29 January, 2009
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**Benmelech and Dlugosz**
**THE CREDIT RATING CRISIS**
**NBER working paper 15045**

# Introduction

This paper characterizes the 2007–2008 downturn of the US economy which had world wide impact, as a "credit rating crisis" and attempt to provide evidence that ratings shopping by producers of structured finance products may have played role in the crisis.

By examining the changes in the credit ratings of ABS CDOs, they show that tranches rated solely by one agency, and by S&P in particular, were more likely to be and more severely downgraded by January 2008. As of October 2008, Citigroup, AIG, and Merrill Lynch took write-downs totaling \$34.1 billion, \$33.2 billion, and \$26.1 billion, respectively, due to ABS CDO exposure. While these are extremely large in absolute size, they amount to just about 1% of the structured finance securities (\$11 trillion dollars).

Using micro-level data on the collateral composition of ABS CDOs they find three features of ABS CDOs:

1. a high concentration in residential housing — on average 70% of the underlying securities were residential mortgage backed securities or home equity loan securities and 19% were CDO tranches backed by housing assets,
2. high exposure to the most risky segment of residential housing: 54.7% of the assets of ABS CDOs were invested in home equity securities.
3. Low inter-vintage diversification: about 75% of ABS CDOs were comprised of mortgages that were originated in 2005 and 2006.

# 1 Securitization and AAA rating

Two types of securitization:

1. pass-through securitizations: the issuer pools a set of assets and issues securities to investors backed by cash flows. A single type of security is issued so that an investor holds a proportional claim on the underlying assets.
2. tranched securitizations: After pooling a set of assets, the issuer creates several different classes of securities (tranches) with prioritized claims on the collateral. Some investors hold more senior claims than others. (theoretically tranching is justified via asymmetric information, financial regulations, and via behavioral economics.)

# 2 Structured Finance Background

Structured finance is developed in order to fund the growing demand for housing in the late 1970s and 1980s. Because there was a concern about the ability of savings and loans (thrifts) to meet the demand, Wall Street attempted to address the demand by creating an alternative, more efficient funds. In January 2008, there were 111,988 individual rated tranches outstanding worldwide.

### 2.1 Common Structured Finance Products

- Collateralized debt obligations (CDOs) are structured finance securities that are pooled and tranched. CDOs are backed by a pool of assets, like other structured finance securities, but they issue classes of securities with some investors having priority over others.
- Collateralized bond obligations (CBOs) are CDOs backed primarily by high-yield corporate bonds.
- Collateralized loan obligations (CLOs) are CDOs backed primarily by leveraged high-yield bank loans.
- Collateralized mortgage obligations (CMOs) are CDOs backed by mortgage collateral (often RMBS or CMBS rather than individual mortgages)
- Asset-backed securities (ABS) are the general term for bonds or notes backed by pools of assets rather than a single corporation or government. Common types of collateral for ABS are auto loan receivables, student loan receivables, etc. ABS appear in our sample because they are sometimes used as collateral for CDOs.
- Mortgage-backed securities (MBS) are asset-backed securities whose cash flows are backed by the principal and interest payments of a set of mortgage loans. MBS can be divided into residential mortgage-backed securities (RMBS) and commercial mortgage-backed securities (CMBS), depending on the type of property underlying the mortgages.
- Home Equity Loans securities (HEL) are residential mortgage-backed securities whose cash flows are backed by a pool of home equity loans.

## 3 Data and Summary Statistics

### 3.1 Sample Construction

Analysis uses three data sets: (i) Moody's Structured Finance Default Risk Services database, (covers all structured finance products issued since 1982) Sample of products rated by Moody's. 7 broad deal types: ABS, CDO, CMBS, MBS, PF (Public Finance), RMBS, and Other. (ii) Moody's Corporate Default Risk Services database (covers 11,000 corporate entities, including 380,000 debts during 1970–September 2008, and (iii) Pershing Square's Open Source Research (data on CDOs of ABS that were insured by MBIA or AMBAC issued during 2005–2007.

### 3.2 The Evolution of the Structured Finance Market

Table 1 displays the evolution of the structured finance market across deal types from 1983 to 2008. Table 1 demonstrates, CDOs have been the fastest growing sector of the structured finance market between 2003 and 2006; the number of CDO tranches issued in 2006 (9,278) was almost twice the number of tranches issued in 2005 (4,706).

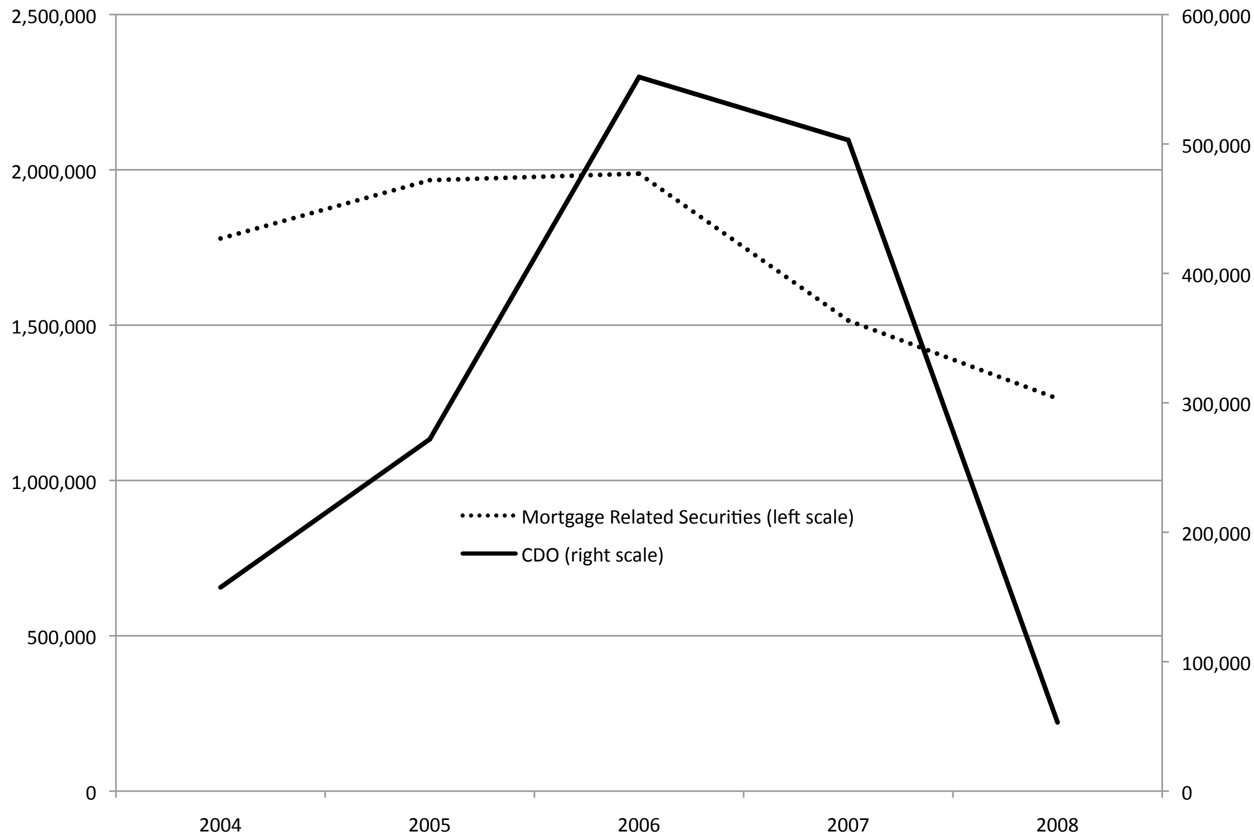
Table 1:
**Structured Finance Tranche Issuance By Year and Type**

| Year | ABS(%) | CDO(%) | CMBS(%) | MBS(%) | PF(%) | RMBS(%) | Other(%) | Number of deals |
|---|---|---|---|---|---|---|---|---|
| 1983 | 0 | 0 | 0 | 100.0 | 0 | 0 | 0 | 1 |
| 1984 | 16.7 | 0 | 0 | 16.7 | 0 | 66.7 | 0 | 6 |
| 1985 | 3.6 | 0 | 0 | 0 | 0 | 96.4 | 0 | 28 |
| 1986 | 9.1 | 0 | 0 | 0 | 0 | 90.9 | 0 | 77 |
| 1987 | 11.3 | 0 | 0 | 0 | 0 | 88.7 | 0 | 142 |
| 1988 | 11.3 | 0 | 0.3 | 0 | 0 | 88.3 | 0 | 300 |
| 1989 | 10.6 | 0.1 | 0.9 | 0.1 | 0.1 | 87.8 | 0.3 | 705 |
| 1990 | 13.4 | 0.7 | 1.0 | 0.1 | 0.2 | 83.8 | 0.9 | 1,010 |
| 1991 | 18.5 | 1.1 | 1.0 | 0.3 | 0.2 | 77.9 | 1.2 | 1,333 |
| 1992 | 22.6 | 1.0 | 1.2 | 0.3 | 0.2 | 73.2 | 1.5 | 1,704 |
| 1993 | 25.3 | 0.8 | 1.9 | 0.2 | 0.3 | 69.5 | 2.0 | 2,105 |
| 1994 | 26.4 | 1.9 | 2.3 | 0.2 | 0.5 | 66.6 | 2.2 | 2,571 |
| 1995 | 29.8 | 1.8 | 2.6 | 0.2 | 0.8 | 62.1 | 2.7 | 2,988 |
| 1996 | 32.7 | 1.7 | 2.6 | 0.2 | 1.6 | 56.3 | 4.9 | 3,567 |
| 1997 | 37.0 | 2.1 | 2.7 | 0.2 | 4.1 | 49.4 | 4.5 | 4,088 |
| 1998 | 37.7 | 3.3 | 3.0 | 0.1 | 8.1 | 40.9 | 6.9 | 5,050 |
| 1999 | 38.2 | 4.5 | 3.5 | 0.1 | 13.0 | 33.6 | 7.2 | 6,010 |
| 2000 | 39.0 | 6.1 | 4.0 | 0.1 | 14.7 | 28.2 | 7.8 | 6,856 |
| 2001 | 39.0 | 7.4 | 4.5 | 0.1 | 15.1 | 25.3 | 8.5 | 7,667 |
| 2002 | 37.9 | 8.9 | 5.1 | 0.1 | 14.9 | 23.6 | 9.5 | 8,704 |
| 2003 | 36.8 | 10.8 | 5.4 | 0.1 | 14.7 | 22.1 | 10.2 | 9,893 |
| 2004 | 35.6 | 13.5 | 5.6 | 0.1 | 14.6 | 19.8 | 10.8 | 10,964 |
| 2005 | 34.1 | 15.5 | 5.8 | 0.1 | 15.0 | 18.8 | 10.8 | 12,208 |
| 2006 | 31.6 | 16.6 | 5.8 | 0 | 16.5 | 20.2 | 9.3 | 14,371 |
| 2007 | 29.4 | 18.9 | 5.8 | 0 | 16.5 | 21.0 | 8.3 | 16,890 |
| 2008 (a) | 26.3 | 20.4 | 5.5 | 0 | 20.0 | 20.8 | 7.1 | 19,715 |

This table presents percent of total issuance by number for main deal types as well as total issuance by number. (a) Rating actions as of 9/22/2008.

Figure 1 illustrates the dramatic growth in the dollar value of global CDOs issued compared to all mortgage-related securities. CDO issuance fell to its lowest level since the mid-1990s, with a total of 53.1 billion dollars. Likewise, the number of all new structured finance tranches issued between January and September 2008 fell to 6,644 from a peak of 47,055 tranches in 2006.

Figure 1: CDO and Mortgage-related securities Issuance 2004-2008




# 4 Credit Rating: Structured Finance vs. Corporate Bonds

## 4.1 Credit Rating Transitions of Structured Finance Products

Table 2 and Figure 2a display the behavior of structured finance rating transitions over time. As Table 2 shows, the number of downgrades and upgrades were roughly similar before 2002.

Table 2 also reports the average magnitude of downgrades and upgrades, where a change of one notch (say from A2 to A3) is coded as -1.0. For example a downgrade from Aa2 to A2 would be coded as -3.0 (moving from Aa2 to Aa3 to A1, and then to A2). In 2002 and 2003, the number of downgrades rose dramatically and exceeded the number of upgrades. Many collateralized bond obligations were downgraded during this time as corporate credit quality deteriorated in the economic slowdown of 2001-2002. Downgrades again fell below upgrades during the structured finance boom of 2005 and 2006.

Table 2:
**Structured Finance Upgrades and Downgrades**

**Panel A: Total Upgrades and Downgrades***

| Cohort formed: | Rated Tranches | DNG # | DNG Avg. change** | UPG # | UPG Avg. change | WR # | WR percent |
|---|---|---|---|---|---|---|---|
| 1/1/90 | 2,825 | 85 | -1.2 | - | 0.0 | 48 | 1.7% |
| 1/1/91 | 3,993 | 155 | -1.2 | - | 0.0 | 124 | 3.1% |
| 1/1/92 | 5,571 | 87 | -1.8 | 122 | 2.1 | 828 | 14.9% |
| 1/1/93 | 7,290 | 149 | -1.5 | 131 | 1.5 | 1,336 | 18.3% |
| 1/1/94 | 9,320 | 192 | -2.8 | 237 | 1.9 | 1,038 | 11.1% |
| 1/1/95 | 11,083 | 148 | -2.0 | 352 | 1.7 | 637 | 5.7% |
| 1/1/96 | 13,403 | 175 | -2.7 | 272 | 1.9 | 1,065 | 7.9% |
| 1/1/97 | 15,298 | 49 | -1.5 | 439 | 1.5 | 1,100 | 7.2% |
| 1/1/98 | 18,214 | 447 | -2.4 | 366 | 2.0 | 1,924 | 10.6% |
| 1/1/99 | 20,419 | 330 | -3.6 | 380 | 2.2 | 2,169 | 10.6% |
| 1/1/00 | 23,358 | 463 | -1.5 | 642 | 2.3 | 2,235 | 9.6% |
| 1/1/01 | 26,905 | 476 | -2.5 | 557 | 1.7 | 3,084 | 11.5% |
| 1/1/02 | 31,901 | 1,847 | -2.9 | 720 | 1.8 | 4,598 | 14.4% |
| 1/1/03 | 38,147 | 2,515 | -3.1 | 699 | 2.5 | 7,920 | 20.8% |
| 1/1/04 | 43,476 | 1,798 | -3.6 | 1,216 | 2.4 | 6,953 | 16.0% |
| 1/1/05 | 52,843 | 874 | -2.5 | 2,202 | 2.2 | 6,878 | 13.0% |
| 1/1/06 | 71,462 | 986 | -2.5 | 2,748 | 2.3 | 7,085 | 9.9% |
| 1/1/07 | 94,127 | 8,109 | -4.7 | 2,990 | 1.9 | 6,692 | 7.1% |
| 1/1/2008ˆ | 442,908 | 36,880 | -5.6 | 1,269 | 2.4 | 6,380 | 1.4% |

**Panel B: Tranches Affected**

| Cohort formed: | Rated Tranches | DNG # of tranches | DNG % of tranches | UPG # of tranches | UPG % of tranches | UPG&DNG # of tranches | UPG&DNG percent |
|---|---|---|---|---|---|---|---|
| 1/1/90 | 2,825 | 80 | 2.8% | - | 0.0% | - | 0.0% |
| 1/1/91 | 3,993 | 154 | 3.9% | - | 0.0% | - | 0.0% |
| 1/1/92 | 5,571 | 84 | 1.5% | 121 | 2.2% | - | 0.0% |
| 1/1/93 | 7,290 | 145 | 2.0% | 131 | 1.8% | 18 | 0.2% |
| 1/1/94 | 9,320 | 181 | 1.9% | 236 | 2.5% | 1 | 0.0% |
| 1/1/95 | 11,083 | 134 | 1.2% | 350 | 3.2% | - | 0.0% |
| 1/1/96 | 13,403 | 144 | 1.1% | 269 | 2.0% | - | 0.0% |
| 1/1/97 | 15,298 | 46 | 0.3% | 439 | 2.9% | - | 0.0% |
| 1/1/98 | 18,214 | 371 | 2.0% | 359 | 2.0% | 2 | 0.0% |
| 1/1/99 | 20,419 | 311 | 1.5% | 374 | 1.8% | 4 | 0.0% |
| 1/1/00 | 23,358 | 401 | 1.7% | 638 | 2.7% | 6 | 0.0% |
| 1/1/01 | 26,905 | 421 | 1.6% | 545 | 2.0% | 5 | 0.0% |
| 1/1/02 | 31,901 | 1,298 | 4.1% | 710 | 2.2% | 5 | 0.0% |
| 1/1/03 | 38,147 | 1,947 | 5.1% | 681 | 1.8% | 20 | 0.1% |
| 1/1/04 | 43,476 | 1,634 | 3.8% | 1,168 | 2.7% | 9 | 0.0% |
| 1/1/05 | 52,843 | 737 | 1.4% | 2,138 | 4.0% | 8 | 0.0% |
| 1/1/06 | 71,462 | 885 | 1.2% | 2,495 | 3.5% | 14 | 0.0% |
| 1/1/07 | 94,127 | 6,801 | 7.2% | 2,834 | 3.0% | 88 | 0.1% |
| 1/1/2008(a) | 442,908 | 29,545 | 6.7% | 1,254 | 0.3% | 464 | 0.1% |

* A single tranche downgraded k times in the year shows up k times. Tranches that are downgraded and withdrawn show up in the dng column and the wr column. This is in contrast to Moodys method where a tranche that is downgraded then withdrawn in the same year only shows up as withdrawn. ** Average size of a single downgrade action on a tranche (not just the difference in rating between beginning of year and end of year) (a) Rating actions as of 9/22/2008.

**Figure 2a**
**Number of Downgrades vs. Upgrades of Structured Finance Products**

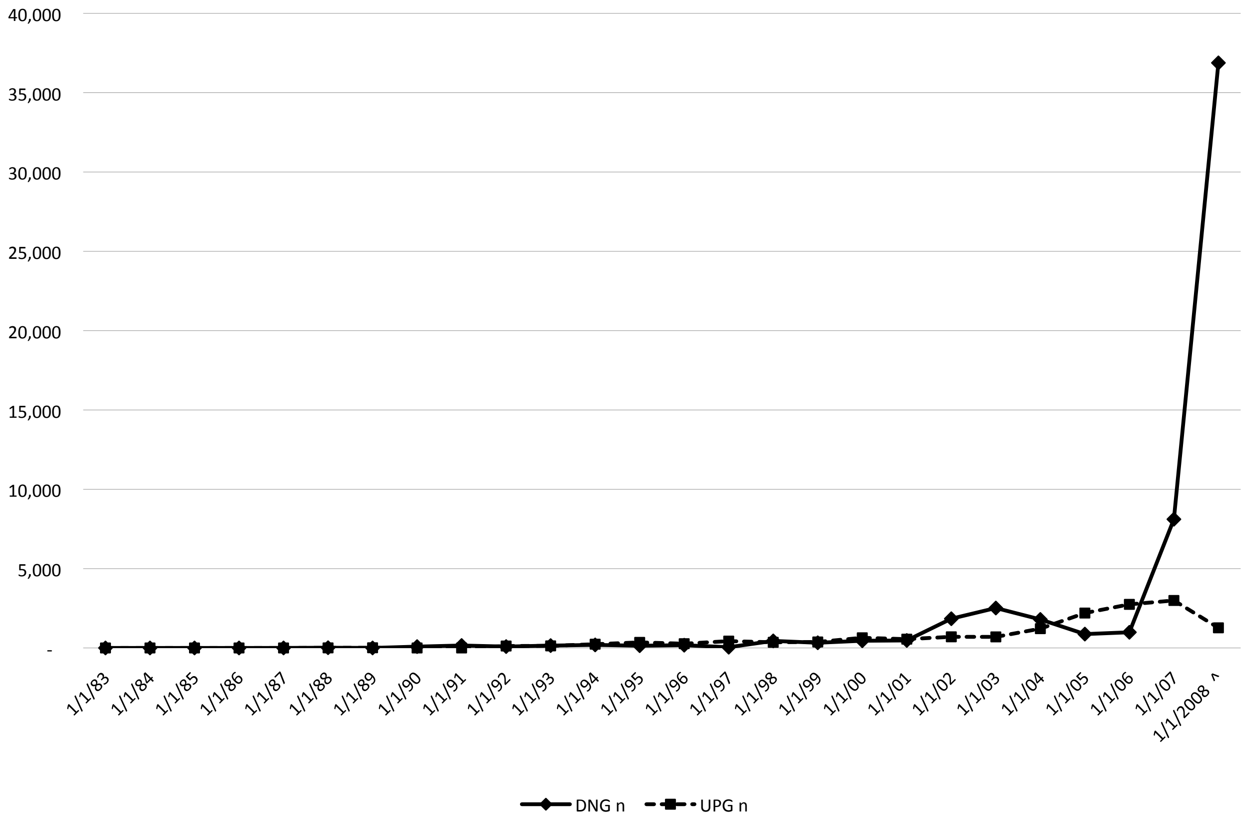
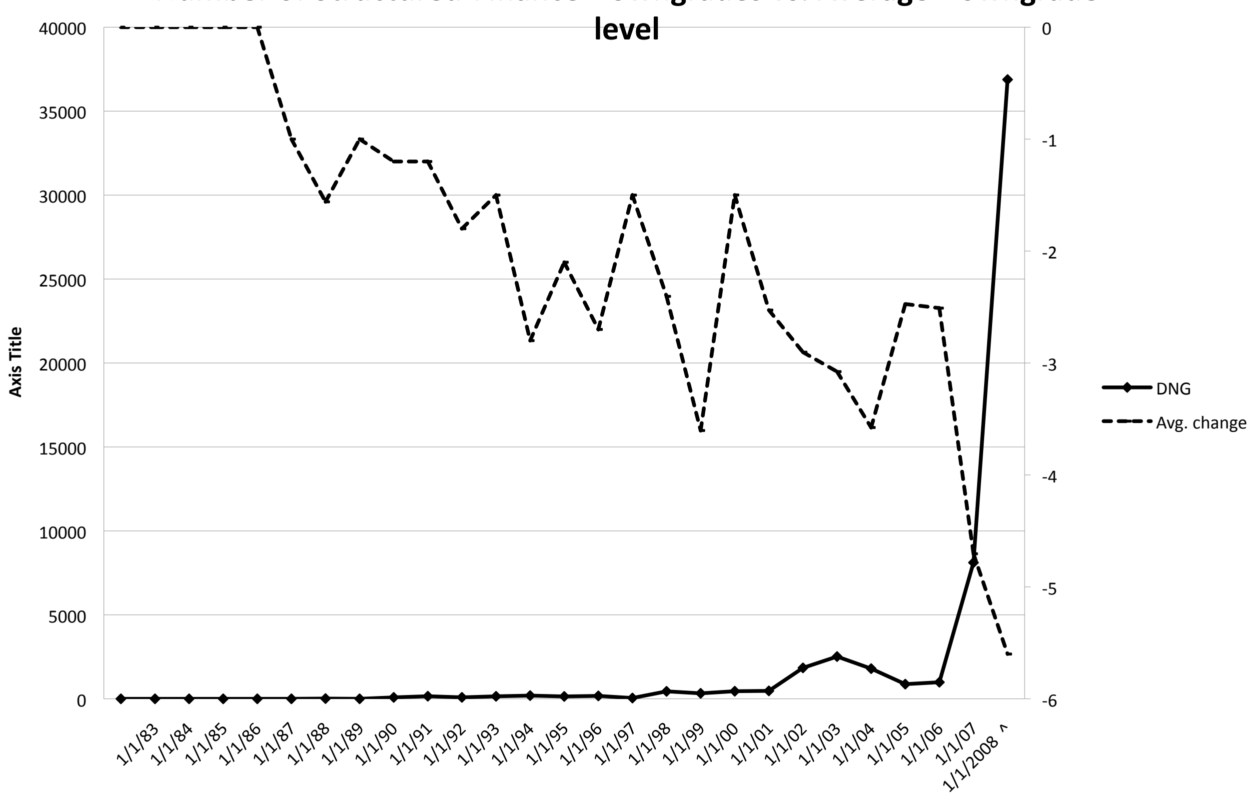



**Figure 3a**
**Number of Structured-Finance Downgrades vs. Average Downgrade level**



## 4.2 Credit Rating Transitions of Corporate Bonds

The total number of upgrade and downgrade actions on corporate bonds are reported in Panel A of Table 3, and the number of securities affected by ratings actions in Panel B.

Table 3:
**Corporate Bonds Upgrades and Downgrades**

**Panel A: Total Upgrades and Downgrades***

| Cohort formed: | Rated Bonds | DNG # | DNG Avg. change** | UPG # | UPG Avg. change** | WR # | WR percent |
|---|---|---|---|---|---|---|---|
| 1/1/90 | 3,016 | 349 | -1.5 | 287 | 1.3 | 321 | 10.6% |
| 1/1/91 | 3,115 | 343 | -1.4 | 231 | 1.4 | 326 | 10.5% |
| 1/1/92 | 3,582 | 582 | -1.4 | 141 | 1.4 | 621 | 17.3% |
| 1/1/93 | 3,899 | 465 | -1.3 | 142 | 1.6 | 772 | 19.8% |
| 1/1/94 | 4,229 | 398 | -1.3 | 264 | 1.4 | 435 | 10.3% |
| 1/1/95 | 4,599 | 342 | -1.3 | 426 | 1.3 | 445 | 9.7% |
| 1/1/96 | 5,124 | 441 | -1.3 | 457 | 1.3 | 520 | 10.1% |
| 1/1/97 | 6,727 | 732 | -1.2 | 522 | 1.3 | 754 | 11.2% |
| 1/1/98 | 8,514 | 1,524 | -1.6 | 577 | 1.3 | 985 | 11.6% |
| 1/1/99 | 10,623 | 2,137 | -1.5 | 800 | 1.5 | 1,117 | 10.5% |
| 1/1/00 | 11,867 | 1,752 | -1.6 | 898 | 1.6 | 1,398 | 11.8% |
| 1/1/01 | 12,437 | 3,190 | -1.7 | 807 | 1.5 | 1,989 | 16.0% |
| 1/1/02 | 12,885 | 5,027 | -1.8 | 431 | 1.5 | 2,068 | 16.0% |
| 1/1/03 | 13,056 | 2,453 | -1.6 | 611 | 1.4 | 2,579 | 19.8% |
| 1/1/04 | 13,523 | 1,233 | -1.3 | 1,540 | 1.5 | 2,425 | 17.9% |
| 1/1/05 | 13,305 | 1,424 | -1.5 | 1,626 | 1.4 | 2,425 | 18.2% |
| 1/1/06 | 12,727 | 2,107 | -1.3 | 1,687 | 1.2 | 2,082 | 16.4% |
| 1/1/07 | 12,586 | 1,539 | -1.4 | 1,869 | 1.2 | 1,851 | 14.7% |
| 1/1/2008 (a) | 12,753 | 1,482 | -2.2 | 367 | 1.3 | 1,517 | 11.9% |

**Panel B: Bonds Affected**

| Cohort formed: | Rated Bonds | DNG # of Bonds | DNG % of Bonds | UPG # of Bonds | UPG % of Bonds | UPG&DNG # of Bonds | UPG&DNG percent |
|---|---|---|---|---|---|---|---|
| 1/1/90 | 3,016 | 326 | 10.8% | 285 | 9.4% | 3 | 0.1% |
| 1/1/91 | 3,115 | 319 | 10.2% | 209 | 6.7% | 7 | 0.2% |
| 1/1/92 | 3,582 | 537 | 15.0% | 138 | 3.9% | 6 | 0.2% |
| 1/1/93 | 3,899 | 420 | 10.8% | 130 | 3.3% | 2 | 0.1% |
| 1/1/94 | 4,229 | 361 | 8.5% | 251 | 5.9% | 12 | 0.3% |
| 1/1/95 | 4,599 | 310 | 6.7% | 420 | 9.1% | 3 | 0.1% |
| 1/1/96 | 5,124 | 410 | 8.0% | 443 | 8.6% | 4 | 0.1% |
| 1/1/97 | 6,727 | 550 | 8.2% | 516 | 7.7% | 7 | 0.1% |
| 1/1/98 | 8,514 | 1,271 | 14.9% | 555 | 6.5% | 11 | 0.1% |
| 1/1/99 | 10,623 | 1,865 | 17.6% | 771 | 7.3% | 36 | 0.3% |
| 1/1/00 | 11,867 | 1,429 | 12.0% | 870 | 7.3% | 37 | 0.3% |
| 1/1/01 | 12,437 | 2,241 | 18.0% | 778 | 6.3% | 43 | 0.3% |
| 1/1/02 | 12,885 | 3,885 | 30.2% | 416 | 3.2% | 23 | 0.2% |
| 1/1/03 | 13,056 | 2,211 | 16.9% | 591 | 4.5% | 22 | 0.2% |
| 1/1/04 | 13,523 | 1,069 | 7.9% | 1,459 | 10.8% | 34 | 0.3% |
| 1/1/05 | 13,305 | 1,149 | 8.6% | 1,520 | 11.4% | 23 | 0.2% |
| 1/1/06 | 12,727 | 1,767 | 13.9% | 1,555 | 12.2% | 162 | 1.3% |
| 1/1/07 | 12,586 | 1,411 | 11.2% | 1,802 | 14.3% | 41 | 0.3% |
| 1/1/2008 (a) | 12,753 | 1,332 | 10.4% | 367 | 2.9% | 5 | 0.0% |

* A single bond downgraded k times in the year shows up k times. Bonds that are downgraded and withdrawn show up in the dng column and the wr column. This is in contrast to Moodys method where a bond that is downgraded then withdrawn in the same year only shows up as withdrawn. ** Average size of a single downgrade action on a bond (not just the difference in rating between beginning of year and end of year) (a) Rating actions as of 9/22/2008.

**Figure 2b**
**Number of Downgrades vs. Upgrades of Corporate Bonds**

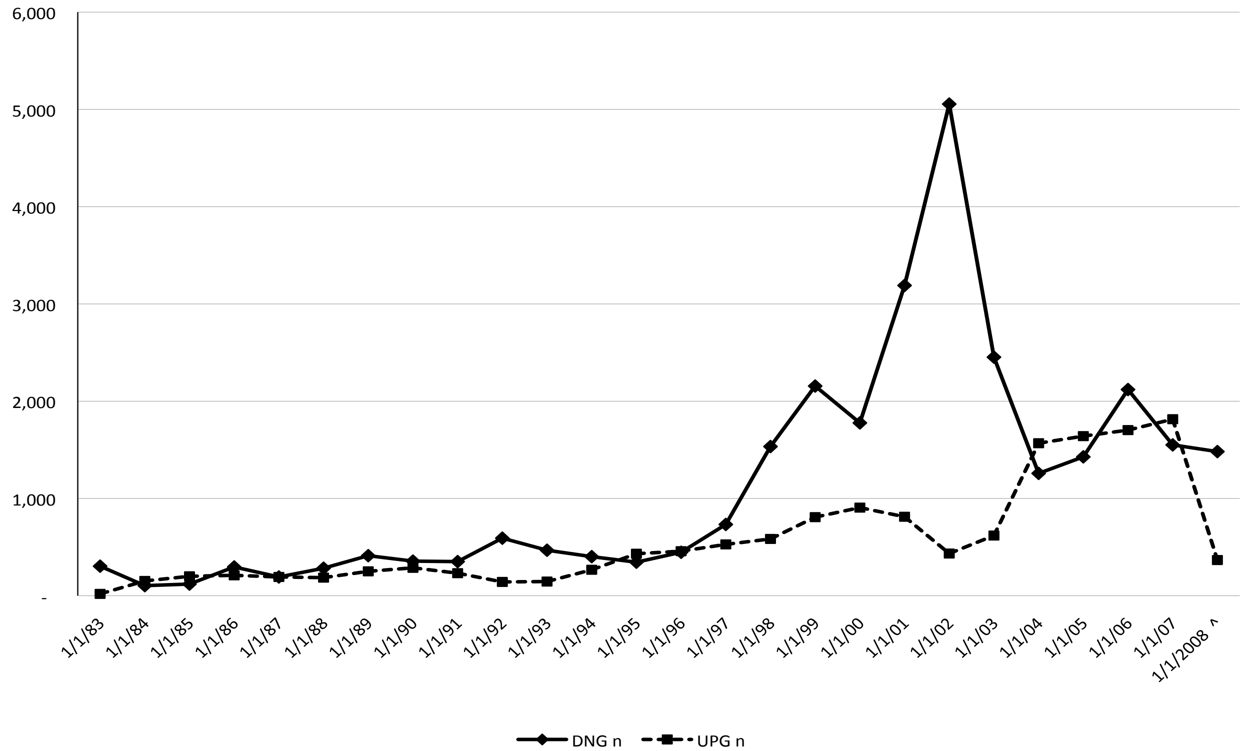



**Figure 3b**
**Number of Corporate Bonds Downgrades vs. Average Downgrade level**


The authors claim that these results suggest that corporate bonds rating were well calibrated to the underlying economic risk of the issuer whereas the initial distribution of structured finance credit ratings was inflated.

## 4.3 The Structured Finance Credit Rating Crisis

In 2007-2008, nearly 95% of all downgrades were tied to RMBS, ABS, or CDO securities.

Table 4:
**Structured Finance Downgrades by Cohort and Deal Type**

| Cohort formed: | Rated n (dng) | ABS n(dng) | ABS %(dng) | CDO n(dng) | CDO %(dng) | CMBS n(dng) | CMBS %(dng) | RMBS n(dng) | RMBS %(dng) |
|---|---|---|---|---|---|---|---|---|---|
| 1987 | 1 | - | 0% | - | 0% | - | 0% | - | 0% |
| 1988 | 15 | 8 | 53% | - | 0% | - | 0% | 2 | 13% |
| 1989 | 1 | 1 | 100% | - | 0% | - | 0% | - | 0% |
| 1990 | 85 | 10 | 12% | - | 0% | 2 | 2% | 72 | 85% |
| 1991 | 155 | 12 | 8% | - | 0% | 2 | 1% | 136 | 88% |
| 1992 | 87 | 31 | 36% | 2 | 2% | 11 | 13% | 41 | 47% |
| 1993 | 149 | 14 | 9% | - | 0% | - | 0% | 129 | 87% |
| 1994 | 192 | 12 | 6% | - | 0% | 26 | 14% | 150 | 78% |
| 1995 | 148 | 1 | 1% | 1 | 1% | 34 | 23% | 91 | 61% |
| 1996 | 175 | 55 | 31% | - | 0% | 42 | 24% | 76 | 43% |
| 1997 | 49 | 15 | 31% | 3 | 6% | 3 | 6% | 15 | 31% |
| 1998 | 447 | 239 | 53% | 43 | 10% | 3 | 1% | 35 | 8% |
| 1999 | 330 | 179 | 54% | 55 | 17% | 6 | 2% | 37 | 11% |
| 2000 | 463 | 169 | 37% | 53 | 11% | 20 | 4% | 10 | 2% |
| 2001 | 476 | 131 | 28% | 194 | 41% | 20 | 4% | - | 0% |
| 2002 | 1847 | 544 | 29% | 893 | 48% | 174 | 9% | 5 | 0% |
| 2003 | 2515 | 1427 | 57% | 699 | 28% | 200 | 8% | 24 | 1% |
| 2004 | 1798 | 1126 | 63% | 316 | 18% | 229 | 13% | 21 | 1% |
| 2005 | 874 | 231 | 26% | 210 | 24% | 153 | 18% | 80 | 9% |
| 2006 | 986 | 423 | 43% | 277 | 28% | 119 | 12% | 44 | 4% |
| 2007 | 8109 | 5246 | 65% | 1057 | 13% | 85 | 1% | 1388 | 17% |
| 2008 (a) | 36880 | 12522 | 34% | 8086 | 22% | 257 | 1% | 13492 | 37% |

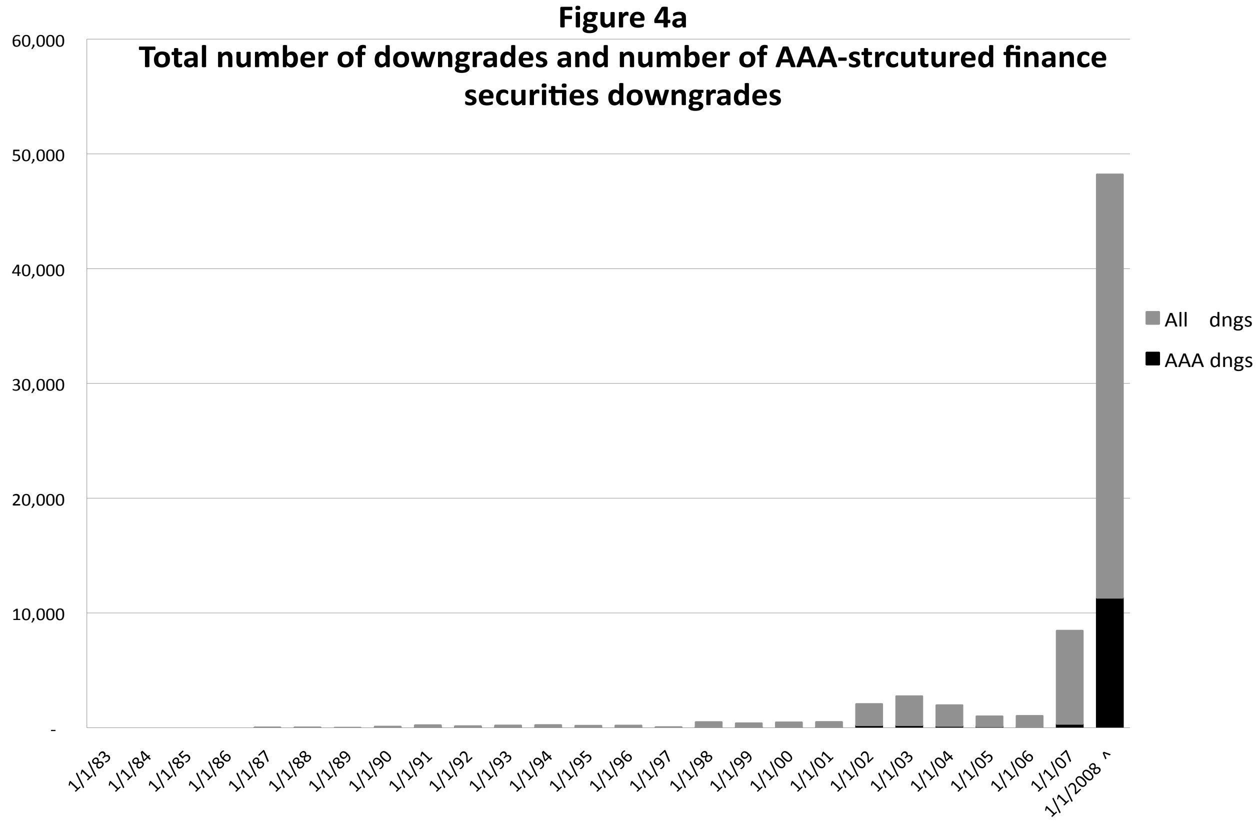
(a) Rating actions as of 9/22/2008.

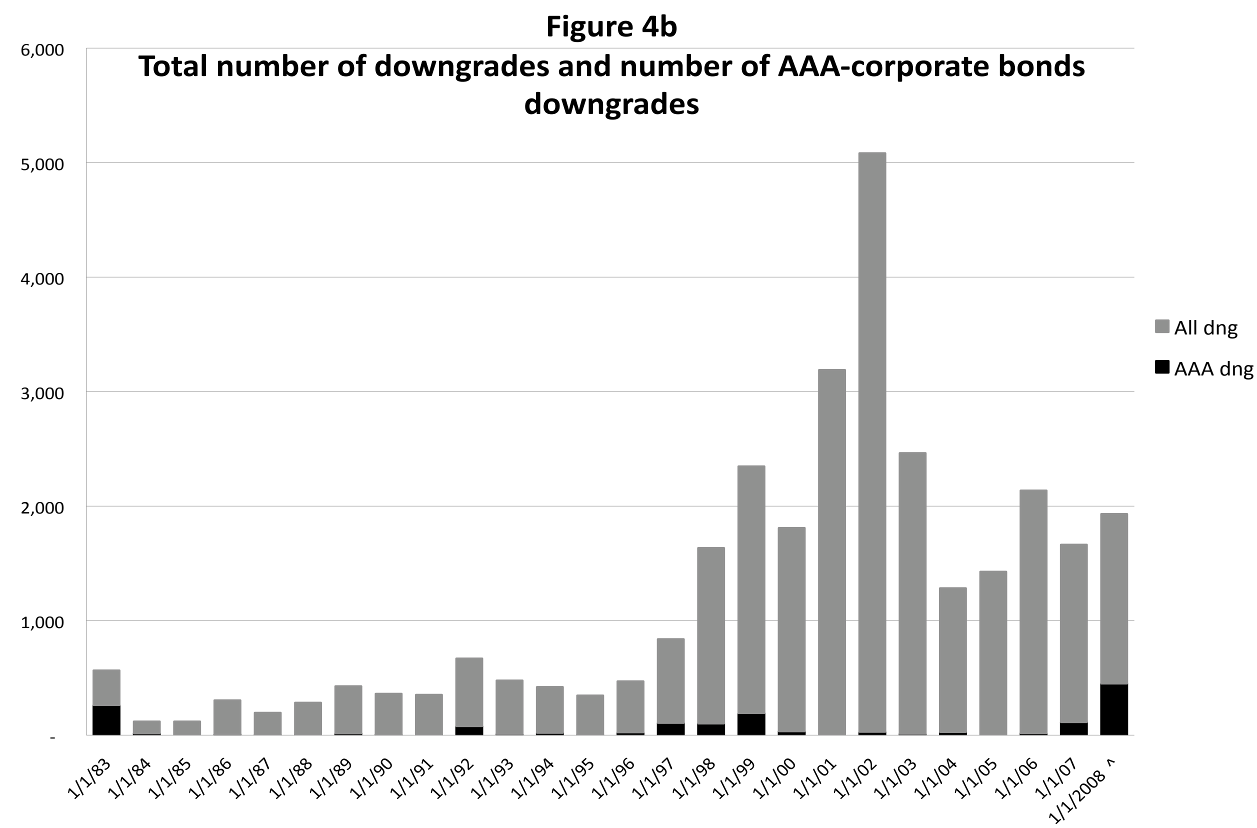
Table 5:
**Asset Types with Most Downgrades**

| | | **Types with most downgrades (1st)** | | | **Types with most downgrades (2nd)** | | |
|---|---|---|---|---|---|---|---|
| Year: | total(dng) | Asset type | n(dng) | %(dng) | Asset type | n(dng) | %(dng) |
| 1990 | 85 | MBS - 1st Mortgage | 70 | 82% | ABS | 3 | 4% |
| 1991 | 155 | MBS - 1st Mortgage | 133 | 86% | ABS | 4 | 3% |
| 1992 | 87 | MBS - 1st Mortgage | 31 | 36% | CMBS | 11 | 13% |
| 1993 | 149 | MBS - 1st Mortgage | 130 | 87% | ABS | 3 | 2% |
| 1994 | 192 | MBS - 1st Mortgage | 143 | 74% | CMBS | 16 | 8% |
| 1995 | 148 | MBS - 1st Mortgage | 80 | 54% | CMBS | 23 | 16% |
| 1996 | 175 | MBS - 1st Mortgage | 70 | 40% | HEL - Other | 55 | 31% |
| 1997 | 49 | MBS - Resecuritized | 12 | 24% | Other - Repackaged | 9 | 18% |
| 1998 | 447 | HEL - Other | 98 | 22% | ABS | 80 | 18% |
| 1999 | 330 | HEL - Other | 94 | 28% | ABS | 50 | 15% |
| 2000 | 463 | PF - FS IRBs | 130 | 28% | ABS | 100 | 22% |
| 2001 | 476 | High-Yield CBO | 97 | 20% | CDO - Balance Sheet | 57 | 12% |
| 2002 | 1847 | High-Yield CBO | 566 | 31% | ABS | 198 | 11% |
| 2003 | 2515 | ABS | 677 | 27% | ABS | 327 | 13% |
| 2004 | 1798 | ABS | 425 | 24% | ABS | 367 | 20% |
| 2005 | 874 | Other - Structured | 146 | 17% | CMBS | 126 | 14% |
| 2006 | 986 | HEL | 290 | 29% | CDO - Synthetic | 125 | 13% |
| 2007 | 8109 | HEL | 4405 | 54% | MBS - 1st Mortgage | 1342 | 17% |
| 2008 | 36880 | MBS - 1st Mortgage | 13015 | 35% | HEL | 9459 | 26% |

(a) Rating actions as of 9/22/2008.

Another unique aspect of the downgrade wave of structured finance products in 2007 and 2008 is its concentration amongst AAA-rated tranches.



### 4.4 Fallen Angels

Next the paper examines structured finance securities that suffered the most severe downgrades. From 1983 to 2008, 11% of tranches were eventually downgraded 8 or more notches (fallen angels), affecting 11% of deals. Table 6, Panel B decomposes these fallen angel tranches by their original credit rating.

Table 6:
**Fallen Angels**

**Panel A: Fallen Angles 1983-2008**

| Number of tranches | Number of deals | Fallen tranches | Fallen deals |
|---|---|---|---|
| 179,760 | 33,978 | 19,421 | 3,879 |

**Panel B: Fallen Angels by Credit Ratings**

| Initial Rating | Number | Percent |
|---|---|---|
| AAA | 3,707 | 19% |
| Aa1 | 992 | 5% |
| Aa2 | 1,809 | 9% |
| Aa3 | 1,221 | 6% |
| A1 | 1,058 | 5% |
| A2 | 2,036 | 10% |
| A3 | 1,421 | 7% |
| Baa1 | 1,403 | 7% |
| Baa2 | 2,421 | 12% |
| Baa3 | 1,735 | 9% |
| Ba1 | 805 | 4% |
| Ba2 | 738 | 4% |
| Ba3 | 75 | 0% |
| Total | 19,421 | 100% |

**Panel C: Fallen Angels by Vintage**

| Vintage | Number | Percent |
|---|---|---|
| 1983-1996 | 171 | 1% |
| 1997 | 58 | 0% |
| 1998 | 113 | 1% |
| 1999 | 153 | 1% |
| 2000 | 140 | 1% |
| 2001 | 170 | 1% |
| 2002 | 318 | 2% |
| 2003 | 304 | 2% |
| 2004 | 405 | 2% |
| 2005 | 842 | 4% |
| 2006 | 3,127 | 16% |
| 2007 | 5,404 | 28% |
| 2008 | 8,216 | 42% |
| | 19,421 | 100% |

**Panel D: Fallen Angels by Deal Type**

| Deal | Number | Percent |
|---|---|---|
| ABS | 8,752 | 45% |
| RMBS | 6,218 | 32% |
| CDO | 4,111 | 21% |
| Other | 249 | 1% |
| CMBS | 49 | 0% |
| PF | 42 | 0% |
| Total | 19,421 | 100% |

**Panel E: Asset Types with Most Fallen Angels**

| Asset Type | Number | Percent |
|---|---|---|
| HEL - Closed-End - Not High LTV | 6,662 | 34% |
| MBS - First Mortgage | 6,037 | 31% |
| ABS CDO - Cash Flow | 1,729 | 9% |
| ABS CDO - Synthetic | 1,318 | 7% |
| HEL - Closed-End - High LTV | 813 | 4% |
| ABS CDO - Other | 509 | 3% |

## 5 The Collapse of ABS CDO's Credit Ratings

### 5.1 What are ABS CDOs?

ABS CDOs (first issued in 1999) were initially diversified and collateralized by ABS from different sectors such as: aircraft ABS, mutual fund fees, manufactured housing. However since 2003 the primary asset classes backing ABS CDOs have been subprime and non-conforming RMBS and CDO tranches.

ABS CDOs are broadly classified into 2 categories:

1. High Grade ABS CDOs which are backed by AA and A-rated collateral, and
2. Mezzanine ABS CDOs that are backed by BBB collateral.

"Because of the commonly held belief was that the risk of default for high grade collateral was close to zero, the credit support for a triple-B note can be less than 1%. Such a highly leveraged structure, however, leaves little room for error, not only for the default risk, but also for the timing of the cash flows. High grade (HG) ABS CDOs are highly leveraged, and larger, typically between \$1 billion to \$3 billion. Mezzanine ABS CDOs are typically smaller than High Grade ABS CDOs, with deal sizes ranging from 300million to 1.5 billion.

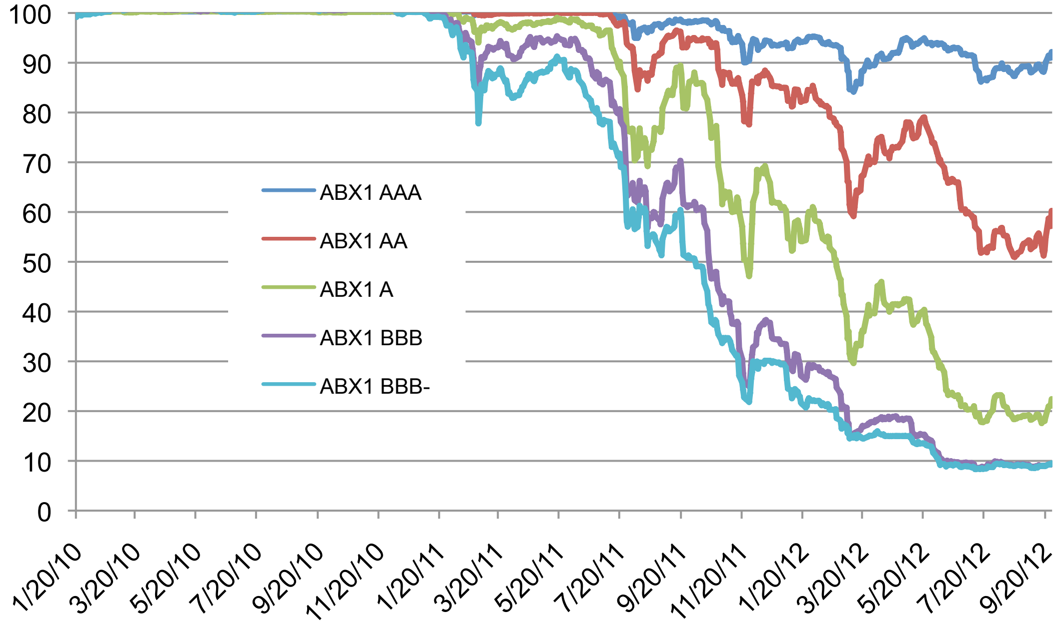
## 5.2 The Collateral Structure of ABS CDO

Table 7 reports summary statistics on the 534 collateral pools including the weighted average rating of the underlying assets (weighted by the par value of the underlying securities) and a breakdown by asset type and vintage.

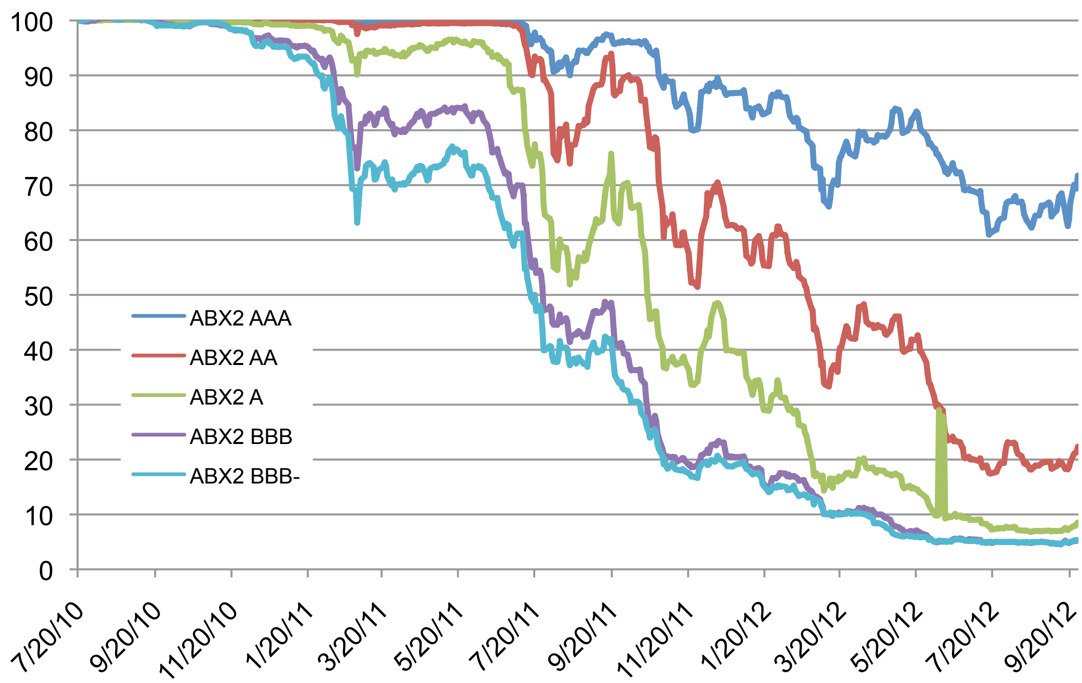
Table 7:
**ABS CDO Collateral structure**

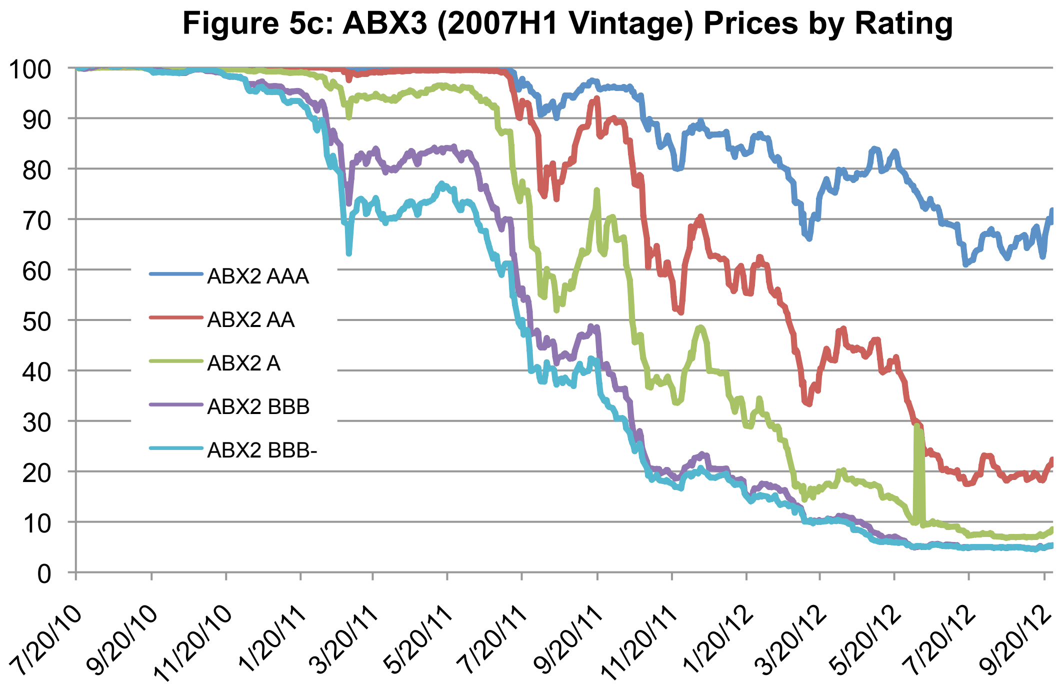
| | Mean | 25th Percentile | Median | 75th Percentile | Standard Deviation | Min | Max |
|---|---|---|---|---|---|---|---|
| Collateral amount (million) | \$1,006.7 | \$492.8 | \$849.7 | \$1,283.3 | \$916.9 | \$100.0 | \$11,132.2 |
| Number of collateral securities | 149.7 | 103 | 137 | 182 | 73.1 | 26 | 990 |
| *Collateral weighted-average credit rating* | | | | | | | |
| S&P | A | BBB+ | A- | AA | N/A | BBB- | AAA |
| Moody's | A2 | Baa2 | A3 | Aa2 | N/A | Baa3 | Aaa |
| *Collateral share by asset type:* | | | | | | | |
| CDO | 18.8% | 3.2% | 9.3% | 22.6% | 25.9% | 0.0% | 100.0% |
| Home Equity ABS | 54.7% | 36.3% | 59.9% | 83.3% | 31.8% | 0.0% | 100.0% |
| RMBS | 15.0% | 0.0% | 9.0% | 21.5% | 19.8% | 0.0% | 100.0% |
| CMBS | 4.6% | 0.0% | 0.0% | 3.8% | 13.1% | 0.0% | 100.0% |
| *Collateral share by mortgage type:* | | | | | | | |
| Prime | 8.2% | 0.0% | 4.5% | 11.2% | 12.2% | 0.0% | 91.8% |
| Midprime | 29.7% | 13.2% | 29.1% | 45.0% | 20.2% | 0.0% | 77.5% |
| Alt-A | 5.2% | 0.0% | 2.0% | 7.1% | 8.0% | 0.0% | 72.6% |
| Subprime | 24.2% | 13.1% | 24.8% | 34.5% | 16.3% | 0.0% | 100.0% |
| *Collateral vintage* | | | | | | | |
| 2005H1 | 15.3% | 2.4% | 8.5% | 22.4% | 17.9% | 0.0% | 96.1% |
| 2005H2 | 21.0% | 4.9% | 16.9% | 31.8% | 18.4% | 0.0% | 96.7% |
| 2006H1 | 23.4% | 4.8% | 21.8% | 37.3% | 19.7% | 0.0% | 100.0% |
| 2006H2 | 15.9% | 1.3% | 8.4% | 26.4% | 18.0% | 0.0% | 90.5% |
| 2007H1 | 7.3% | 0.0% | 2.4% | 7.9% | 12.4% | 0.0% | 93.4% |
| 2007H2 | 0.9% | 0.0% | 0.0% | 0.6% | 1.9% | 0.0% | 13.8% |

## Figure 5a: ABX1 (2006H1 Vintage) Prices by Rating




## Figure 5b: ABX2 (2006H2 Vintage) Prices by Rating





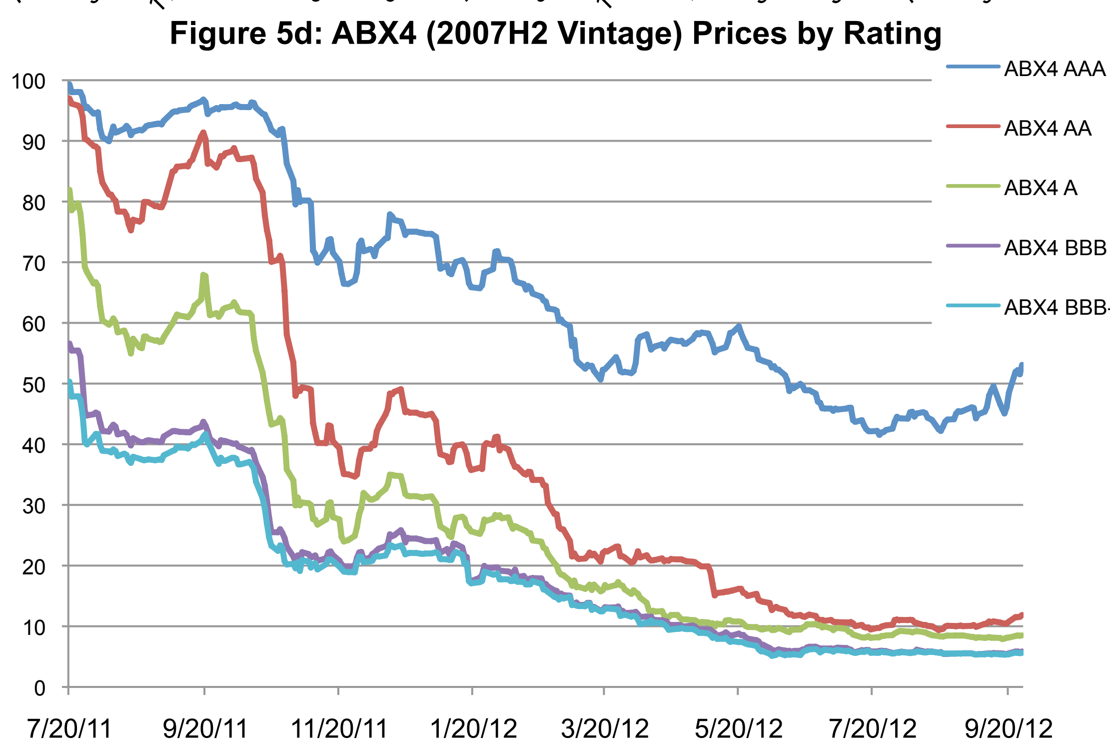




Table 8 decomposes the collateral in high grade and mezzanine ABS CDOs by vintage.

Table 8:
**Collateral Vintage by Credit Rating**

| | *Collateral weighted average S&P rating* | | | *Corresponding ABX price (as of September 25, 2008)* | |
|---|---|---|---|---|---|
| | ABS CDO Grade | | High - Mezzanine | | |
| | High Grade | Mezzanine Grade | difference | | |
| | A | BBB | (t-test) | A | BBB |
| *Collateral vintage* | | | | | |
| 2005H1 | 15.7% | 16.0% | -0.003 | N/A | N/A |
| | [7.9%] | [9.9%] | (-0.27) | N/A | N/A |
| 2005H2 | 21.0% | 22.7% | -0.017 | N/A | N/A |
| | [16.0%] | [22.1%] | (-0.89) | N/A | N/A |
| 2006H1 | 21.6% | 28.6% | -0.070 *** | 22.42 | 9.44 |
| | [16.8%] | [29.1%] | (-3.99) | | |
| 2006H2 | 16.5% | 16.2% | 0.004 | 8.54 | 5.35 |
| | [7.5%] | [13.2%] | (0.25) | | |
| 2007H1 | 8.4% | 5.9% | 0.025 ** | 7.42 | 5.33 |
| | [3.1%] | [2.1%] | (2.49) | | |
| 2007H2 | 1.1% | 0.6% | 0.005 *** | 8.50 | 5.85 |
| | [0.0%] | [0.0%] | (3.70) | | |
| Number of CDOs | 299 | 205 | – | – | |

1. Lack of inter-sector diversification: high concentration in residential housing — on average 70% of the assets of ABS CDOs were invested in RMBS and Home Equity Securities, and 18.8% in other CDOs that are concentrated in the housing market as well.

2. Very high concentration in Home Equity ABS: especially the most risky segment of the sector. On Average, 54.7% of the assets of ABS CDOs are invested in home equity securities that include: first-lien subprime mortgages, second-lien home equity loans, and home equity lines of credit.

3. Low inter-vintage diversification: about 75% of ABS CDOs comprised of 2005H1 through 2006H2 vintages, Figures 5a and 5b shows that the 2006H1 and 2006H2 vintages performed miserably since summer 2007.

## 5.3 The Consequences of the ABS CDOs Collapse

Table 9 provides information on aggregate crisis related write-downs as well as write-downs for some of the largest financial institutions in the world.

Table 9:
**ABS CDOs and Write-Downs**

**Panel A: Crisis-related Write-Downs for Selected Financial Institutions ($ millions)**

| | latest announcement | ABS CDOs | Corporate credit | RMBS | Other | Total |
|---|---|---|---|---|---|---|
| *Insurers/Asset managers* | | | | | | |
| ACA Capital | 11/8/2007 | 1,700 | - | - | - | 1,700 |
| AIG | 11/10/2008 | 33,190 | - | - | 33,753 | 66,943 |
| Ambac | 11/5/2008 | 11,136 | 360 | 1,046 | 219 | 12,761 |
| MBIA | 5/12/2008 | 3,500 | 1,600 | | 1,800 | 6,900 |
| Prudential | 7/30/2008 | - | - | 3,410 | - | 3,410 |
| *North American Banks* | | | | | | |
| Bank of America | 1/16/2009 | 9,089 | 932 | - | 2,834 | 12,855 |
| Bear Streans | 1/29/2008 | 2,300 | - | - | - | 2,300 |
| Citigroup | 10/16/2008 | 34,106 | 4,053 | 1,319 | 15,904 | 55,382 |
| Goldman Sachs | 9/16/2008 | - | 4,100 | 1,700 | 1,400 | 7,200 |
| JP Morgan Chase | 1/15/2009 | 1,300 | 5,467 | 5,305 | - | 12,072 |
| Lehman Brothers | 6/16/2008 | 200 | 1,300 | 4,100 | 3,400 | 9,000 |
| Merrill Lynch | 10/16/2008 | 26,100 | 2,845 | 12,998 | 13,125 | 55,068 |
| Morgan Stanley | 12/17/2008 | 7,800 | 3,810 | 3,781 | 1,992 | 17,383 |
| *European Banks* | | | | | | |
| Credit Suisse | 10/23/2008 | 3,427 | 3,057 | 530 | 2,523 | 9,357 |
| Deutsche Bank | 10/30/2008 | 2,092 | 5,820 | 3,386 | 3,677 | 14,974 |
| Fortis Bank | 8/4/2008 | 4,359 | 3,660 | 144 | - | 8,163 |
| ING | 11/12/2008 | 565 | - | 8,028 | 25 | 8,617 |
| Royal Bank of Scotland | 11/4/2008 | 3,609 | 1,849 | 2,566 | 4,122 | 12,146 |
| UBS | 8/12/2008 | 21,870 | 348 | 1,716 | 13,871 | 37,805 |
| *Asian and Emerging Market Banks* | | | | | | |
| Aozora Bank | 5/15/08 | 510.0 | - | - | - | 510.0 |
| Mitsubishi UFJ | 8/13/08 | 359.5 | 2,348 | 921 | 11 | 3,640 |
| Mizuho | 11/13/08 | 3,898 | 629 | 2,539 | 584 | 7,650 |
| National Australia Bank | 10/21/08 | 669.5 | - | - | - | 669.5 |
| Sumitomo Mitsui | 11/19/07 | 561.7 | - | - | - | 561.7 |

**Panel B: Aggregate Crisis-related Write-Downs ($ millions)**

| | ABS CDOs | Corporate credit | RMBS | Other | Total |
|---|---|---|---|---|---|
| Insurers/Asset managers | 61,074 | 6,320 | 10,386 | 38,3471 | 116,126 |
| North American Banks | 84,319 | 23,702 | 42,272 | 59,011 | 209,305 |
| European Banks | 63,464 | 18,579 | 26,423 | 62,634 | 171,100 |
| Asia/Emerging markets Banks | 9,358 | 4,724 | 5,728 | 3,743 | 23,553 |
| Total | 218,216 | 53,324 | 84,810 | 163,735 | 520,084 |

## 6 Why did the Ratings Collapse?

Two candidates: (1) Lax rating and rating shopping (2) Model error.

### 6.1 Ratings Shopping

Table 10:
**Number of Raters**

**Panel A: Number of raters over time**

| | *Number of raters* 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| pre 2004 | 603 | 133 | 550 | 535 |
| | (33.11%) | (7.30%) | (30.20%) | (29.38%) |
| 2004 | 374 | 439 | 1,993 | 1,186 |
| | (9.37%) | (11.00%) | (49.92%) | (29.71%) |
| 2005 | 547 | 778 | 5,363 | 2,537 |
| | (5.93%) | (8.43%) | (58.14%) | (27.50%) |
| 2006 | 573 | 392 | 7,060 | 2,786 |
| | (5.30%) | (3.63%) | (65.30%) | (27.77%) |
| 2007 | 171 | 94 | 2,479 | 845 |
| | (4.76%) | (2.62%) | (69.07%) | (23.54%) |
| entire period | 2,888 | 1,857 | 17,721 | 8,033 |
| | (9.47%) | (6.09%) | (58.10%) | (26.34%) |

**Panel B: Number of raters by security type**

| | *Number of raters* 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| CMBS | 10 | 16 | 1,116 | 257 |
| | (0.71%) | (1.14%) | (79.77%) | (18.37%) |
| RMBS | 463 | 1,371 | 6,768 | 1,065 |
| | (4.79%) | (14.18%) | (70.01%) | (11.02%) |
| Home Equity | 346 | 406 | 6,997 | 5,983 |
| | (2.52%) | (2.96%) | (50.95%) | (43.57%) |
| CDO | 91 | 35 | 2,909 | 723 |
| | (2.42%) | (0.93%) | (77.41%) | (19.24%) |

Table 11:
**Most common raters**

**Panel A: Securities rated by only one of the agencies**

| | Fitch | Moody's | S&P | Total |
|---|---|---|---|---|
| pre 2004 | 20 | 21 | 92 | 133 |
| | (15.04%) | (15.79%) | (69.17%) | (100.0%) |
| 2004 | 66 | 32 | 341 | 439 |
| | (15.03%) | (7.29%) | (77.68%) | (100.0%) |
| 2005 | 97 | 46 | 635 | 778 |
| | (12.47%) | (5.91%) | (81.62%) | (100.0%) |
| 2006 | 162 | 56 | 174 | 392 |
| | (41.33%) | (14.29%) | (44.39%) | (100.0%) |
| 2007 | 29 | 27 | 38 | 94 |
| | (30.85%) | (28.72%) | (40.43%) | (100.0%) |
| entire period | 374 | 182 | 1,280 | 1,836 |
| | (20.37%) | (9.91%) | (69.72%) | (100.00%) |

**Panel B: Securities rated by two agencies**

| | S&P+Moody's | S&P+Fitch | Moody's+Fitch | Total |
|---|---|---|---|---|
| pre 2004 | 402 | 86 | 62 | 550 |
| | (73.09%) | (15.64%) | (11.27%) | (100.0%) |
| 2004 | 1,695 | 225 | 73 | 1,993 |
| | (85.05%) | (11.29%) | (3.66%) | (100.0%) |
| 2005 | 4,413 | 566 | 384 | 5,363 |
| | (82.29%) | (10.55%) | (7.16%) | (100.0%) |
| 2006 | 6,433 | 313 | 314 | 7,060 |
| | (92.12%) | (4.43%) | (4.45%) | (100.0%) |
| 2007 | 2,323 | 75 | 80 | 2,479 |
| | (93.71%) | (3.03%) | (3.23%) | (100.0%) |
| entire period | 15,266 | 1,265 | 913 | 17,445 |
| | (87.51%) | (7.25%) | (5.23%) | (100.00%) |

Table 12:
**Rating Transitions and Number of Raters**

| | 1 | 2 | 3 | Total |
|---|---|---|---|---|
| number of downgrades | 238 | 2,912 | 1,788 | 4,938 |
| (downgrade %) | (12.81%) | (16.24%) | (21.84%) | (17.65%) |
| number of upgrades | 85 | 561 | 369 | 1,015 |
| (upgrade %) | (4.57%) | (3.13%) | (4.51%) | (3.63%) |
| number unchanged | 1,535 | 14,454 | 6,030 | 22,019 |
| (unchanged %) | (82.62%) | (80.63%) | (73.65%) | (78.72%) |
| Total | 1,858 | 17,927 | 8,187 | 27,972 |
| | (100.00%) | (100.00%) | (100.00%) | (100.00%) |

Table 13:
**Rating Shopping: Probit regression models for probability of a downgrade**

| Dependent Variable= | Pr(down) | Pr(down) | Pr(down) | Pr(down) | rating change | rating change | rating change |
|---|---|---|---|---|---|---|---|
| Number of raters | | | 0.045 a | 0.086 a | | | 0.132 |
| | | | (0.004) | (0.007) | | | (0.503) |
| One rater | 0.061 b | 0.075 b | | | -2.716 a | -1.808 a | |
| | (0.030) | (0.043) | | | (0.793) | (0.727) | |
| Two rater | -0.005 | | | | -0.909 a | | |
| | (0.010) | | | | (0.201) | | |
| Three raters | | 0.027 a | | | | 0.909 a | |
| | | (0.009) | | | | (0.201) | |
| only S&P | | | 0.169 a | 0.322 a | | | -2.579 a |
| | | | (0.049) | (0.034) | | | (0.300) |
| only Moody's | | | 0.084 b | 0.223 a | | | -1.937 c |
| | | | (0.049) | (0.070) | | | (1.011) |
| only Fitch | | | 0.093 | 0.240 a | | | -2.043 a |
| | | | (0.073) | (0.056) | | | (0.861) |
| S&P and Moody's | | | | 0.061 a | | | -0.828 |
| | | | | (0.016) | | | (0.534) |
| Moody's and Fitch | | | | 0.046 c | | | -0.692 a |
| | | | | (0.029) | | | (0.151) |
| Fixed-Effects | | | | | | | |
| Vintage | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Security-type | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Estimation | probit | probit | probit | probit | OLS | OLS | OLS |
| Observations | 28,238 | 28,238 | 28,238 | 28,238 | 4,904 | 4,904 | 4,904 |
| Pseudo/Adjusted $R^2$ | 0.12 | 0.12 | 0.12 | 0.13 | 0.15 | 0.15 | 0.15 |

Table 14:
**Rating Shopping and AAA Securities**

| Dependent Variable= | Pr(down) | Pr(down) | Pr(down) | Pr(down) |
|---|---|---|---|---|
| Number of raters | | | -0.016 a | -0.048 a |
| | | | (0.004) | (0.007) |
| One rater | 0.138 b | 0.077 | | |
| | (0.061) | (0.068) | | |
| Two rater | 0.014 a | | | |
| | (0.003) | | | |
| Three raters | | -0.014 a | | |
| | | (0.003) | | |
| only S&P | | | 0.050 | -0.018 |
| | | | (0.085) | (0.042) |
| only Moody's | | | 0.007 | -0.019 c |
| | | | (0.046) | (0.061) |
| only Fitch | | | 0.005 | 0.007 |
| | | | (0.004) | (0.008) |
| S&P and Moody's | | | | -0.049 a |
| | | | | (0.006) |
| Moody's and Fitch | | | | -0.018 a |
| | | | | (0.0003) |
| Fixed-Effects | | | | |
| Vintage | Yes | Yes | Yes | Yes |
| Security-type | Yes | Yes | Yes | Yes |
| Estimation | probit | probit | probit | probit |
| Observations | 4,654 | 4,654 | 4,654 | 4,654 |
| Pseudo $R^2$ | 0.21 | 0.21 | 0.21 | 0.23 |

The estimation result is consistent with the hypothesis that the rating is simply an imperfect measure so that more evaluation leads to more accurate assessment of the true state and that perhaps S&P uses a slightly more inaccurate assessment and that there is a rating shopping.

To see if rating agencies became lax, it is useful to examine a variant of Table 15. In addition, it is useful to compare outcome of securities rated as a given level by itself alone and with some other rating companies.

Provided that there is no systematic difference in the ratings across agencies, to see if there is a rating shopping, one need to examine if the performance of a tranche with only one rating company is systematically worse than those with multiple ratings holding the rating constant. This corresponds to Table 14 so there is a slight evidence of rating shopping.

## 6.2 The Failure of the Black Box

Table 15 reports differences in opinion. Only anecdotal evidences about the failure of the black box is offered.

Table 15:
**Credit Rating Dispersion**

| | Mean | 25th Percentile | Median | 75th Percentile | Standard Deviation | Min | Max | # of tranches where diff=0 | # of tranches |
|---|---|---|---|---|---|---|---|---|---|
| S&P - Fitch | -0.02 | 0.0 | 0.0 | 0.0 | 0.601 | -5.0 | 5.0 | 7,671 | 9,507 |
| S&P - Moody's | -0.26 | 0.0 | 0.0 | 0.0 | 0.881 | -10.0 | 7.0 | 16,806 | 23,839 |
| Moody's - Fitch | 0.31 | 0.0 | 0.0 | 1.0 | 0.665 | -4.0 | 10.0 | 6,478 | 9,150 |

Table 16:
**Ratings Correlation**

| | S&P | Moody's | Fitch |
|---|---|---|---|
| S&P | 1.0 | | |
| Moody's | 0.983<br>(0.000) | 1.0 | |
| Fitch | 0.962<br>(0.000) | 0.979<br>(0.000) | 1.0 |

# 7 Summary

1. First, from 1992 to 2001, downgrades and upgrades were relatively infrequent (1-2% of outstanding tranches) and roughly balanced. 2002 and 2003 saw a spike in downgrades which was only slightly less severe than the current crisis — nearly 5% of tranches were downgraded 3 notches on average but the overall market was much smaller at that time. The number of outstanding structured finance securities in 2002 was roughly one third of the number outstanding in 2007 and only one tenth the size of the market in 2008. Nearly 30% of downgrades in 2002 and 2003 affected tranches of high-yield collateralized bond obligations (CBOs), indicating that rating models did not anticipate how badly these assets would perform in a recession.

2. Second, the current crisis is notable for the size and severity of downgrades. We show that in 2007 and 2008, approximately 62% of downgrades can be attributed to securities backed by home equity loans or first mortgages. Examining securities that suffered the most severe downgrades (8 notches or more), we find that the majority of these tranches come from deals backed by home equity loans, first mortgages, and CDOs of ABS. It is these asset classes for which the rating model experienced the most dramatic failures. By now, it is well established that rating models failed to properly account for correlation of home prices at the national level. ABS CDOs would also be affected by this, since they often contain RMBS as collateral. But ABS CDOs are also more sensitive to errors in correlation assumptions, since they are higher level securitizations (securitizations that contain securitized assets in their collateral pools). Structured finance securities that fell 8 or more notches were most likely to be rated AAA.

3. Third, we compare the performance of structured finance ratings to the performance of cor-

porate bonds from 1983 to 2008. While corporate bonds are also sensitive to macroeconomic events, the magnitude of downgrades is relatively low and stable over time. Even during the 2001/2002 recession when 30% of corporate bonds were downgraded, the average downgrade was only 1.8 notches. Downgrades of structured finance securities in the 2007/2008 crisis were much more severe, averaging around 5-6 notches. Using micro-level data on ABS CDOs — one of the structured asset classes that performed relatively poorly in the recent crisis — we provide suggestive evidence that ratings shopping may have played a role in the current crisis. Among 534 ABS CDOs issued between 2005 and 2007, we find that tranches rated solely by one agency, and by S&P in particular, were more likely to be downgraded by January 2008. Further, tranches rated solely by one agency are more likely to suffer more severe downgrades. Nevertheless, it is not clear that rating shopping led to the ratings collapse as the majority of the tranches in our sample are rated by 2 or 3 agencies.