# Credit Derivatives and the Financial Crisis

(See also Chapter 26.6)

# The Problem

Asset Backed Securities and Mortgage Backed Securities normally considered safe were blended with low-grade, high default probability assets.

The sub prime mortgage market is partially to blame but the real issues are

- Lack of transparency
- The failure to price risk

A market works only when there is transparent price discovery

Price in the ABS market represents the discount on bonds

# ABACUS PROSPECTUS

*Recent Developments in Subprime Residential Mortgage Lending.* Recently, delinquencies, defaults and losses on residential mortgage loans have increased and may continue to increase, which may affect the performance of RMBS, in particular RMBS Residential B/C Mortgage Securities which are backed by subprime mortgage loans. Subprime mortgage loans are generally made to borrowers with lower credit scores. Accordingly, mortgage loans backing RMBS Residential B/C Mortgage Securities are more sensitive to economic factors that could affect the ability of borrowers to pay their obligations under the mortgage loans backing these securities. Market interest rates have been increasing and accordingly, with respect to adjustable rate mortgage loans and hybrid mortgage loans that have or will enter their adjustable-rate period, borrowers are likely to experience increases in their monthly payments and become increasingly likely to default on their payment obligations. Discovery of fraudulent mortgage loan applications in connection with rising default rates with respect to subprime mortgage loans may indicate that the risks with respect to these mortgage loans are particularly acute at this time. Such risks may result in further increases in default rates by subprime borrowers as it becomes more difficult for them to obtain refinancing.

These economic trends have been accompanied by a recent downward trend or stabilization of property values after a sustained period of increase in property values. Because subprime mortgage loans generally have higher loan-to-value ratios, recoveries on defaulted mortgage loans are more likely not to result in payment in full of amounts owed under such mortgage loans, resulting in higher net losses than would have been the case had property values remained the same or increased. A decline in property values will particularly impact recoveries on second lien mortgage loans that may be included in the mortgage pools backing RMBS Residential B/C Mortgage Securities.

# Preliminaries

A mortgage backed security is a bond issue backed by the strength of the underlying asset market (e.g. housing prices) and credit-worthiness of the borrower (e.g. FICA scores)

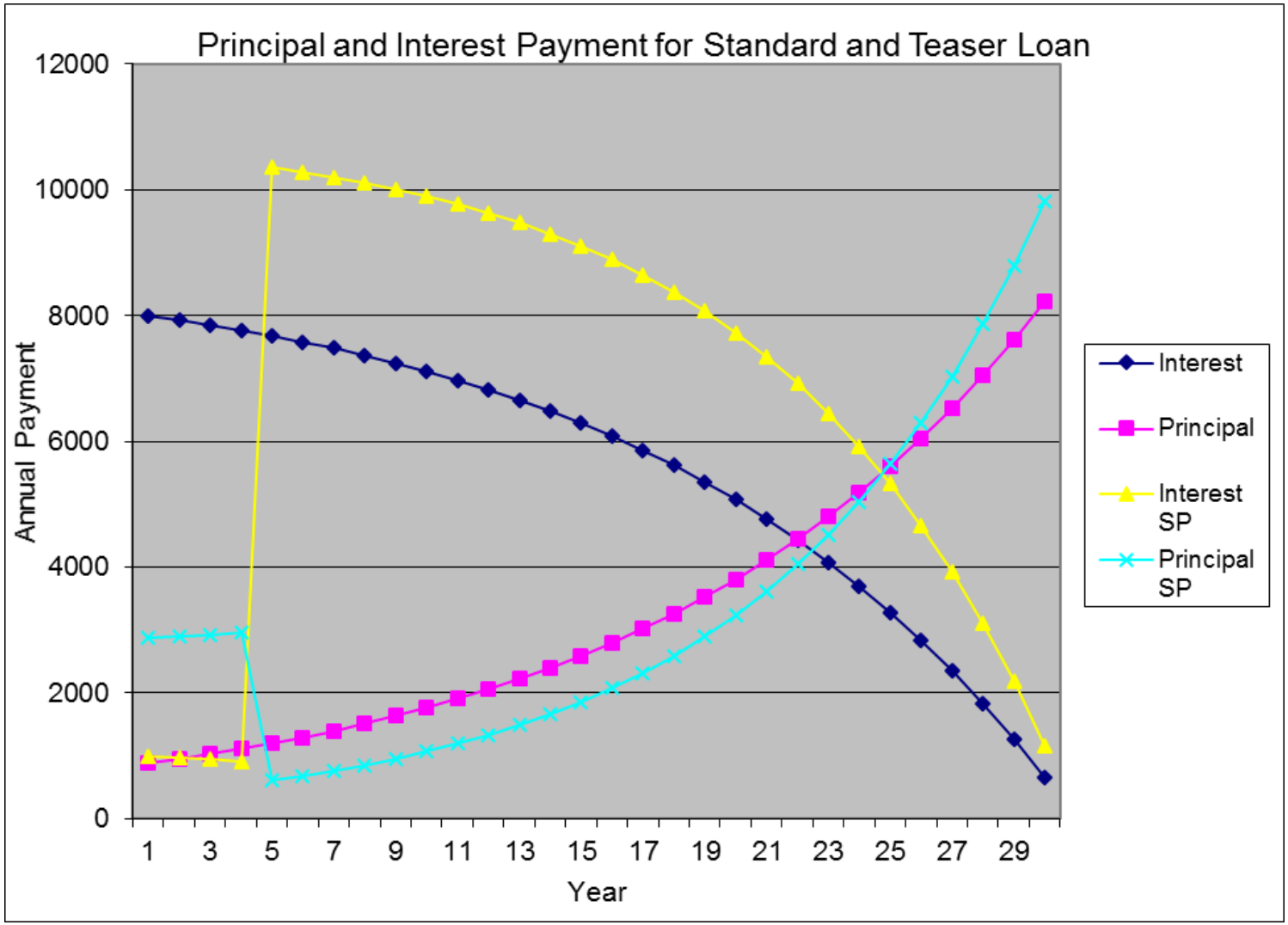
Sub prime mortgages are by definition lower risk class assets but to sell lower risk investors would get a higher yield.

Crisis started with fraudulent origination of sub-prime loans with teaser rates and an adjustable rate

Sub-prime loans were offered at low starting rates that borrower could afford followed by an adjustable rate they could not afford.

Destined to fail….. “The Big Short”

# Payment Schedule for Standard and Sub Prime with Teaser and Adjustable Rate



# Bond Pricing Basics

- The value of the bond equals the present value of interest and principle payments adjusted for the probability of default and other factors.

$$B = \frac{A(i^*)}{r}\left(1-e^{-rN}\right) - \left(\frac{A(i)}{Z}\right)E\left[\max(0, Z-P(T))\right]\frac{\left(1-e^{-rN}\right)}{r}$$

- The key to the market is in determining the yield on a bond with risk, i.e. a premium above a risk free rate. This is what Moody's and S&Poor do.

- $$\frac{1-\left(1+i^*\right)^{-N}}{i^*} = \left[\frac{1-(1+i)^{-N}}{i}\right]\left[1+\frac{E[Max(0, Z-P(T))]}{Z}\right]^{-1}$$

# Mortgage Backed Securities

Banks/financial Institutions originate mortgages from deposits or equity capital

Mortgages are combined into investment grade bonds that are sold to investors through secondary markets (Fannie Mae and Freddy Mac) and funds are returned to originators to lend again.

Bonds were rated by Moody's and Standard and Poor to determine the yield on bonds.

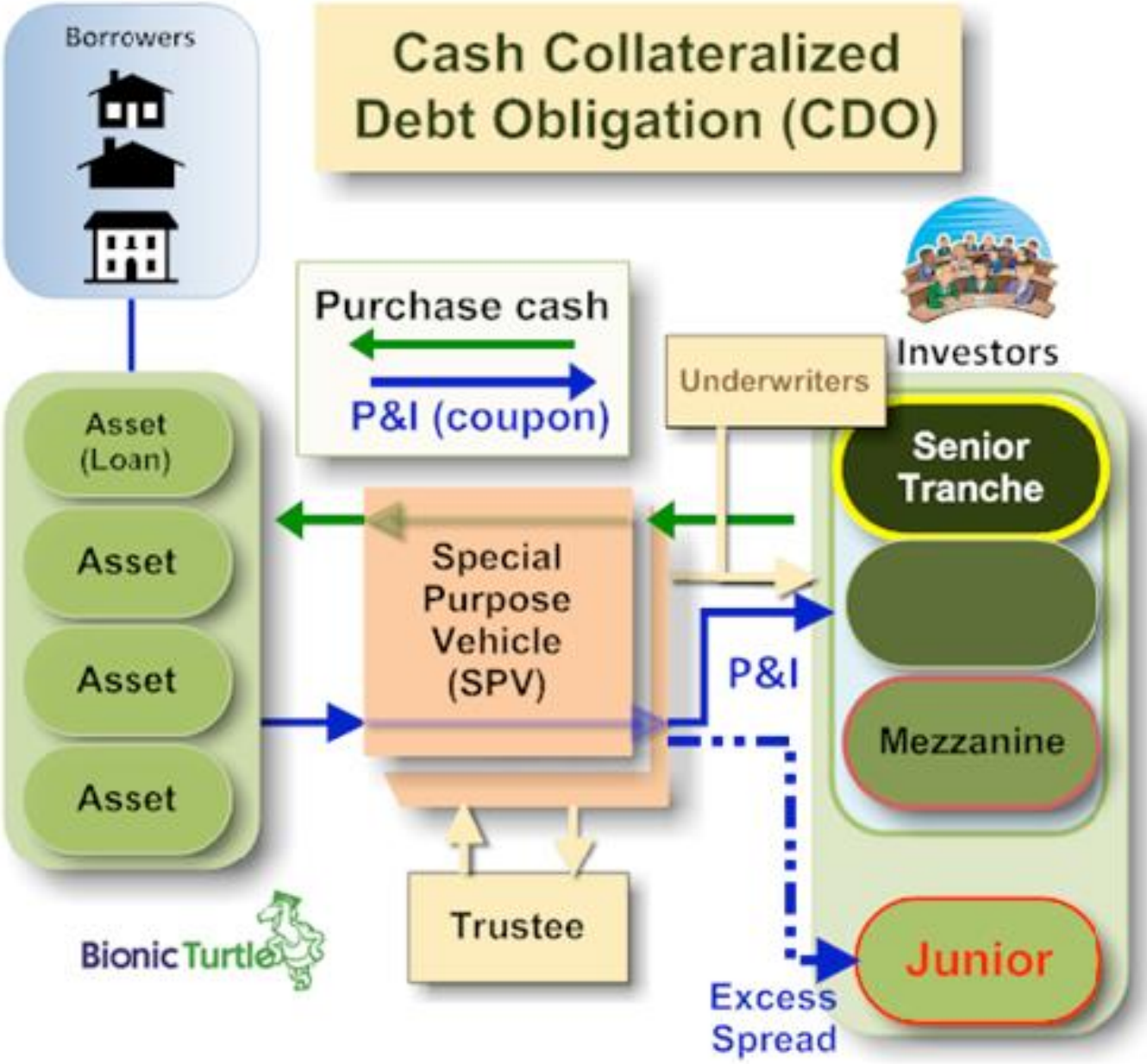
Basis points above LIBOR

# CDOs

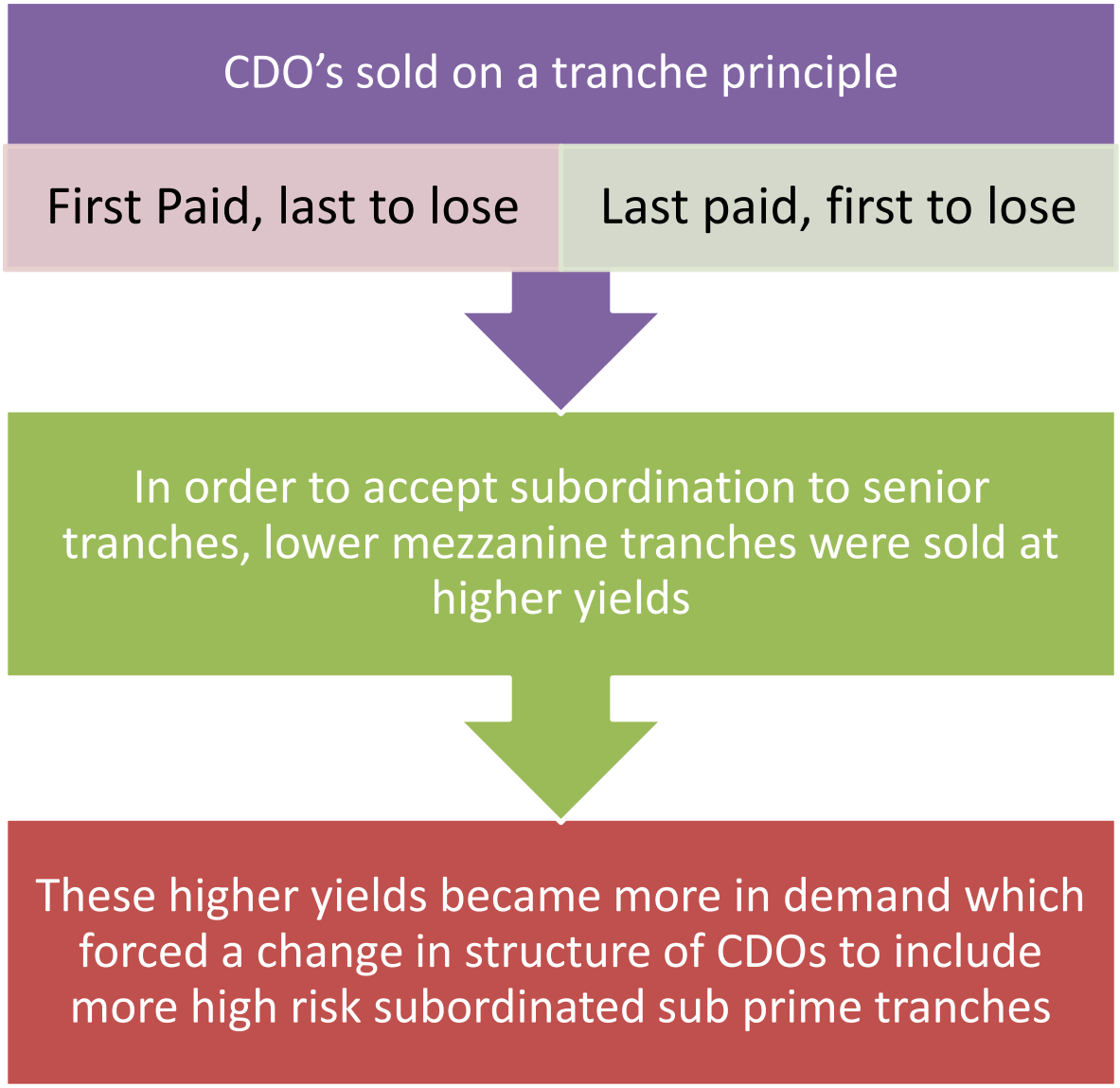
The basic principle behind a CDO involves the re-packaging of fixed income securities and the division of their cash flows according to a strict waterfall structure.

A CDO is constructed by creating a special purpose vehicle (SPV) which buys assets and issues bonds backed by the assets' cash flows.

The bonds are divided into a number of tranches with different claims on the principal and interest generated by the CDO's assets.


Borrowers
Cash Collateralized Debt Obligation (CDO)
Purchase cash
P&I (coupon)
Investors
Underwriters
Asset (Loan)
Asset
Asset
Asset
Special Purpose Vehicle (SPV)
Senior Tranche
P&I
Mezzanine
Trustee
Junior
Excess Spread
BionicTurtle

# Mezzanine Structure



# CDO Structure

This table summarizes the average liability structure of 735 ABS CDOs issued from 1999-2007. The % with tranche is the percent of CDOs that contained a tranche with the given rating at its issuance. The average number of tranches refers to the number per CDO with the given rating. The yield refers to the average coupon paid to the tranches, and the subordination refers to the percent of credit enhancement of the given tranche.

*Source: Lehman Live*

| Rating | % With Tranche | Average # of Tranches | Yield | Subordination |
|---|---|---|---|---|
| AAA | 100.0% | 2.5 | 3.4% | 21.5% |
| AA+ | 7.4% | 0.1 | | 16.8% |
| AA | 81.7% | 0.9 | 4.1% | 14.0% |
| AA- | 12.7% | 0.1 | | 11.0% |
| A+ | 8.1% | 0.1 | | 16.8% |
| A | 59.6% | 0.6 | 4.3% | 11.0% |
| A- | 25.5% | 0.3 | | 12.0% |
| BBB+ | 11.3% | 0.1 | | 14.5% |
| BBB | 80.1% | 0.9 | 4.4% | 6.8% |
| BBB- | 19.3% | 0.2 | | 10.2% |
| Below BBB- | 37.2% | 0.5 | | -- |
| Unrated | 86.3% | 1.1 | | -- |
| | -- | 7.4 | | -- |

# Appendix B: Credit Rating Scale

| Moodys | S&P | Fitch | Score |
|---|---|---|---|
| Aaa | AAA | AAA | 1 |
| Aa1 | AA+ | AA+ | 2 |
| Aa2 | AA | AA | 3 |
| Aa3 | AA- | AA- | 4 |
| A1 | A+ | A+ | 5 |
| A2 | A | A | 6 |
| A3 | A- | A- | 7 |
| Baa1 | BBB+ | BBB+ | 8 |
| Baa2 | BBB | BBB | 9 |
| Baa3 | BBB- | BBB- | 10 |
| Ba1 | BB+ | BB+ | 11 |
| Ba2 | BB | BB | 12 |
| Ba3 | BB- | BB- | 13 |
| B1 | B+ | B+ | 14 |
| B2 | B | B | 15 |
| B3 | B- | B- | 16 |
| Caa1 | CCC+ | CCC+ | 17 |
| Caa2 | CCC | CCC | 18 |
| Caa3 | CCC- | CCC- | 19 |
| Ca | CC | CC | 20 |
| C | C | C | 21 |
| D | D | D | 22 |
| NR | NR | NR | 0 |

# ABACUS Pitch Book

## Liabilities

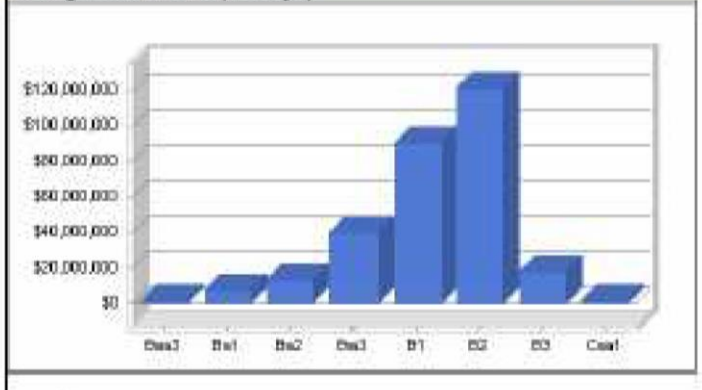
| Notes | Ccy | Amount | Coupon/ Spread | Maturity | S&P Rating Initial | S&P Rating Current | Moody's Rating Initial | Moody's Rating Current |
|---|---|---|---|---|---|---|---|---|
| Class X | USD | $ 4,116,821 | 4.4364% | 10/15/10 | AAA | AAA | Aaa | Aaa |
| Class A-1L | USD | $ 216,000,000 | L+ 26 | 10/15/17 | AAA | AAA | Aaa | Aaa |
| Class A-2L | USD | $ 18,000,000 | L+ 42 | 10/15/17 | AA | AA | Aa2 | Aa2 |
| Class A-3L | USD | $ 19,000,000 | L+ 75 | 10/15/17 | A- | A- | A2 | A2 |
| Class B-1L | USD | $ 16,500,000 | L+ 185 | 10/15/17 | BBB | BBB | Baa2 | Baa2 |
| Class B-2L | USD | $ 8,000,000 | L+ 500 | 10/15/17 | BB | BB | Ba2 | Ba2 |
| Preferred Shares | USD | $ 24,030,000 | n.a. | 10/15/17 | n.r. | n.r. | n.r. | n.r. |

## Collateral Summary

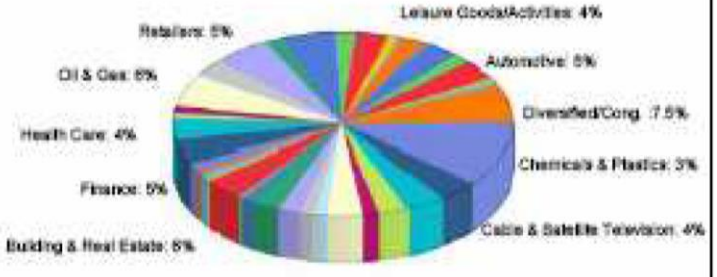
| | Current | | Current | Trigger |
|---|---|---|---|---|
| Number of Obligors | 176 | Senior Class A O/CTest | 128.30% | 112.00% |
| WARF | 2,223 | Class A O/C Test | 118.60% | 106.00% |
| Wtd. Avg. Spread | 2.70% | Class B-1L O/C Test | 111.40% | 104.50% |
| Diversity Score | 75.7 | Class B-2L O/C Test | 108.10% | 103.75% |
| Wtd. Avg. Life | 5.2 | | | |
| MTM Price | 100.09% | Interest Coverage Test | 2.60% | 1.60% |

## Portfolio Distribution

Ratings Distribution (Moodys)



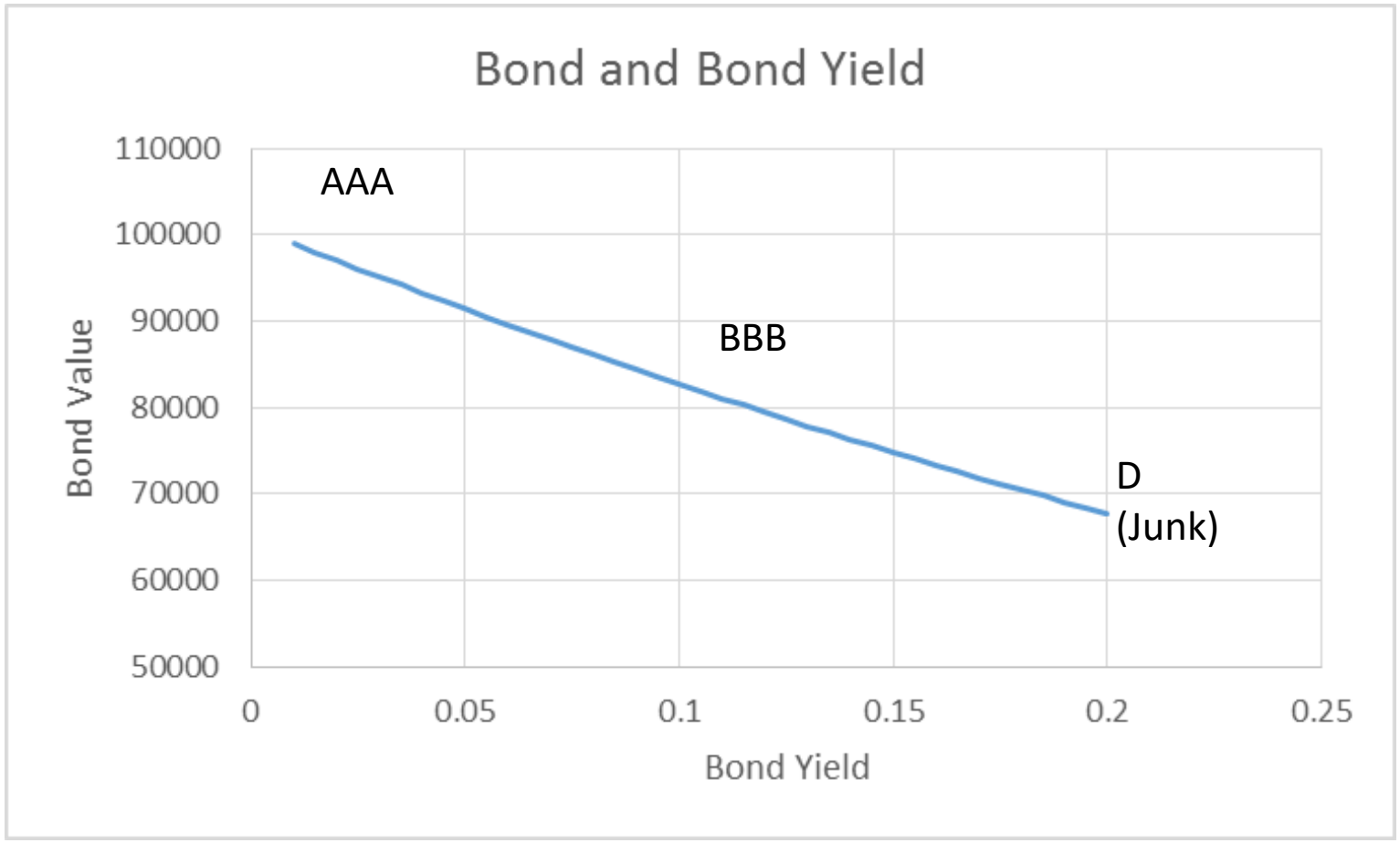

Industry Distribution (Moodys)



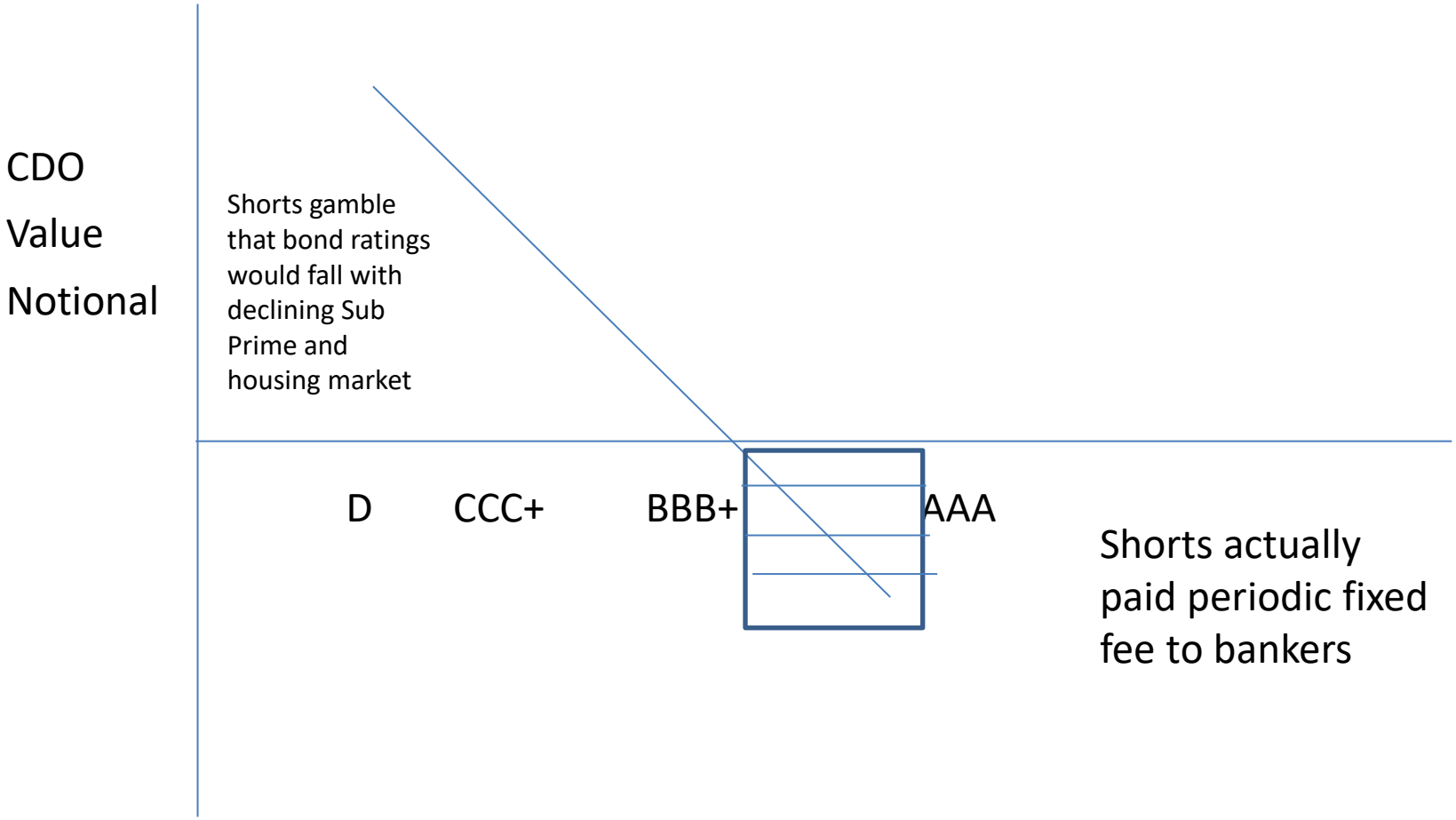

| Security Type | % |
|---|---|

| Top 5 Holdings | Ratings | Exposure | % |
|---|---|---|---|

# Bond Value, Yield, and Rating



# The Big Short



## Table 2: Average Principal Allocations by Asset-Class

This table summarizes the average collateral composition for of 735 ABS CDO deals originated between 1999-2007. The abbreviations stand for: HEL – home equity loan (includes all RMBS less than prime), RMBS – residential mortgage-backed securities (by prime borrowers), CMBS – commercial mortgage-backed securities, other ABS – other asset-backed securities (including auto-loans, credit-cards, etc.).
*Source: Lehman Live*

| Year of Origination | Deals | % HEL | % RMBS | % CMBS | % CDO | % Other ABS |
|---|---|---|---|---|---|---|
| 1999 | 1 | 0% | 14% | 9% | 3% | 74% |
| 2000 | 16 | 5% | 1% | 2% | 12% | 80% |
| 2001 | 28 | 7% | 6% | 8% | 18% | 61% |
| 2002 | 47 | 16% | 6% | 7% | 8% | 63% |
| 2003 | 44 | 29% | 14% | 3% | 18% | 37% |
| 2004 | 101 | 35% | 14% | 6% | 17% | 28% |
| 2005 | 153 | 37% | 16% | 10% | 11% | 25% |
| 2006 | 217 | 33% | 16% | 7% | 9% | 35% |
| 2007 | 135 | 36% | 12% | 8% | 14% | 29% |
| TOTAL | 742 | 34% | 14% | 8% | 12% | 32% |

# Changes in Demand and Supply

Increased inclusion of sub prime mortgages met demand for higher yielding tranches

Investors could see that as long as house prices increased , loan to value ratios would remain below 1.0

- Borrowers may default on loan, but principal would be distributed
- Ignored the prospect of a housing bubble

Issuers began stripping low grade B and sub-B sub-prime mortgages from the bonds and creating new BBB or higher rated bonds comprised solely of sub prime

- On belief that portfolio was diversified and not perfectly correlated (seriously).
- This was done sometimes up to 4 times, creating new CDOs out of the worst of the previous CDO, and all rated BBB or higher with many rated AAA

# Credit Default Swaps

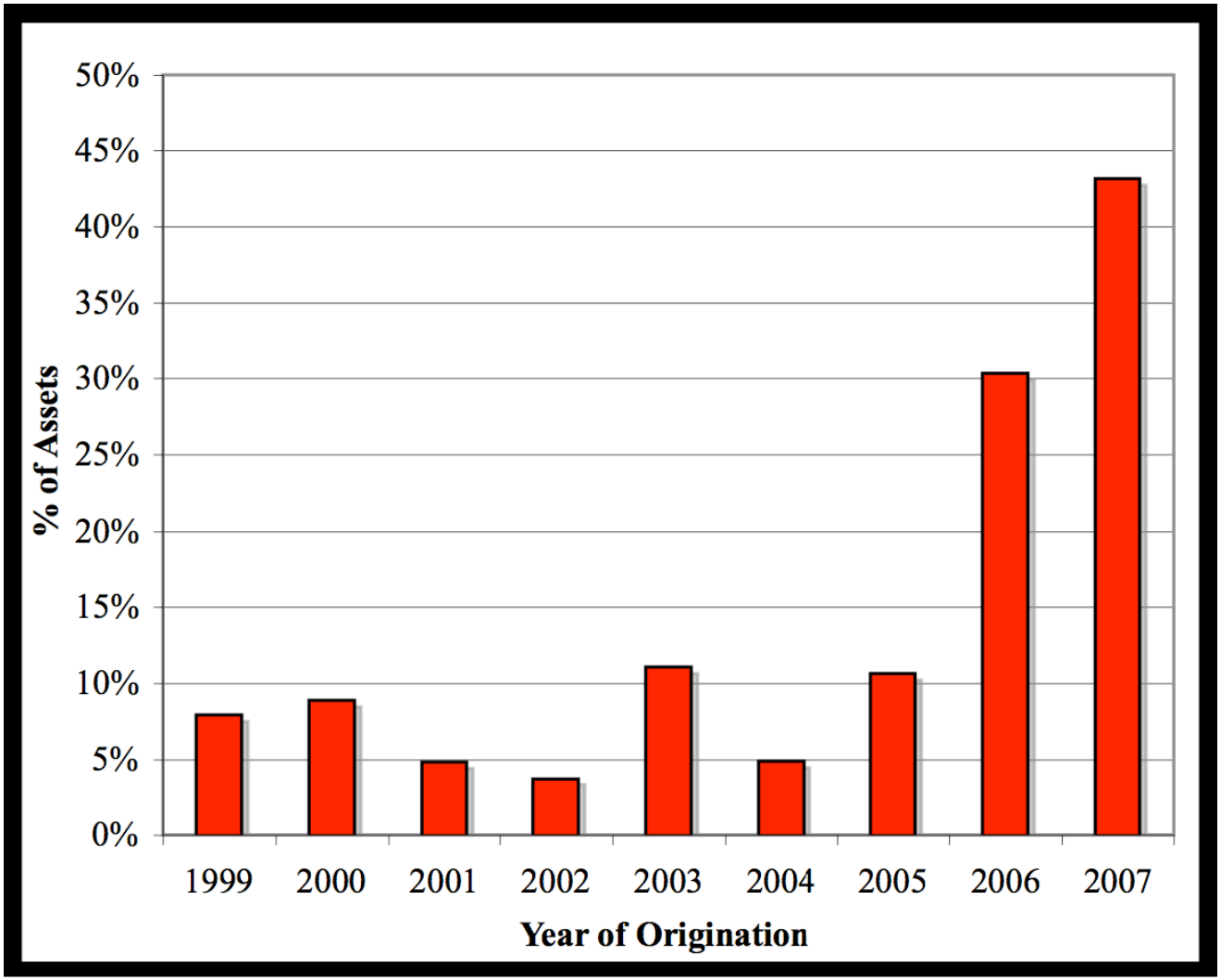
As demand for CDOs outstripped supply, synthetic CDOs were constructed using credit default swaps (CDS)

CDS are derivatives on the underlying mortgage backed securities and could be designed by mezzanine tranche (e.g subprime)

Allowed CDO managers to take long positions in CDOs without having to take ownership of the CDOs

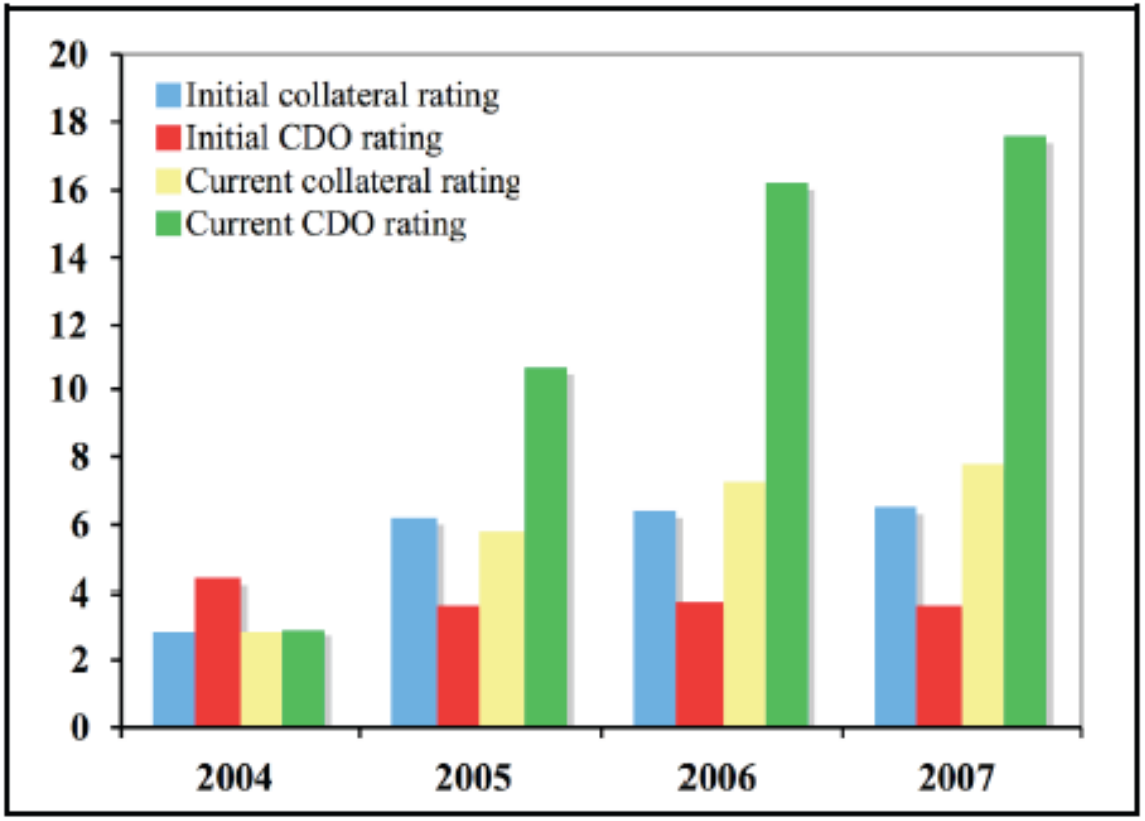
Provided a mechanism for skeptics to short the CDO market

# default rates of CDO assets in ABS CDOs by year of origination.



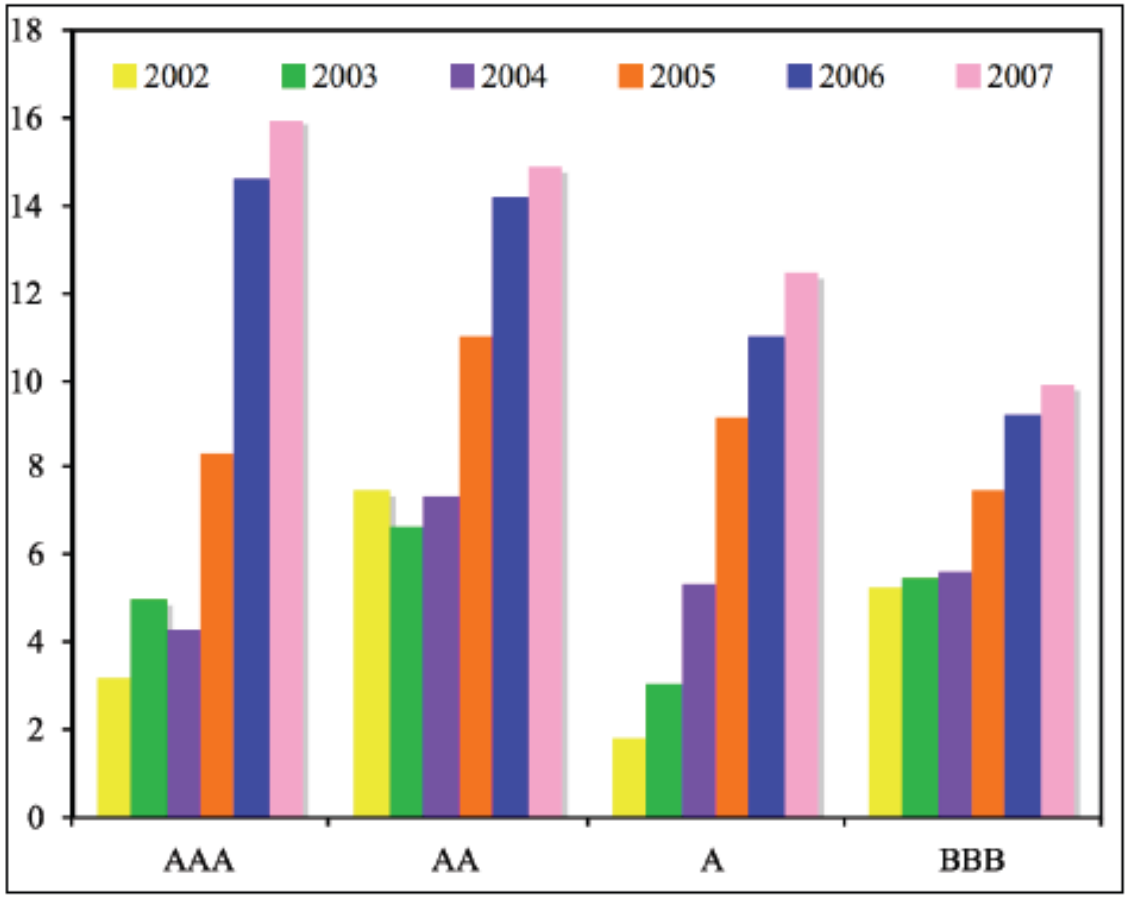
## Figure 9: Evolution of CDO Tranche and Collateral Asset Ratings

This Figure shows the weighted average ratings of the CDO tranches and their underlying asset pools in the high information sample both at issuance and currently, broken down by CDO vintage. The numbers on the y-axis correspond to the rating scale outlined in Appendix B, with lower numbers equal to higher-quality ratings (1=AAA, 22=D).



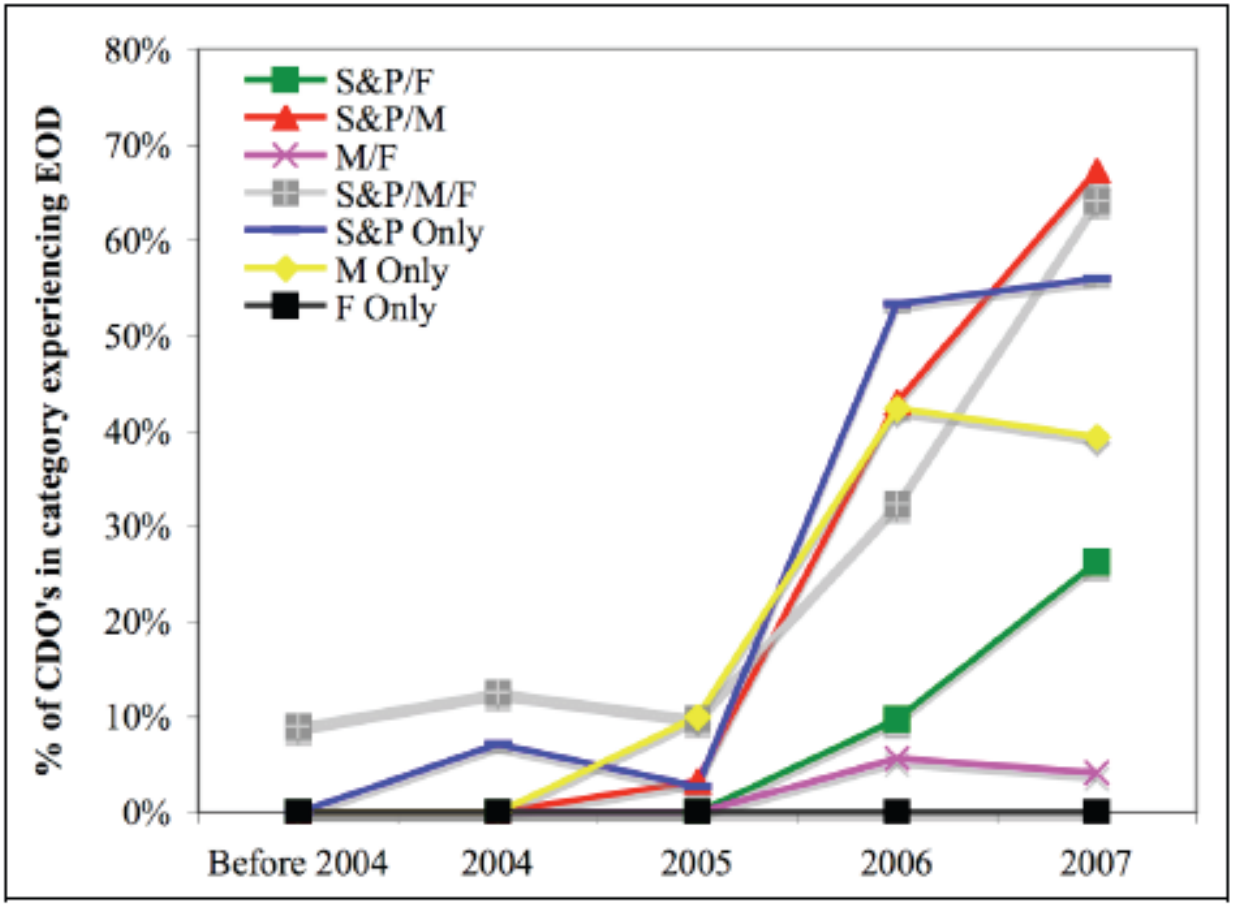
## Figure 10: Downgrades of CDO Tranches Across Time

This Figure shows the average downgrade of CDO ratings from each CDO vintage, by initial tranche rating. The numbers on the y-axis correspond to the rating scale outlined in Appendix B, with lower numbers equal to higher-quality ratings (1=AAA, 22=D).



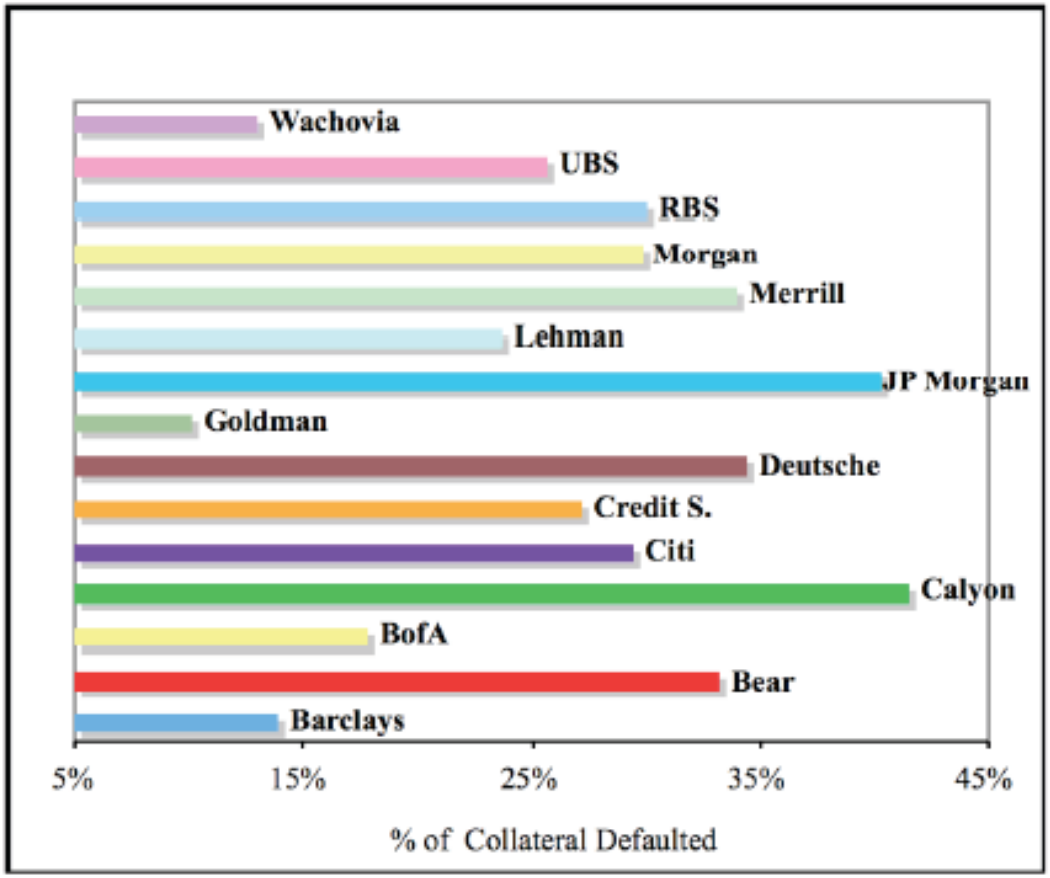
## Figure 11: Event of Default Frequency by Rating Combination

This Figure plots the percent of CDOs that experienced an event of default as a function of the agencies who rated it. *Source: UBS CDO Research.*



## Figure 13: Performance of Underwriters' CDO's

This Figure plots the percent of CDO collateral that had defaulted as of December 2008 broken down by underwriter. *Source: S&P CDO Interface, Lehman Live.*



# Bottom Line

The financial meltdown was likely due to the mispricing of risk in the CDO market by the rating agencies

But investment bankers should have known better

CDOs are derivatives of the real market but slicing and dicing of sub prime CDOs into newer higher rated CDOs flies in the face of diversification theory, but this is how the rating was done.

- They were creating more non-systematic risk, not less

There was a mismatch between the transitional probabilities of a downgrade from AAA tranches to CCC or unrated and the actual quality of the real market which was defined by the actual quality of real loans and predatory lending practices of companies such as Country wide.

CDS instruments could have been used to hedge sub prime risks but it was mostly the shorts who took the positions leaving the longs to double exposure to the risk (they owned both the CDOs and took counterparty positions in CDS and other derived forwards.)