

NAIC Collateralized Loan Obligation (CLO) Stress Tests Methodology

The NAIC Capital Markets Bureau (CMB) and the Structured Securities Group (SSG) performed a series of stress tests on the CLO holdings of insurance companies. There has been a great deal of regulatory interest in leveraged loans and CLOs as the current credit cycle matures. We ran three scenarios – A, B, and C – with increasing conservatism. The goal has been to measure the potential impact of CLO distress on insurance company balance sheets. This memo lists and describes the assumptions used in our scenarios.

We welcome regulatory and industry feedback on this project.

Concern about U.S. insurer holdings of CLOs stems from loosened underwriting on the underlying leveraged loans. The loosening underwriting falls into three areas: 1) covenant-lite; 2) absence of subordination; and 3) weaker earnings before interest, taxes, depreciation, and amortizations (EBITDA) multiples.

Our Stress Thesis is that these developments will result in substantially lower recovery rates on leveraged loans during the next recession. Specifically, we wanted to see how CLOs would perform if the loan recoveries deteriorated from the historical norms to levels comparable with unsecured debt.

Additionally, we wanted to run our recovery stress in both a historical and a moderately stressful default environment.

We endeavored to model all tranches of broadly syndicated loan CLOs held by U.S. insurance companies.

We tried to exclude:

- Commercial real estate (CRE) CLOs – The risk is commercial real estate, and different assumptions are required.
- Re-securitizations, asset-backed securities (ABS) collateralized debt obligations (CDOs) and trust preferred securities (TruPS) CDOs – They are out of scope.
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Base data used was Moody's Annual Default Study published in 2019 (Moody's Study).¹
 We used 10-year cohort data for all cohorts with at least 10 years (1970-2009).
 We calculated an issuer weighted average term structure of default rates for each broad rating category (e.g., Baa, Ba).

- The default data was sorted into a 40 cohort () by 10 tenor () matrixes (M_{rating}) for each broad category. Eg: M_{Baa} , M_{Ba} .
- A 40-element vector (n_{rating}) was also created based on the number of issuers in each cohort (). Eg: n_{Baa} , n_{Ba} , n_B .
- The weighted default vector (d_{rating}) for each category was calculated as follows:

Where i is the cohort and j is the tenor.

The weighted average standard deviation was also calculated in a similar fashion for each tenor.

Where i is the cohort and j is the tenor.

These rating category default rates were scaled by historical ratios (e.g., the ratio of B3 cumulative defaults from Exhibit 44 at year 3 to B defaults from Exhibit 43 is $16.55\% / 12.57\% = 1.32$) to produce rating-specific default vectors.

- This was done to have a longer dataset (starting in 1970 vs. 1983) and to be able to

Certain Ca-C-rating default rates (highlighted in yellow) were adjusted to ensure that marginal defaults rates remained non-negative. We believe that this data artifact was due to scaling so closely to a boundary (100% default).

The NAIC used Moody's Analytics CDOnet to model the CLO waterfalls. CDOnet publishes the underlying portfolio as reported by the trustee. We used the reported collateral and ratings in our analysis as described below.

Historical default rates are reported at the issuer level, while the debt instrument typically has an issue rating,

Some portion of the defaulted amount was recovered as described below.

Exhibit 7 of the Moody's Study was used to model recovery rates. Exhibit 7 provides historical recovery rates for nine categories of corporate debt recoveries from first lien bank loan to junior subordinated bond.

- Please see further discussion of

First, the manager may make poor decisions. Historical performance is indicative but no guarantee of future returns. Additionally, considering the dominant position of CLOs in leveraged loan markets, manager trading choices may be a zero-sum game for the CLO market as a whole.

Second, a manager may affect the performance of the CLO by undermining the operation of the O/C tests. The O/C tests are defined as the total number of assets over the total liabilities (tranches) at a given point in the capital structure. Often, there are a number of O/C tests conventionally beginning below the single-A tranche. The asset side counts performing loans at par, but defaulted loans are counted at the lower of market price and assumed recovery rate.

As the portfolio experiences defaults, the O/C numerator decreases which may cause the O/C test to breach its test level. A breach acts to divert interest and / or principal to purchase additional collateral (increasing the numerator) or to pay down senior liabilities (decreasing the denominator). These tests provide a substantial amount of subordination and are responsible for CLOs' solid performance to date.

However, manager actions can undermine this mechanic through "par trading". During the tech bust of the early 2000's, collateralized bond obligation (CBO) managers purchased deeply discounted, but not yet defaulted assets to bolster their struggling O/C ratios. For example, a bond purchased at a \$0.50 price which has not yet technically defaulted, would double the impact on the numerator of the O/C ratio. Of course, the bond was trading at a discount for a reason and would quickly default.

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