

May 27, 2008

## CLO Resiliency and Return

Once again, we focus on the resiliency of CLO returns to defaults and recoveries. This time, with the help of Moody's Wall Street Analytics, we expand the scope of our analysis to 340 CLOs issued 2003-7.<sup>1</sup>

- We show CLO returns in annual default rates up to 25% and recoveries down to 50%. Results are displayed by vintages 2003-7 and ratings Aaa-Ba2.
- We tested CLOs in the worst default and recovery environment U.S. leverage loans have experienced since the inception of the market in 1995. On average, *every* vintage and rating down to Ba2 returns more than LIBOR, *even if purchased today at par*. The variability of individual CLO results is such that in this scenario one is better off buying a slightly bad Baa2 CLO than an average Aaa CLO. However, variability from CLO to CLO is such that one is better off with a really bad Aaa CLO than a really bad Baa2 CLO.
- We tested CLO debt tranches in a Great Depression high yield bond default and recovery scenario. On average, Aaa, Aa2, and most A2 tranches still return more than LIBOR, even if purchased at par. The variability of individual CLO results are such that unless one is sure of picking a good Aa2, one is better off sticking to Aaa CLOs.
- We show the CDRs at which CLO tranches begin to lose coupon and the CDRs at which they begin to return less than LIBOR assuming CLOs are purchased at par.
- We show the CDR that maximizes cash flow and minimizes WAL to produce the highest yield for CLOs purchased at a discount.

### Default and Recovery Scenarios

Exhibit 1 (next page) shows the 26 default and recovery scenarios we asked Moody's Wall Street Analytics (MWSA) to run on CLOs covered by their modeling service. Note that when we test CLOs with higher CDRs (constant

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<sup>1</sup> Tranche by tranche results are available for download from Moody's Wall Street Analytics at <http://wsainc.com/UBS>.

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default rates<sup>2</sup>) we also stress them with lower loan recoveries in the event of default. We also specify bond recoveries, for those CLOs that are allowed to invest a portion of their portfolios in those assets.

### Exhibit 1: Default and Recovery Scenarios

Scenario #	CDR %	Loan Recovery %	Bond Recovery %
1	0	na	na
2	0.5	90	60
3	1	87	57
4	1.5	84	54
5	2	82	52
6	2.5	79	49
7	3	76	46
8	3.5	73	43
9	4	71	41
10	4.5	68	38
11	5	65	35
12	5.5	64	34
13	6	63	33
14	6.5	62	32
15	7	61	31
16	7.5	60	30
17	8	59	29
18	9	58	28
19	10	57	27
20	12	56	26
21	14	55	25
22	16	54	24
23	18	53	23
24	20	52	22
25	22	51	21
26	25	50	20

In creating our scenarios, we attempted to correlate default and recovery rates. In the very mild default scenario of 0.5% CDR, we use the highest average recoveries of recent years. For loans, this was around 90% in 1996 and for bonds this was around 60% in 1985, 1987, and 1996.<sup>3</sup>

Five percent CDR approximates the highest cumulative default rate of U.S. institutional loans since that market developed in 1995. Loans originated in

<sup>2</sup> In the constant default rate methodology, the same default percentage is applied each year to the remaining balance of CLO collateral.

<sup>3</sup> Moody's annual default studies publish recovery details for the previous two years. We use Moody's series of average trading prices after default as our measure of recovery.

2000 had a cumulative default rate over 4.5 years of 21.0%.<sup>4</sup> Applying 5% CDR over the same time period produces a cumulative default rate of 20.6%. The 65% loan recovery rate we associate with that 5% CDR is the worst average recovery rate in any one year since the inception of the institution loan market. The lower loan recoveries we present, still further down the exhibit, are invented and have no basis in historical experience.

Another default “landmark” in Exhibit 1 is 10% CDR. Over four years, this CDR produces a 34.4% cumulative default rate, a little higher than the 33.9% high yield bond default rate prevailing in the depths of the Great Depression 1932-35.<sup>5</sup> Over five years, this same 10% CDR produces 41% cumulative defaults, equal to the worst five-year B-rated high yield bond default rate since 1970.<sup>6</sup> Higher default rates, further down the exhibit, have no basis in historical experience for either leverage loans or high yield bonds.

Other modeling assumptions that we provided MWSA were:

- default reinvestment;
- prepay loans at 15% per annum, bonds at 5%;
- reinvest principal proceeds in accordance with the CLO’s current portfolio attributes with respect to the percentage of bonds versus loans, weighted average spreads, weighted average coupon, price, etc.

Defaulting reinvestment is, of course, unambiguously conservative in comparison to not defaulting reinvestment. A low prepay rate is conservative as prepaid assets are not unavailable to default. Our choice of 15% loan prepayments reflects what we think is a low lifetime prepay rate. Assuming that reinvestment mirrors the current portfolio’s parameters captures the manager’s investment style, although it may not always realistically reflect market opportunities going forward.

## Example Results

We asked MWSA to show the results of default and recovery scenarios in terms of the present-value of future CLO tranche cash flows. We did not ask for IRRs, because at the stresses we put CLOs through we knew the negative IRR results that would be generated would be hard to interpret.<sup>7</sup> Instead, we show CLO tranche PVs as a percent of current outstanding par, thus creating a present value



4 Steve Miller, Robert Polenberg, Aditi Mahendroo, *1Q08 Institutional Loan Default Review*, S&P LCD, April 2008.

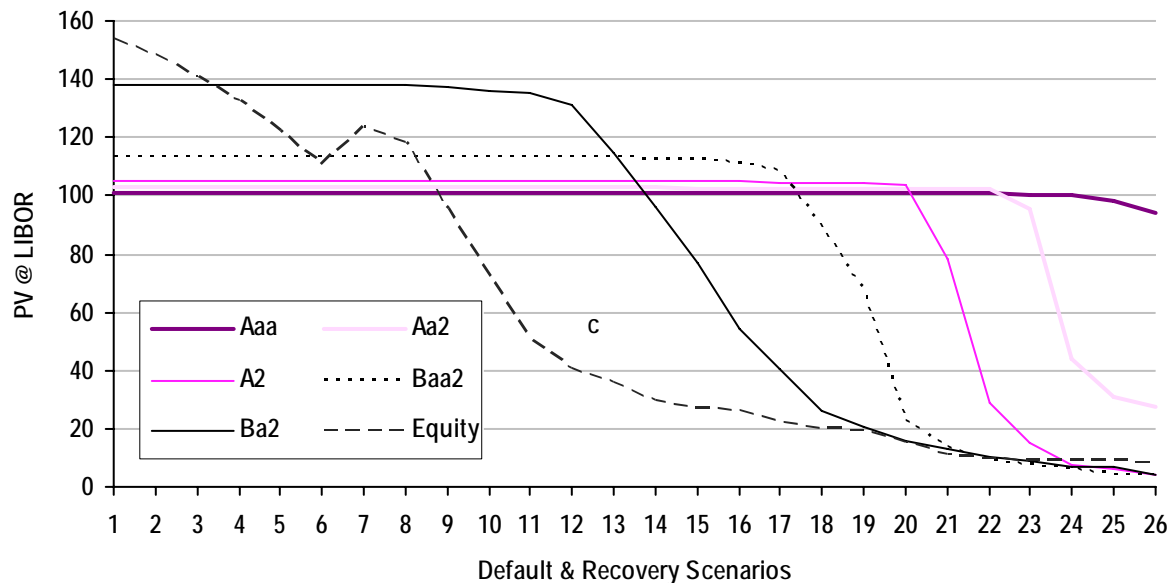
5 Lea V. Carty and Dana Lieberman, *Historical Default Rates of Corporate Bond Issuers, 1920-1996*, Moody’s Investors Service, January 1997, page 9 for the worst four-year period 1932-1935. W. Braddock Hickman, the grandfather of default study research, found a rate of 48.9% over the same period in *Corporate Bond Quality and Investor Experience*, NBER, 1958. The considerable difference could be because Moody’s focused on Moody’s-rated bonds.

6 Kenneth Emery et al, *Corporate Default and Recovery Rates, 1920-2007*, Moody’s, February 2008.

7 Which is worse, a -10% IRR over one year or a -5% IRR over two years? We’re not sure, either.

price. Because we are assuming the certainty of particular stress scenarios, we asked MWSA to discount cash flows for all tranches at LIBOR. This allows comparison of results across tranches of different ratings. In our exhibits, a “PV @ LIBOR” of 100 means that the CLO’s future cash flows, when discounted at LIBOR, equal the CLO’s outstanding par balance. If so, the tranche’s IRR is LIBOR if purchased at par. A PV greater or smaller than 100 indicates the price necessary to produce a LIBOR return. Exhibit 2 (below) shows results for one CLO from 2005.

Exhibit 2: Present Value Results for a 2005 CLO



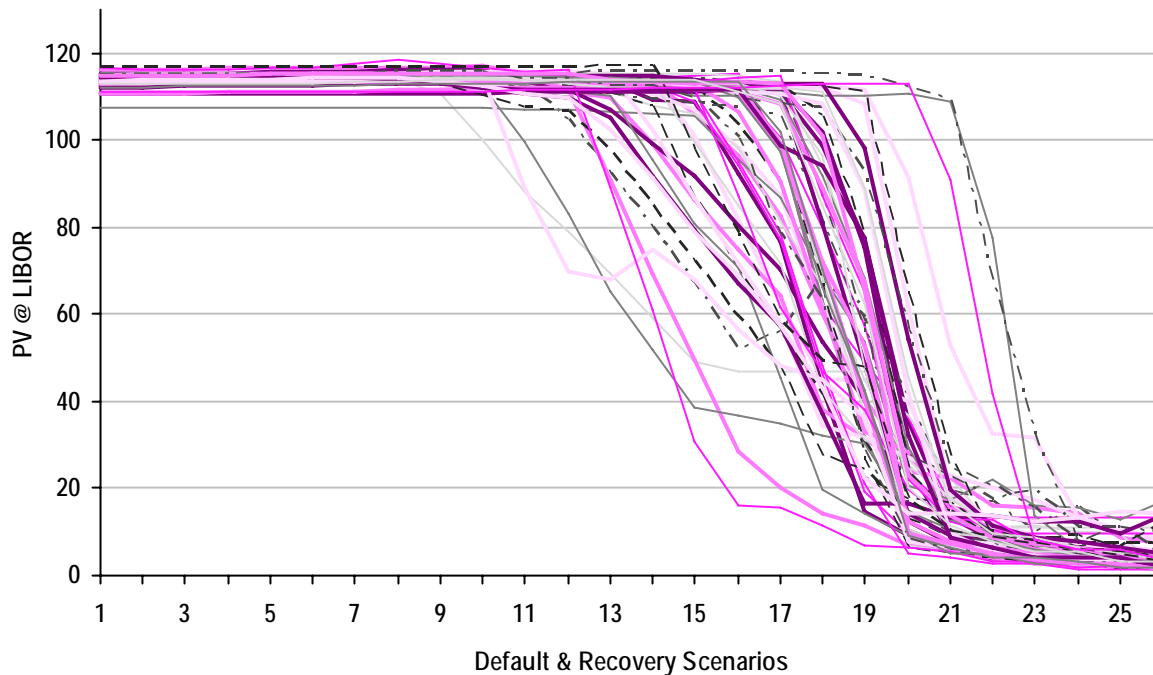
Source: Moody's Wall Street Analytics

Looking at the exhibit, it's easy to identify the CLO's tranches. The line with the highest PV in the 0% CDR case (Scenario 1 at the left of the exhibit) is, of course, the equity tranche. The next two highest are the Ba2 and Baa2 tranches. Neither tranche suffers a loss at 0% CDR; the difference in their PVs is the result of the higher coupon of the Ba2 tranche relative to the Baa2 tranche. Aaa, Aa, and A tranche PVs are very close to each other at 0% CDR because the difference in their coupons is not enough to cause their PVs to be very different. Looking to the right of the exhibit, one sees where each tranche eventually “breaks” or returns less than full principal and interest, causing their PVs to decline. For the Ba tranche, this is at Scenario 10, where we assume 4.5% CDR and 68% recovery on loans. For the two Aaa tranches of this CLO, loss of some interest occurs at Scenario 25, where we assume 22% CDR, and 51% loan recovery.

Exhibit 3 (next page) shows results for 61 Baa2 CLOs issued in 2005. Coupon spreads above LIBOR for these CLOs range 170-285 bps, thus creating

differences in PVs in Scenario 1, the 0% CDR case. The first CLO to default on a portion of its coupon does so in Scenario 9, at 4% CDR. That same CLO's PV falls to 100 in Scenario 11 at 5% CDR. The two strongest Baa2 CLOs begin defaulting on a portion of their coupons in Scenarios 20 and 21 at 12-14% CDR.

Exhibit 3: Present Value of 62 Baa2 CLOs from 2005



Source: Moody's Wall Street Analytics

Some of the difference in the relative strength of these Baa2 tranches is explained by the CLO's WARF triggers. CLOs with higher WARF triggers (and therefore lower collateral ratings) must be structured to withstand the higher collateral losses those lower ratings imply. Another factor is the maximum limit for high yield bonds in these CLOs. CLOs with larger "bond buckets" must also be able to withstand higher collateral losses. Still another factor is the pattern and extent of collateral losses to date, which affects the current strength of tranches.

### Present Value Results for 340 CLOs

Exhibit 4 (next page) shows the distribution of the CLO debt tranches we studied by vintage and original ratings. In all, we looked at 1,575 tranches from 340 CLOs issued 2003-7.

Exhibit 4: Number of CLO Tranches in Study

CDO Tranche	2003	2004	2005	2006	2007	Total
Aaa	38	61	109	193	110	511
Aa2	18	20	58	106	69	271
A2	21	29	65	113	68	296
Baa2	24	31	62	102	64	283
Ba2	12	17	42	82	61	214
Total	113	158	336	596	372	1575

Source: Moody's Wall Street Analytics

In Exhibits 5A and 5B (pages 7 and 8), we show average PV results for each vintage and rating of debt tranches shown in Exhibit 4. Rather than show every one of the 26 scenarios MWSA ran for us, we focus on scenarios where the average PV for CLOs of a particular rating and vintage first falls below 100. This implies an IRR of less than LIBOR if the CLO was purchased at par today.

In the top panel of Exhibit 5A, we show PVs under a 0% CDR scenario. As we only look at floating rate debt tranches, differences in average PVs reflect coupon spreads above LIBOR. Therefore, in the 0% CDR scenario, the PVs of lower-rated higher-coupon tranches are always greater than the PVs of higher-rated lower-coupon tranches.

As one moves down the panels of Exhibits 5A and 5B, average present values sometimes rise for particular combinations of vintages and ratings. This happens if enough tranches represented in a cell of the panel extend their maturities, but still pay all principal and interest. The above-LIBOR coupon received over a longer time period present values to a greater amount. Eventually, as one goes down the panels to higher CDRs, present values decline.

Recall that our 5% CDR scenario replicates the worse loan performance since the U.S. institutional loan market developed in 1995. This was the 2000 loan vintage which had a cumulative default rate of 21.0% over 4.5 years. Our 5% CDR scenario produces a similar cumulative default rate of 20.6% over 4.5 years. In that scenario, we use a 65% recovery rate, the worst average loan recovery rate in any calendar year since 1995.

Results for the 5% CDR scenario are shown in the third panel of Exhibit 5A. Note that all average debt tranche PVs are above 100, implying an IRR greater than LIBOR if the CLO was purchased today at par. Ba2 tranches are down significantly from the PVs in the 0% CDR case, indicating that they are not returning all promised coupon. But Ba2 PVs are still well above higher-rated tranches, which *might* indicate that if one expects a repeat of 2000 default and recovery conditions, Ba CLO tranches offer the best return, even if they don't return all their promised coupon.



## Exhibit 5A: Average Present Value for 340 CLOs, By Vintage and Original Rating

0% CDR						
CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	102	102	101	102	102	102
Aa2	105	104	103	103	104	104
A2	109	107	106	106	108	107
Baa2	117	115	113	113	118	115
Ba2	148	136	136	134	138	136

2.5% CDR, 79% Loan Recovery, 49% Bond Recovery						
CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	102	102	101	102	102	102
Aa2	105	104	103	103	104	104
A2	109	108	106	106	108	107
Baa2	117	115	114	114	118	115
Ba2	149	137	137	135	138	137

5% CDR, 65% Loan Recovery, 35% Bond Recovery						
CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	102	102	101	101	102	101
Aa2	105	104	103	103	104	104
A2	109	108	106	106	108	107
Baa2	118	112	113	112	118	114
Ba2	141	129	124	123	120	124

6% CDR, 63% Loan Recovery, 33% Bond Recovery						
CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	102	102	101	101	101	101
Aa2	105	104	103	103	103	103
A2	109	108	106	105	107	106
Baa2	118	110	109	111	115	112
Ba2	121	117	105	102	95	103

7.5% CDR, 60% Loan Recovery, 30% Bond Recovery						
CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	102	102	101	101	101	101
Aa2	105	104	103	103	103	103
A2	109	108	105	103	105	105
Baa2	112	96	96	100	104	101
Ba2	66	64	56	51	48	53

10% CDR, 57% Loan Recovery, 27% Bond Recovery						
CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	102	101	101	101	101	101
Aa2	105	104	102	102	102	102
A2	109	103	96	96	101	99
Baa2	59	45	54	52	49	52
Ba2	24	20	24	20	18	21

Source: Moody's Wall Street Analytics

Exhibit 5B: Average Present Value for 340 CLOs, By Vintage and Original Rating  
(continued)

16% CDR, 54% Loan Recovery, 24% Bond Recovery						
CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	102	101	100	100	100	100
Aa2	93	96	85	87	90	89
A2	32	29	31	25	26	28
Baa2	11	8	12	10	7	10
Ba2	10	8	10	8	10	9

20% CDR, 52% Loan Recovery, 22% Bond Recovery						
CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	101	99	98	98	99	98
Aa2	43	47	44	47	47	46
A2	9	10	12	10	9	10
Baa2	7	5	6	7	5	6
Ba2	7	6	7	8	7	7

25% CDR, 50% Loan Recovery, 20% Bond Recovery						
CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	95	91	93	92	94	93
Aa2	29	30	31	33	32	32
A2	5	7	6	6	6	6
Baa2	5	4	4	5	3	4
Ba2	4	4	4	5	5	5

Source: Moody's Wall Street Analytics

However, let's take a step back and poke at the Ba results a little. MWSA's cash flow model, just like any other we know about, is driven by defaults and recoveries. It does not take into account collateral downgrades. But in a 5% CDR environment, we would expect *a lot* of leverage loan downgrades. Downgrades affect CLO cash flows because after a certain point, CCC assets are not given credit in over-collateralization tests. Thus, collateral downgrades added to collateral defaults would cause CLO over-collateralization triggers to trip sooner, cutting off cash flow to lower debt tranches sooner. How much sooner? It depends on leverage loan downgrades. So, bottom line, those looking for a pickup in spread to Aaa CLOs in a 5% CDR environment would be safer moving up the capital structure from Ba2 to Baa2 or A2 CLOs.

The other default "landmark" we mentioned was 10% CDR, which replicates Great Depression speculative-grade bond defaults. This is shown in the last panel of Exhibit 5A. What's interesting there is that in that extreme default scenario, an investor is better off with Aa2 CLOs than Aaa CLOs. Not all the Aa2 CLOs pay full interest and principal, which we can tell because their average PVs decrease from the 0% CDR case. But higher coupons on the Aa2 CLOs that do pay make up for this and Aa2 CLO PVs are greater than Aaa CLOs PVs. As most Aa2 CLO tranches are non-PIK, they would not be affected by our concern about leverage loan downgrades causing over-collateralization triggers to trip.

## Present Value Standard Deviation

As we explained, Exhibit 5A and 5B show average PVs for all the CLOs from a particular vintage and original rating. Exhibit 6 (below) delves deeper and shows the *standard deviation* among CLO PVs in the 5% CDR scenario, which replicates the worse default and recovery environment for leverage loans since the inception of that market in 1995. Ba2 CLOs have the highest PV standard deviation. PV standard deviation is significantly reduced in the Baa2 tranches and further reduced as one continues up in rating. PV standard deviations for 2007 Aa2 and A2 CLOs are high because of the broad range of coupon spreads for those CLOs.

**Exhibit 6: PV Standard Deviations for 5% CDR, 65% Loan Recovery, 35% Bond Recovery**

CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	1.0	0.6	0.4	0.6	0.7	0.6
Aa2	0.9	0.5	0.5	0.5	2.1	1.3
A2	0.9	0.9	1.2	1.9	3.9	2.6
Baa2	1.2	15.1	5.2	6.1	6.6	7.7
Ba2	7.6	15.7	16.1	13.2	15.0	15.0

Source: Moody's Wall Street Analytics

It's interesting to consider the risk of buying a bad Baa2 CLO versus a bad Aaa CLO. Suppose "bad" is defined as a CLO that returns one SD below average PV in the 5% CDR scenario. Such a bad Baa2 CLO would return 114 (the average Baa2 PV across all vintages in the third panel of Exhibit 5A) minus 7.7 (the average Baa2 standard deviation across all vintages in Exhibit 6), or 106.3. An average Aaa CLO would return 101. One is better off with a bad Baa2 CLO than an average Aaa CLO! However, if one defines a "bad" CLO as one which performs *two* standard deviations below average, the result changes. The bad Baa2 CLO would return 114 minus 2 \* 7.7 or 98.6. A bad Aaa CLO would return 101 minus 2 \* 0.6, or 99.8. In that case, one is better off with a bad Aaa CLO than a bad Baa2 CLO.

Exhibit 7 (next page) provides standard deviations in the 10% CDR scenario, which replicates Great Depression high yield bond defaults. Except for Aaa CLOs, PV standard deviations have significantly increased, showing an increasing divergence of performance among CLOs of the same vintage and original rating. For an investor expecting Great Depression defaults and unsure of his ability to pick out an average CLO or one that will perform one to two standard deviations below average, Aaa tranches are the ones to buy.



### Exhibit 7: PV Standard Deviations for 10% CDR, 57% Loan Recovery, 27% Bond Recovery

CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	0.9	0.7	0.3	0.4	0.5	0.5
Aa2	0.9	0.6	6.1	2.5	5.8	4.4
A2	3.2	10.1	18.6	20.2	16.6	17.8
Baa2	21.4	27.4	29.2	26.0	29.3	27.3
Ba2	8.1	8.3	25.0	22.7	15.4	19.9

Source: Moody's Wall Street Analytics

### CLO Debt Tranche “Breakpoints”

It's handy to define the strength of CLOs by their ability to withstand defaults and default losses. We'll first look at CLOs in terms of their “coupon break points” or the combination of CDR and recovery which cause a CLO tranche to fail to return promised coupon. We continue to test CLOs using the combinations of CDRs and recoveries in Exhibit 1. In determining coupon break points, we accept the small tolerance of losing one point of PV. In other words, PV must decline 1 from the 0% CDR PVs shown in the first panel of Exhibit 5A before we declare a “coupon break point.” This is basically a 10 bps loss in yield on a security with a ten-year weighted average life.

Exhibit 8 (below) shows the CDR at which CLOs of a particular vintage and original rating lose one point of present value. There are big differences in the CDR coupon breakpoints across vintages. For example, 2007 Aaa CLOs have coupon break points at 12 CDR while 2003 Aaa CLOs have coupon break points at 22 CDR. There is even a discontinuity in the 2004 vintage where Baa2 CLOs have a lower average coupon breakpoint than Ba2 CLOs. This is caused by the mix of CLOs having Baa2 tranches, but not Ba2 tranches.

Exhibit 8 is a very different way to look at CLO performance than we have shown so far, and we would argue that it is a *wrong* way to look at CLO performance. It focuses on what was lost rather than what was received. We would argue that it is better to receive 10% IRR, even if one was promised an IRR of 12%, rather than receive a promised 5% IRR.

### Exhibit 8: CDR Where Average Present Value Declines One Point

CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	22	18	16	16	12	16
Aa2	14	16	10	10	7.5	10
A2	12	10	8	6.5	6.5	7
Baa2	7	4	5.5	5.5	5.5	5.5
Ba2	5	4.5	4	4	3.5	4

Source: Moody's Wall Street Analytics

We'd argue that Exhibit 9 (next page) is more relevant to an investor. It shows the combination of CDR and recovery which cause a CLO tranche's PV to fall

below 100. Since we discount CLO cash flows by LIBOR, this shows when average IRR in each combination of vintage and rating falls below LIBOR for CLOs purchased at par. An investor can find the lowest rating that satisfies their worst case CDR scenario and obtain their highest return. Of course, these are averages, and a bad CLO in a particular vintage and rating combination would perform worse. We also repeat our warning that rating downgrades may speed up the point at which cash flow is cut off to lower rated tranches.

#### Exhibit 9: CDR Where Average Present Value Declines Below 100

CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	22	20	16	18	18	18
Aa2	16	16	14	12	14	14
A2	12	12	10	10	12	10
Baa2	9	7.5	7.5	8	8	8
Ba2	7	7	6.5	6.5	6	6.5

Source: Moody's Wall Street Analytics

### Buying CLOs at a Discount: Optimum CDR and Weighted Average Life

We have shown CLO present values as a percent of outstanding principal balance, implicitly assuming CLOs are purchased at par. Since we discount at LIBOR, a PV of 100 means the CLO returns LIBOR. But in today's environment, secondary CLOs trade at substantial discount to par. An important question is how fast the discount will be earned, i.e., what is the weighted average life (WAL) of the CLO? Exhibit 10 (below) shows average WALs for CLOs in the 0% CDR case.

#### Exhibit 10: Weighted Average Life at 0% CDR

CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	3.4	4.5	5.3	6.4	7.5	6.0
Aa2	5.9	6.4	7.7	9.0	10.4	8.7
A2	6.2	6.9	8.2	9.6	11.0	9.1
Baa2	6.5	7.3	8.7	10.0	11.4	9.4
Ba2	6.7	6.7	9.0	10.5	11.8	10.1

Source: Moody's Wall Street Analytics

However, Aaa CLOs, and 2005-7 Aa2 and A2 CLOs sold at a discount have *higher average returns in CDRs greater than 0%*. A positive CDR is optimal if it shortens the weighted average life of a discount CLO without causing the tranche to fail to pay full principal and coupon. In Exhibit 11 (next page) we show optimum CDRs for particular CLO tranches. These CDRs produce the shortest average WALs for CLOs of particular combinations of vintage and rating without causing loss of principal or coupon. We also show the resulting WAL at these CDRs, which can be compared to the CDRs in Exhibit 10 to see how much WAL is shortened.

Discount Aaa tranches are better off in Great Depression type CDRs of 10% or more. Looking from Exhibit 10 to Exhibit 11, average WAL across all Aaa vintages shrinks from 6.0 to 3.2 years. A price discount is earned over about half the amount of time. If a Aaa CLO was purchased at a price of 94, the discount would be earned over six years in a 0% CDR scenario and return 100 bps a year. In higher CDRs, the discount would be earned over 3.2 years and return 188 bps a year.

2005-7 Aa2 and A2 CLOs behave the same as Aaa CLOs in that higher CDRs cause their WALs to shorten, thereby reducing the time over which a price discount is earned and increasing return. 2003-4 Aa2 and A2 CLOs and Baa2 and Ba2 CLOs all lengthen in higher CDRs.

**Exhibit 11: Optimal CDRs and the Weighted Average Life They Produce**  
CDR% / (WAL)

CDO Tranche	2003	2004	2005	2006	2007	Average
Aaa	16-20 (2.8)	16 (3.1)	14 (3.2)	14 (3.3)	10 (3.8)	14 (3.2)
Aa2	0-3.5 (5.9)	0-1.5 (6.4)	9 (6.8)	9 (6.9)	7 (7.3)	9 (6.7)
A2	0-2.5 (6.2)	0-1 (6.9)	7-7.5 (7.7)	6 (8.8)	6 (9.3)	6.5 (8.1)
Baa2	0 (6.5)	0-1 (7.3)	0-1 (8.7)	0-0.5 (10.0)	0-0.5 (11.4)	0-0.5 (9.4)
Ba2	0-1.5 (6.7)	0-1 (6.7)	0 (9.0)	0-0.5 (10.5)	0-1.0 (11.8)	0-1.0 (10.1)

Source: Moody's Wall Street Analytics

## Conclusion

We looked at 1,575 tranches from 340 CLOs rated Aaa to Ba2 issued 2003-7. We tested Aaa to Ba2 CLOs in a 5% CDR scenario, which replicates the worst U.S. leverage loan performance since the market began in 1995. On average, every vintage and rating combination has a greater-than-LIBOR return. In a 10% CDR scenario, which replicates the defaults of high yield bonds in the Great Depression, Aaa, Aa2, and most A2 vintages return more than LIBOR.

We discussed the variability of individual CLO results among these vintage and rating averages. In the 5% CDR scenario, one can be a little unlucky in the selection of a particular Baa2 CLO and still do better than buying Aaa CLOs. In the 10% CDR scenario, individual CLO performance varies drastically, and Aaa CLOs provide the only consistent performance.

We showed the CDRs at which CLO vintage and rating combinations begin to lose their coupon. But we argued that the coupon received is more important than the coupon foregone. It can be better to receive a partial coupon from a Ba2 CLO than a full coupon from a Aaa CLO. To put all CLOs to the same test, we showed the CDRs at which various combinations of CLO vintages and ratings fail to return LIBOR.

Acknowledging that all our present value calculations assume CLOs are purchased at par, we discussed the relationship between CDR and weighted average life. Higher CDRs first shorten the average life of higher-rated CLOs; still higher CDRs reduce realized coupon and principal. Until CDR becomes so high that coupon and principal are impacted, higher CDR can raise the realized yield of a higher-rated CLO purchased at a discount. We showed optimal CDR across CLO vintage and rating.

## CLOs Still Offer Value

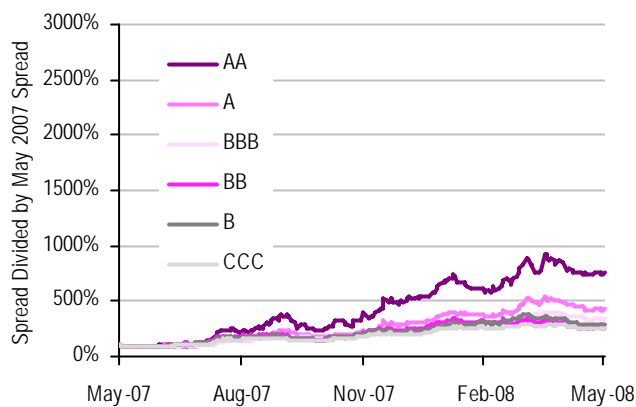
**Question:** Suppose someone told you last year that, with certainty, spreads across the credit market would spike higher and the credit cycle would turn. Would you expect valuations for corporate bonds across the credit spectrum, from double-As to triple-Cs, to widen sharply and exhibit differing amounts of decompression? We would, and this is what occurred.

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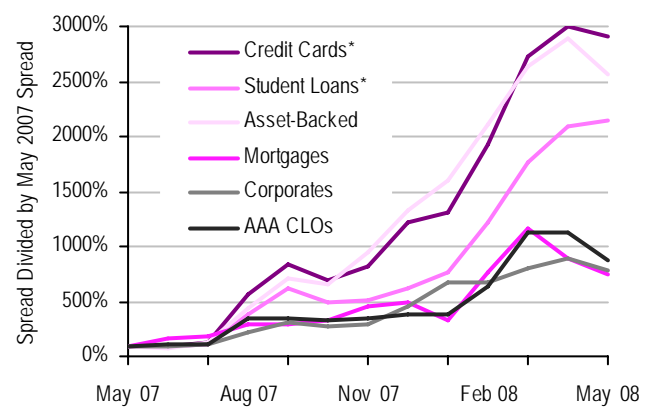
Exhibit 1 (below/left) highlights how sharply corporate spreads of various ratings widened over the past year. Triple-C spreads increased from 400 to 1000 bps, an increase of 250%. Double-A spreads widened from 18 bps to 136 bps over the same period, an increase of 756%. The range of “spread decompression” between different ratings was as great as 646%.

Exhibit 1: % Change in Spreads Across Corporate Credits



Source: UBS, Yield Book  
Note: As of May 15, 2008 Spread to LIBOR

Exhibit 2: % Change in Spreads for AAA “Money Good” Assets



Source: UBS, UBS Mortgage Strategy, UBS Delta, Yield Book  
Note: As of May 9, 2008 \* - single, generic triple-A asset

But what about triple-A “money good” assets? Would you expect to see significant decompression and a broad range of decompression for assets that will make principal and interest payments even in very dire fundamental scenarios (for example, triple-A student loans, credit cards, and CLOs)?

Exhibit 2 (above/right) shows that spread widening for these assets was as much as 3,000% (again, compared to year-ago levels), and the range of spread widening for these “money good” assets was 2,114%. Technicals clearly had a huge influence on spread performance! **Note that these assets traded in a range of only 16 bps one year ago!**

**Key point:** If we are moving from an environment dominated by technical factors to one that will better reflect fundamental variables (default rates, corporate profits, etc), *at least* a portion of the structured product market will have room to benefit.

## But Which Portion? Select CLO Tranches, We Think

Segments of the structured product market may offer attractive value in the context of their fundamental prospects. But which segments? We believe that various CLO tranches, including triple-As and triple-Bs, have lagged in recent trading and may be well-positioned to benefit as valuations and fundamental prospects become increasingly re-aligned.

To illustrate, in Exhibit 3 (below) we compare spread changes of triple-A CLOs to other triple-A “money good” assets, and we look at both the sell-off early in the year and the rally this spring. Among the assets considered, we found that **only one “money good” asset has widened more than triple-A CLOs.**

Also worth noting is the performance of triple-A CLOs relative to underlying loan collateral. A broad portfolio of loan benchmarks is only about 30 bps wider year-to-date, while the senior portion of the CLO structure has widened 99 bps, on average.

And with regard to valuations, at +175 bps, triple-A CLOs provide a spread pickup versus all “money good” comparables except for CMBS.

### Exhibit 3: Triple-A CLO Tranches Have Widened More Than and Offer Spread Pickups Versus Most Other “Money Good” Assets

	Maturity*	Period of Spread Widening			Period of Spread Tightening			YTD
		Mar 14, 2008	Dec 28, 2007	Change	May 9, 2008	Mar 14, 2008	Change	Change
<b>AAA “Money Good” Assets</b>								
FNMA 4.375s of '13 (AAA)	5 yrs	26	-21	+47 bps	-10	26	-36 bps	+11 bps
AAA Mortgage Portfolio	6 yrs	60	22	+38 bps	36	60	-24 bps	+14 bps
AAA Structured Products Portfolio	6 yrs	61	22	+39 bps	37	61	-24 bps	+14 bps
FHLMC 4.5s of '13 (AAA)	5 yrs	23	-23	+46 bps	-8	23	-30 bps	+15 bps
AAA Rated Corporate Portfolio	9 yrs	94	52	+42 bps	88	94	-6 bps	+36 bps
AAA Asset-Backed Portfolio	5 yrs	134	69	+65 bps	128	134	-6 bps	+59 bps
CMBX4 AAA	—	263	65	+198 bps	128	263	-136 bps	+62 bps
AAA Credit Card Portfolio	5 yrs	147	73	+75 bps	138	147	-9 bps	+65 bps
GE 5s of '13 (AAA)	5 yrs	78	47	+31 bps	113	78	+34 bps	+66 bps
Generic AAA Credit Cards	5 yrs	120	53	+67 bps	122	120	+2 bps	+69 bps
Generic AAA CMBS	5 yrs	392	112	+280 bps	192	392	-200 bps	+80 bps
<b>"Average" AAA CLO Tranche</b>	<b>7-8 yrs</b>	<b>225</b>	<b>76</b>	<b>+149 bps</b>	<b>175</b>	<b>225</b>	<b>-50 bps</b>	<b>+99 bps</b>
<b>Underlying Loan Spreads</b>	<b>—</b>	<b>406</b>	<b>289</b>	<b>+117 bps</b>	<b>319</b>	<b>406</b>	<b>-87 bps</b>	<b>+30 bps</b>
Generic AAA Student Loans	7 yrs	126	46	+80 bps	156	126	+30 bps	+110 bps

Source: UBS, UBSDelta, UBS Mortgage Strategy, Yield Book

Note: As of May 9, 2008

\* - final maturity or average life, as appropriate

Loan spreads are calculated as spreads to maturity

## So Let's Find a Trade

The fundamental backdrop is soft, fundamentals are likely to have an increasing influence on valuations in the coming quarters, and select CLO tranches lagged comparables within the structured space as well as outside.

**Trade Idea:** Long “average” BBB CLO tranche (\$69.2, 750 bps), short high-yield index (\$98.5, 539 bps)

**Rationale:** Positive carry, dollar take-out, favorable performance in many bullish and bearish scenarios

Consider the payoff profile for a package highlighted above in various scenarios and assume a 3-year holding period. As shown in Exhibit 4 (next page), the package holds up in the status quo, an extreme bearish scenario, and an extreme bullish scenario.

- 1) **Status Quo:** This package is obviously well-positioned to benefit from a “status quo” environment due to positive carry (211 bps per year) and a very large dollar takeout (\$29.3)
- 2) **Extreme bearish scenario:** The high-yield index currently has 19 names (as of May 13) that are trading at “distressed” levels (i.e., 1,000+ bps). Assume that all 19 default over the next three years (i.e., an annual default rate of 6.3% throughout holding period).

Assuming that defaults are evenly spaced over the holding period and that spreads at the end of the holding period are unchanged, the annual total return of the bond position is mid-single digits (4.4%). **In our view, this shows that a lot of bad news is already priced into the market.**

But how does the BBB CLO perform? First and foremost, suppose that the deal manager is...ineffective...and the CLO has as many defaults as the HY index. Our CLO desk calculates that the total return for an “average” BBB tranche would be about 10.6%. **Structure can be very effective in protecting against fundamental risk.**

- 3) **Extreme bullish scenario:** We assume that there are zero defaults, and spreads for both assets tighten 20% (from the initial spread). The HY index generates an annual return of 9.9%, relative to 13.5% for the BBB tranche (i.e., package +3.6%). The BBB CLO benefits from more duration and wider starting spreads.

## Exhibit 4: Long "Average" BBB CLO, Short High-Yield Index

## POSITION: Buy BBB CLO Tranche, buy CDX.HY 10

Position	Issue	Price	Spread	Hedge Ratio	Spread / \$s at Risk
Long	BBB CLO Tranche	\$69.23	750 bps		750 bps / \$69.23
Short	CDX.HY 10	\$98.51	539 bps	1.00x	539 bps / \$98.51
Difference					+211 bps / -\$29.28

## TOTAL RETURN PERFORMANCE:

## STRESS TEST: Cumulative defaults spread evenly over a 3-years

Position	Issue	Assumptions for Total Return			Annualized Total Return
		Default	Recovery	Exit Spread	
Long	BBB CLO Tranche	19%	70%	750 bps	10.59%
Short	CDX.HY 10	19%	40%	539 bps	4.37%
Difference					+6.22%

## STRESS TEST: No defaults over a 3-years

Position	Issue	Assumptions for Total Return			Annualized Total Return
		Default	Recovery	Exit Spread	
Long	BBB CLO Tranche	0%	NA	600 bps	13.46%
Short	CDX.HY 10	0%	NA	431 bps	9.89%
Difference					+3.57%

Source: UBS, Bloomberg      Note: As of May 15, 2008  
 Assumed 3-yr LIBOR of 3.49%

## 2008 Institutional Investor Poll

This year's Institutional Investor U.S. Fixed Income Research poll is anticipated to close June 6. In today's challenging environment, the poll means even more than it usually does to street research analysts. We hope you will consider UBS' efforts over the past year when voting.

To vote for a UBS analyst, vote for "UBS" or the analyst by name. If you have not received a ballot from II, please contact [FIRTSurvey@iimagazine.com](mailto:FIRTSurvey@iimagazine.com).

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<b>Douglas Lucas</b>	Collateralized Debt Obligations
<b>Trevor Murray</b>	Commercial MBS
<b>Laurie Goodman</b>	Mortgage Strategy MBS/Adjustable Rate Mortgages MBS/Agency Structured Products MBS/Non-Agency Structured Products MBS/Agency Pass-Throughs MBS/Prepayments
<b>Thomas Zimmerman</b>	ABS/Real Estate Strategy ABS/Prepayments ABS/Other Strategy MBS/Non-Agency Structured Products
<b>Dipa Sharif</b>	ABS/Other Strategy
<b>Rei Shinozuka</b>	ABS/Real Estate Strategy
<b>MaryBeth Fisher</b>	MBS/Adjustable Rate Mortgages MBS/Agency Pass-Throughs
<b>Brian Landy</b>	MBS/Prepayments
<b>Ke Yin</b>	ABS/Prepayments MBS/Non-Agency Structured Products
<b>James Bejjani</b>	MBS/Adjustable Rate Mortgages MBS/Agency Pass-Throughs
<b>Stephen Antczak</b>	High Yield Strategy
<b>David Kim, Kevin McCarthy</b>	Credit Derivatives
<b>George Bory, Kevin McCarthy</b>	Investment Grade Strategy

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