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Collateralized Loan Obligation (CLO) Stress Testing the U.S. Insurers Year-End 2020 Exposure

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Similar to year-end 2019, the Stress Thesis for the NAIC Capital Markets Bureau (CMB) and Structured Securities Group (SSG) remains that the consequences of less stringent underwriting on the underlying bank loan collateral will result in substantially lower recovery rates during the next recession.

- o Since the uncertainties associated with the COVID-19 pandemic have subsided and the potential impacts ere addressed in the NAIC CMB and SSG s pA   N   A

Default Rates

The NAIC SSG and CMB used Mood s Anal tics CDOnet to model the CLO aterfalls CDOnet publishes the underlying bank loan portfolios, and the NAIC SSG and CMB used the reported collateral and ratings in the stress testing analysis. Base default rate data was obtained from Mood s Annual Default Stud published in 2021 Mood s Stud [1] The stress tests used 10-year cohort data for all cohorts with at least 10 years (1970 2011), and an issuer-weighted average term structure of default rates was calculated for each broad rating category (e.g., Baa, Ba, etc.). In addition, a weighted average standard deviation ( ) was calculated for each tenor.

Two of the original default scenarios were retained for the stress tests: Historical and Historical . For Scenarios A, B, and C, rating category default rates were scaled by historical ratios to produce rating-specific default vectors as shown in Table 2 and Table 3.

Certain Ca-C default rates (as highlighted in yellow in Table 2 and Table 3) were adjusted to ensure marginal defaults r3653o ensure

Recovery Rates

Unlike the default rates, recovery rates have remained unchanged since the YE2018 stress testing. Recovery rate data was obtained from Exhibit of the Mood s Stud hich pro ides historical reco er rates for nine categories of corporate debt recoveries, ranging from first lien bank loans down to junior subordinated bonds. A portion of the defaulted amount of underlying bank loan collateral was modeled to recover at a set of recovery rate assumptions. The NAIC Stress Thesis expects the underlying bank loans to perform similar to unsecured debt in the next market downturn; other asset types in the portfolio were assumed to perform similar to their next worse category; i.e., the stepdo n scenario

CDOnet labels the underlying collateral as senior secured bank loan, second lien bank loan, and senior unsecured bond We also added an Other categor for an debt not co ered b the three aforementioned categories (see Table 4).

Since the bulk of CLO collateral are classified as senior secured loans, the assumed recovery rate was reduced from 64% to 40% in the stepdown scenario. Recoveries were assumed to occur six months after default.

Three scenarios were run: A, B, and C with varying default and recovery rate assumptions, as shown in Table 5.

	Historical	Historical
B	Historical	Stepdown
C	Historical	Stepdown

What Was Not Modeled

Correlations were not explicitly modeled, as each CLO has a unique underlying portfolio, which can be diversified across several issuers and industries, and advanced correlation analysis is beyond the scope of this project.

CLO managers were also not factored into the stress testing, given the difficulty of this task. There are limited purchases and sales permitted after the reinvestment period; and while CLO managers intend to improve the credit quality of the portfolio, sometimes they do not. Historical performance is indicative, but no a guarantee of future returns, and given the dominant position of CLOs in the leveraged bank loan market, CLO manager trading decisions may be a   zero-sum game   for the CLO market in general.

At the deal level, more than 1,700 unique transactions were analyzed, totaling about $827.9 billion par value. Our analysis of the U.S. insurance industry's total CLO exposure resulted in four categories for the purposes of this report, as shown in Table 6.

Mapped and Modeled "Normal"	Security mapped and modeled; pays normal principal and interest.	$117.07	$140.92
Mapped and Modeled "Atypical"	Security mapped and modeled; atypical promises: primarily equity and Combo Notes.	$1.38	$1.28
Out of Scope	Security can be modeled but is out of scope of our current project.	$18.90	$26.19
Need Information	More information is needed; includes CLO tickers and Combo Notes.	$19.53	$24.52

Mapped and Modeled

We were able to model $142.2 billion of U.S. insurers' year-end 2020 CLO exposure (an increase from $119 billion at year-end 2019), which was separated into two categories: Normal and Atypical. There were $140.9 billion of Normal tranches, which pay regular promises of principal and interest, and $1.3 billion of Atypical tranches. Atypical tranches have unusual payment promises, and they consist of mostly equity and Combo Note tranches.

Mapped and Modeled   Normal

The exposure to modeled Normal tranches increased by about 20% to $140.9 billion at year-end 2020 from $117.1 billion at year-end 2019. Our analysis showed that the highest-rated Normal tranches that suffered losses were rated single A in our most conservative Scenario C. However, the loss was limited to a single bond and does not necessarily indicate weakness in the structure and quality of CLOs overall.

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[2] The NAIC SSG and CMB recently revised YE2019 CLO Exposure from $158.4 billion to $156.9 billion as a result of the availability of a more granular review. Accordingly, YE2019 CLO exposure by category (Total $bil BACV 2019) was updated reflecting the revised YE2019 CLO Exposure.

Table 7 shows the losses by broad rating category, where only missed principal payments were counted as losses.

During periods of credit stress, some mezzanine tranches may not receive interest payments if a senior overcollateralization (O/C) test was triggered. This would not constitute a default; rat/F1nts i

31	-	-	-
103	26.6%	26.6%	26.6%
126	18.6%	19.8%	20.0%
21	0.0%	14.9%	86.5%
998	77.9%	79.0%	80.8%

Similar to prior stress testing, we found that the risk on rated Combo Notes is not comparable with similarly rated Normal tranches. Rated Atypical tranches are particularly concerning, as they are susceptible to high losses in stress scenarios; however, they are concentrated in only a few companies. Additionally, about 86% of the exposure to Atypical tranches is with large insurers; i.e., insurers with total cash and invested assets of more than $5 billion. Small insurers, those with total cash and invested assets of less than $500 million, accounted for less than 1% of exposure to Atypical tranches.

Out of Scope

Tranches that were deemed "Out of Scope" for this project totaled $26.2 billion, as shown in Table 10. This represents an increase from $19 billion at year-end 2019 and was driven by the middle market CLO category.

Collateralized Bond Obligations	Transactions classified as backed primarily by bonds - likely to include in the future.	$2.80	$5.53
Middle Market CLO	Transactions backed by Middle market companies, with little available data. Will seek to find a data source for analysis.	$14.80	$19.30
Other	Misc. categories, including resecuritizations and preferred stock.	$1.40	$1.37

Middle market CLOs are backed by loans to small and medium-sized companies. These loans have less publicly available information and may have materially different performance. For example, middle market loans have less liquidity, which may have a negative impact on recovery rates. Nevertheless, we continue seeking a data source that will allow us to analyze these CLOs.

Need Information

CLO tranches for which we need information for stress testing increased by about 17% to $24.5 billion at year-end 2020 from $21 billion at year-end 2019. This follows a 40% increase from $15.1 billion at year-end 2018. These tranches include those for which we do not have a CLO model available from our vendor,

are a Combo Note where the underlying CLO is modeled but terms and conditions of the transaction are unknown, or the insurer identified the investment as a CLO but did not identify the relevant tranche.

The stress test analysis found that 946 U.S. insurers, with surplus of about $928.5 billion held some amount of CLO tranches modeled. Similar to last year's stress testing results, we found that the losses on insurers' CLO investments that were modeled, even in the stressed scenarios, were highly concentrated.

To understand the impact of potential losses on insurers, principal loss (compare with Table 7) for Scenarios A, B, and C was divided by each insurer's year-end 2020 total surplus. For each scenario, the principal loss as a percentage of total surplus for each of the 946 insurers was sorted from highest to lowest, and then the insurer with the largest percentage loss was referenced as "Insurer 1," the insurer with the second largest percentage loss was referenced as "Insurer 2" and so on until the smallest percentage loss, which was referenced as "Insurer 946" (x-axis). Please note the difference in the scale of the y-axis in Charts 1, 2, and 3.

Chart 1 shows the distribution of losses as a percentage of surplus for December's Scenario A. Although the bulk of insurers show no losses, 33 of the 946 insurers experienced losses in this scenario. Intuitively, the losses were derived primarily from CCC-3(, t)-3(h)3(e)9(lo)-5(s)11(ses)6(we)-3(r)12(e)7(d)3(eriv)-3(ed pr)
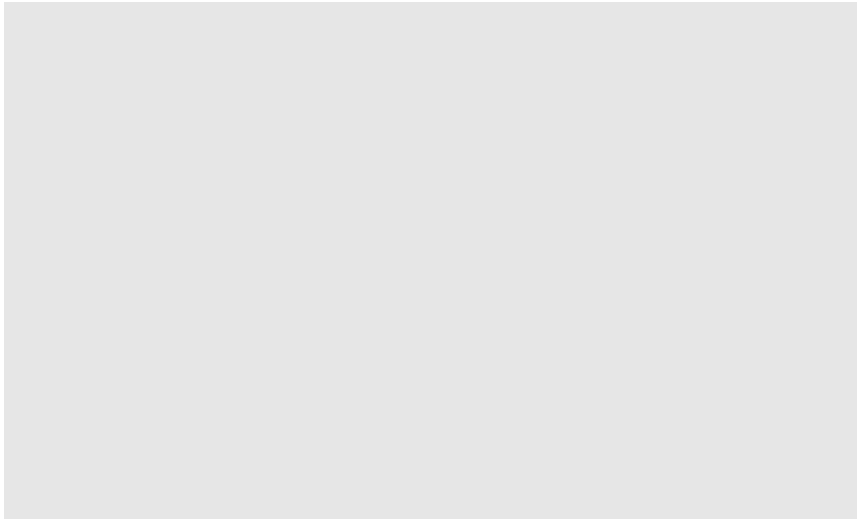
Chart 3 shows the distribution of losses as a percentage of surplus under Scenario C, the most

conservative scenario. The number of insurers experienc...

Chart 4 shows the "Need Information" CLO tranches as a percentage of surplus. Note, since these tranches are not modeled, the chart does not represent loss as a percentage of surplus but rather CLO exposure as a percentage of surplus. About 441 insurers, representing about $799.2 billion of surplus, hold CLO tranches categori ed as Need Information   As a group CLO tranches that Need Information represent 3.1% of surplus. However, to the extent that these are Atypical tranches and perform similarly to those we modeled, they can have an impact on solvency.

Four insurers have CLO exposures greater than 100% of