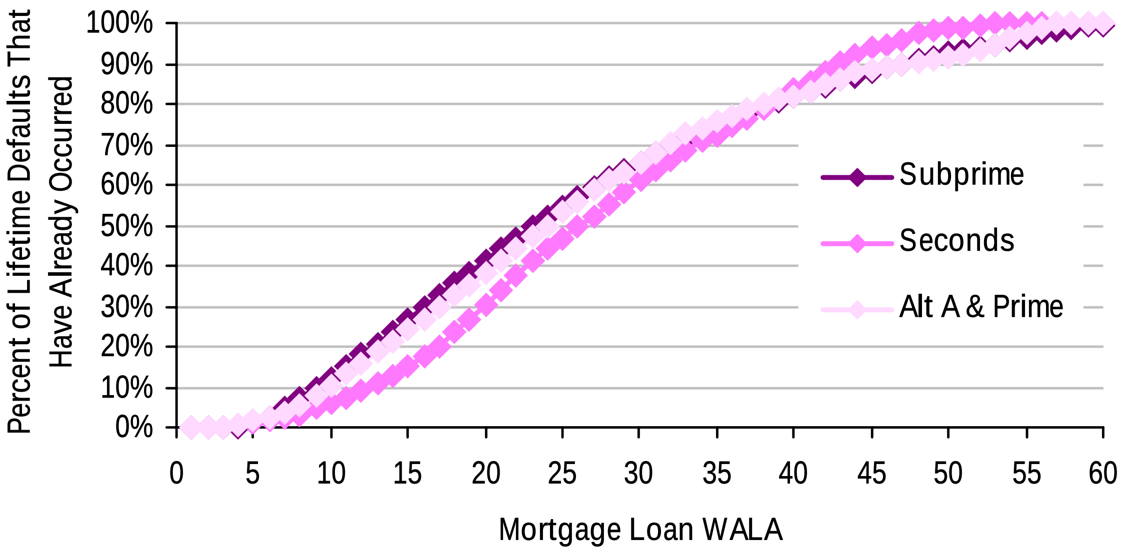
The Social Science Model

- Default timing curves predict how many more defaults are going to occur in a mortgage pool given how many defaults have already occurred and the WALA (or seasoning) of the mortgage loan portfolio

This approach is like measuring sixth graders and predicting their heights as adults



- The “Shutdown Model” reflects the loss of re-financing opportunity and higher delinquency “roll rates”
- Higher loss given default reflects worse HPA prediction

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Behavioral Feedback Loops

Home Price Appreciation

- High home price appreciation decreased mortgage loan defaults and losses
- Low loan losses decreased loan underwriting vigilance, made mortgage credit more readily available
  - “Affordability”mortgage loan products embed payment shock or high LTV or both
- Easy mortgage lending supported HPA

Unfortunately, the process can also work in reverse

Behavioral Feedback Loops

No Skin in the Game

- Mortgage brokers were paid to originate loans, not screen applicant credit risk
- Mortgage originators transferred almost all risk to Wall Street
- Wall Street transferred almost all risk to subprime investors
- ABS CDO managers were paid for assets under management and early payments from mortgage loans

Unfortunately, when the music stopped, participants up and down the chain were left holding the risk they hadn't passed on

Next Behavioral Effect

Change in Willingness to Pay

- Homeowners who can pay their mortgage will choose not to
- www.youwalkaway.com
- Homeowners can be educated to increase their wealth by “walking away” just as they were educated to save money by refinancing

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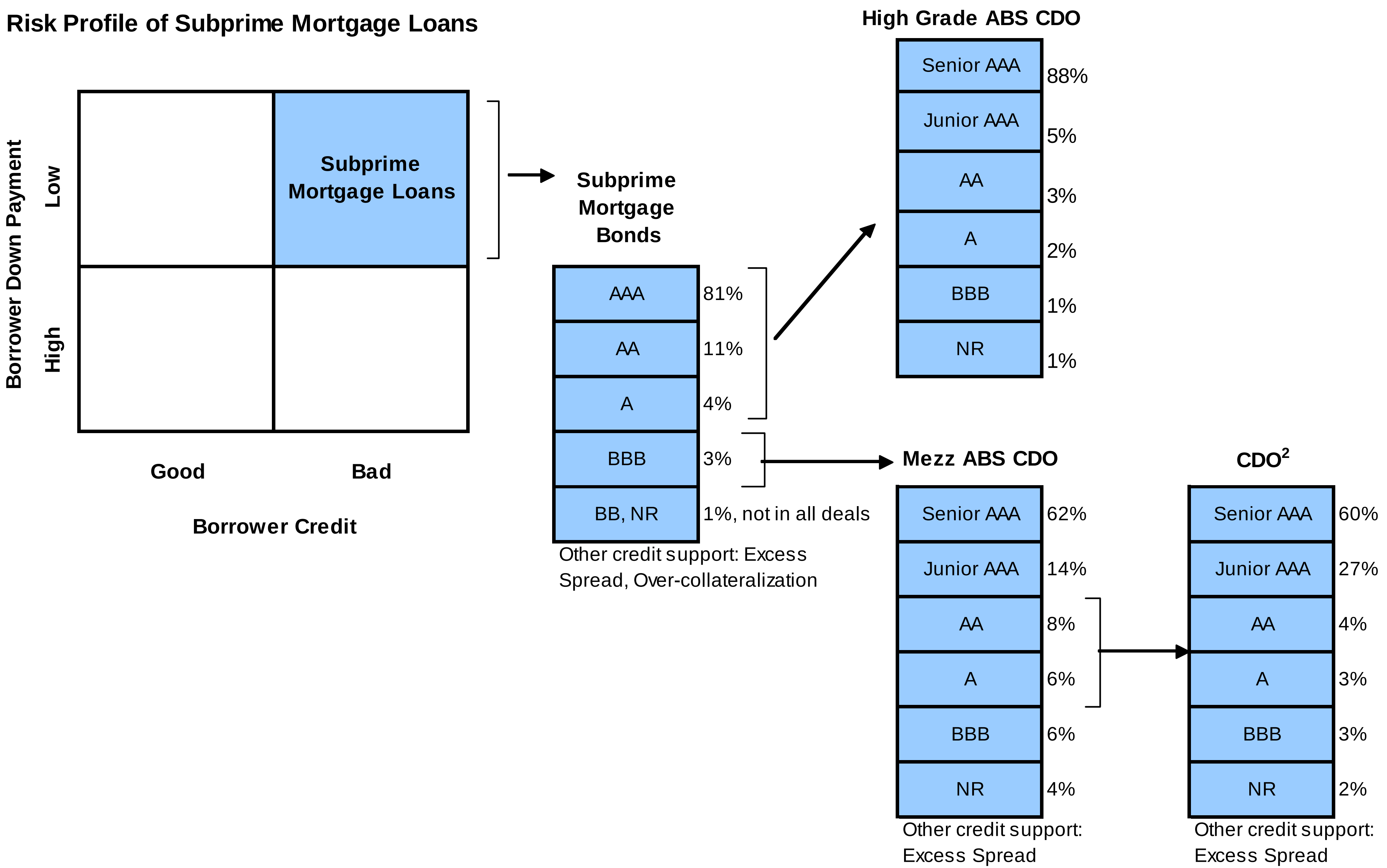
SECTION 2

ABS CDO Losses

Russian Dolls



Residential Mortgage Deals in 420 ABS CDOs

Using the old November 2007 model of mortgage loan losses

Number of Deals by Vintage and Mortgage Loan Type

Vintage	Subprime	Alt-A	Seconds	Prime	Total
1997-2002	175	31	2	43	251
2003	215	71	7	136	429
2004	368	259	27	182	836
2005	483	473	64	191	1,211
2006	516	497	72	135	1,220
2007	150	115	21	26	312
Total	1,907	1,446	193	713	4,259

Average Predicted Losses by Vintage and Mortgage Type

Vintage	Subprime	Alt-A	Seconds	Prime	Average
1997-2002	5.0	0.7	4.7	0.3	3.7
2003	2.9	0.4	4.5	0.0	1.6
2004	3.0	0.5	6.5	0.1	1.7
2005	7.5	1.5	17.8	0.2	4.5
2006	19.5	4.6	46.9	0.3	12.9
2007	22.8	6.2	65.1	0.6	17.7
Average	10.3	2.7	31.6	0.2	7.0

These statistics are of mortgage deals whose bonds were purchased by ABS CDOs and are not necessarily representative of all mortgage deals

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Subprime Mortgage Bond Losses

Using the old November 2007 model of mortgage loan losses

Number of Subprime Mortgage Bonds by Vintage and Rating in 420 ABS CDOs													All
Vintage	AAA	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	BIG	NA	Ratings
1997-2002	24		24			55	1	10	76	24	5	28	247
2003	22		42	2	5	100	42	69	122	73	1	15	493
2004	117	75	204	87	92	270	176	274	326	279	61	43	2,004
2005	269	294	416	332	314	425	382	420	409	405	198	121	3,985
2006	174	253	416	378	391	460	435	448	444	403	195	127	4,124
2007	62	30	81	61	59	73	88	82	84	57	8	19	704
All Vintages	668	652	1,183	860	861	1,383	1,124	1,303	1,461	1,241	468	353	11,557

Average 120% Shutdown Losses of Subprime Mortgage Bonds in 420 ABS CDOs													All
Vintage	AAA	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	BIG	NA	Ratings
1997-2002	12%		28%			17%	0%	8%	11%	8%	60%	48%	19%
2003	6%		19%	41%	12%	18%	22%	12%	14%	18%	71%	12%	16%
2004	12%	6%	9%	7%	17%	11%	10%	10%	12%	20%	30%	36%	13%
2005	10%	4%	8%	7%	11%	14%	20%	30%	41%	53%	69%	35%	24%
2006	22%	30%	47%	59%	66%	69%	80%	83%	89%	91%	97%	88%	70%
2007	27%	55%	57%	74%	77%	72%	80%	84%	84%	72%	88%	89%	71%
All Vintages	15%	17%	26%	35%	41%	35%	46%	46%	48%	56%	76%	57%	41%

These statistics are of subprime mortgage bonds purchased by ABS CDOs and are not necessarily representative of all subprime mortgage bonds. Many highly-rated securities are from scratch-and-dent deals.

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Collateral Losses of 2006-7 Mezz ABS CDOs

Using the old November 2007 model of mortgage loan losses

Tranche	Threshold Collateral Losses That Threaten Tranche	% of CDOs Whose Predicted Losses Exceed Threshold	Loss Given Default	Tranche Expected Losses
Sr. AAA	37% +	86%	51%	43%
Jr. AAA	24% +	93%	97%	90%
AA	16% +	96%	99%	95%
A	12% +	97%	100%	96%
BBB	7% +	99%	99%	98%

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Why Haven't We Updated CDO Loss Estimates?

Underlying mortgage bond losses are only one part of ABS CDO losses. Other issues, just as important are:

- Interest and principal "waterfalls" in CDO structure
- Effect of ABS CDO collateral downgrades in changing cash flow waterfalls
- Tranche voting rights
- CDO documentation issues
- All of these factors vary across ABS CDOs

Thinking About Losses: Physics vs. Social Science

- Increased default correlation?
- Fatter tail distributions?
- Higher default and loss rates?