

An introduction to CLOs

June 2021

AUTHORS

Luke Lu

Yield Book Mortgage Research
an.lu@lseg.com

Elizabeth Han

Refinitiv LPC
elizabeth.han@refinitiv.com

Hugo Pereira

Refinitiv LPC
hugo.pereira@refinitiv.com

Overview

A Collateralized Loan Obligation (CLO) is a structured securitization that provides financing to non-investment grade companies and caters to debt investors with varying credit risk appetites. In this paper, we explore the key features of a CLO, including the underlying leveraged loan portfolio, deal structural protections, and the role of a CLO manager. The market performance of CLOs has been resilient through economic downturns including the COVID pandemic.

Contents

Executive summary	3
Leveraged loans	4
What is a CLO?	7
CLO life cycle	8
Deal structure	10
Tests, triggers, and concentration limits	11
Role of the CLO manager	11
Investment in CLOs	13
Performance through COVID	14
Conclusion	19
Glossary	20

Executive summary

Leveraged loans, issued by non-investment grade companies, are typically senior secured, floating rate, and callable. They are generally issued through bank syndication desks, and traded in a secondary market.

A Collateralized Loan Obligation (CLO) is a funding vehicle that buys a portfolio of diversified leveraged loans as assets and issues a series of debt obligations, including debt tranches, at various credit ratings and an unrated equity tranche.

CLOs have sophisticated deal structures with robust credit enhancement and risk protection for investors through specially designed performance tests and triggers.

Deals usually start with a warehouse and ramp-up period where the asset portfolio is built up, followed by a reinvestment period where asset managers can trade in and out loans and reinvest prepaid principal proceeds. There is a non-call period at the early part of the reinvestment period, during which equity holders cannot call the deal. An amortization period follows the reinvestment period.

CLO managers play an important role in mitigating risk and enhancing the value of the asset portfolio by actively trading the loans during the reinvestment period.

CLOs have proven to be a resilient and mature product, and have weathered recent severe economic downturns relatively unscathed thanks to its self-curing structure and active management.

Leveraged loans

Leveraged loans are issued by companies with high debt levels and rated below investment grade. They are usually floating rate (with Libor¹ as index), senior secured, and rated at or below Ba1/BB+. Borrowers work with the arranging banks to underwrite and syndicate the loan. After issuance, loans can be traded in the secondary market.

Leveraged loans usually have a five- to seven-year tenor, with soft call protection for six months and can be called at par without penalty at any time outside the non-call period. Issuers may call loans when the loan issuer wants to retire the debt, or when loan spreads tighten and secondary prices exceed par due to a catalyst such as a rating upgrade or a reduction in the Debt / EBITDA ratio.

There is an active secondary market for leveraged loans. The loan prices reflect credit and liquidity risk, and are impacted by market conditions. They rarely trade significantly above par due to the callability feature.

In the U.S., it is common for loans to have Libor floors that range from 50bp to 100bp. When Libor is below the floor, the issuer pays the floor plus the spread. When Libor rates were high pre-2020, floors were less relevant and the majority of loans were done without floors. As rates fell rapidly following COVID, floors staged a strong comeback. So far in 2021, about 77% of first lien institutional loans have a floor from >0 to 75bp, 8% have a floor of 100bp, and only 15% have no floors.

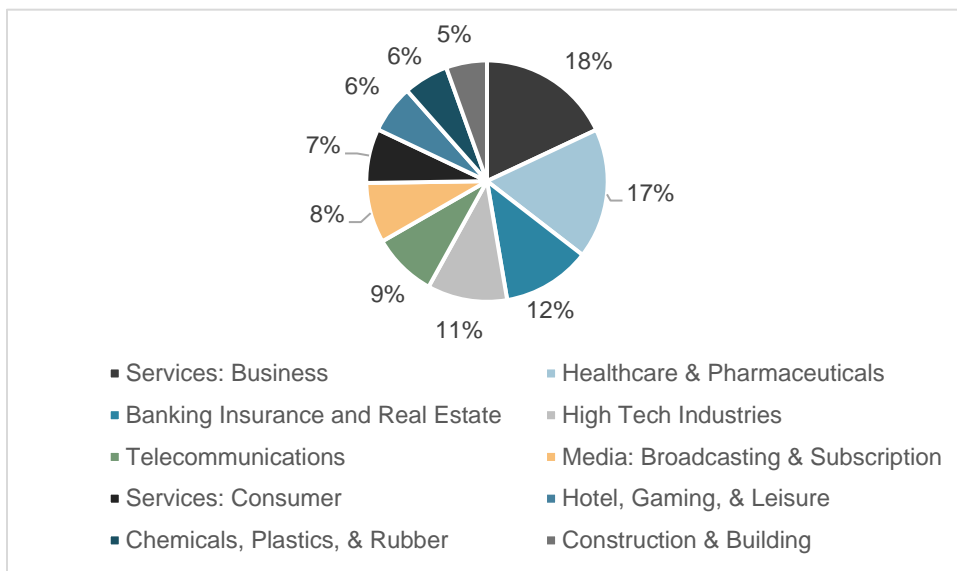
Many issuers are owned by private equity firms who are sponsors of the leveraged loans. Lenders look at the track record of sponsors in evaluating the riskiness of the loan. Sponsors can use the proceeds of a leverage loan in various ways, including a leveraged buyout of the company, supporting merger and acquisition (M&A), recapitalizing their balance sheet, refinancing existing debt, or obtaining additional funding.

One of the benefits of investing in CLOs is diversification. Each CLO can include more than 500 leveraged loans in its underlying asset portfolio. As many as 35 industries are represented in CLO loans, with the top 10 industries making up 65% of the universe. As demonstrated in Exhibit 1, Business Services, Healthcare, Banking, and High Tech are top industries with a double digit percentage allocation.

Lenders assess the credit risk of the loan when evaluating its spread and yield. Ratings, loan seniority in issuer's capital structure, industry trends, and a sponsor's track record are among many factors lenders look at when assessing the credit risk.

¹ Libor based originations are expected to end at the end of 2021, and outstanding legacy contracts have until June 30, 2023 to transition to a replacement rate.

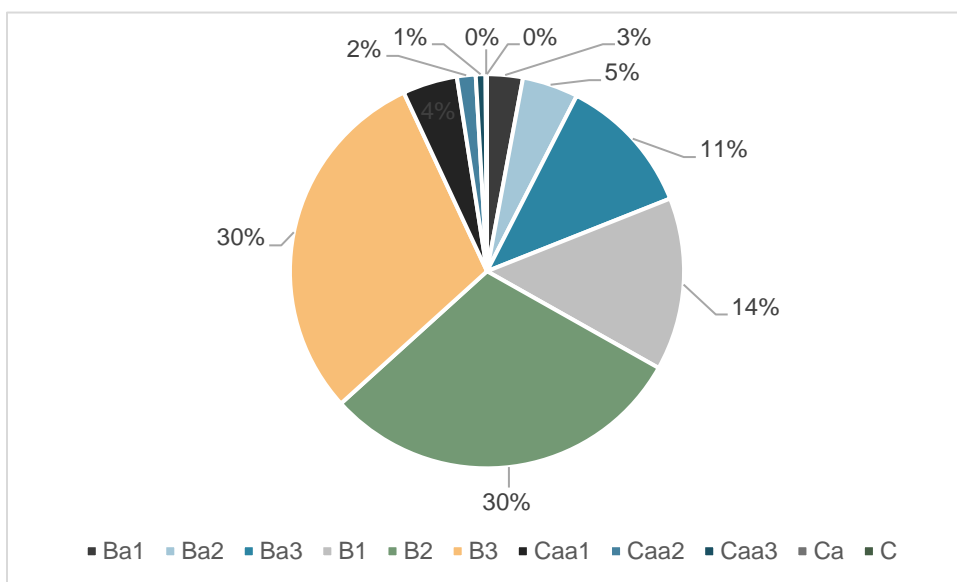
Exhibit 1 – U.S. Leveraged Loan Industry Distribution (Moody’s)



Source: Yield Book, Trepp (May 2021).

Investors also benefit from coverage from the major credit rating agencies. Exhibit 2 shows Moody’s rating distribution of CLO loans. B2 and B3 are the most common ratings. In aggregate they account for 60% of the universe.

Exhibit 2 – US Leveraged Loan Rating Distribution (Moody’s)



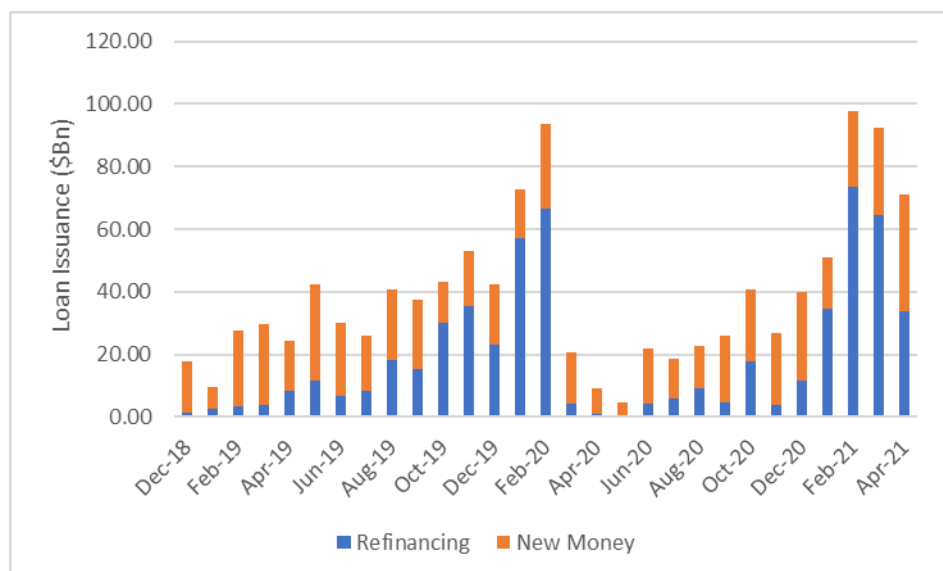
Source: Yield Book, Trepp (May 2021).

The total outstanding balance of U.S. leveraged institutional loans is approximately \$1.23 trillion. Exhibit 3 shows historical leveraged loan issuance in recent years. New issuance for 2020 totaled \$212 billion, while refinancing activity was \$186 billion. Issuance volume for 2021 has been very strong in the

Rating agencies actively monitor the credit risk of loans in CLO collateral to ensure the rating is still valid. There was a large amount of downgrade activity in the wake of the COVID pandemic in 2020.

first four months, with \$106 billion of new issue volume and \$207 billion of refinancing activity.

Exhibit 3 – US Leveraged Loan Issuance



Source: Refinitiv LPC (May 2021).

The majority of leveraged loans are first lien senior secured. Exhibit 4 shows some key loan metrics by lien types. Second lien loans have significantly higher spreads and lower secondary average bids, with about half rated Caa2.

Exhibit 4 – US Leveraged Loan Metrics

Lien	Pct of Universe	Spread (bps)	Mkt Price	Top 1 - Industry	Top 1 - Rating
First Lien	98%	365	98	12% - High Tech	32% - B2
Second Lien	2%	747	94	20% - High Tech	54% - Caa2

Source: Refinitiv LPC, S&P/LSTA Leveraged Loan Index (June 2021).

Leveraged loans usually have contract terms (called covenants), which are designed to protect lenders and require loan issuers to meet certain financial tests or maintain certain operational and financial performance standards. In a benign credit environment, some loans are made more borrower-friendly with less restrictive covenants, and they are referred to as covenant-lite (“cov-lite”) loans. Cov-lite loans can become more levered, which may lead to lower recoveries in the event of a default. Cov-lite loans have gained popularity since 2014 and make up 70-80% of leveraged institutional loan issuance.

Second lien and cov-lite loans have higher inherent credit risk.

CLOs have been a major source of demand for leveraged loans, holding over 50% of the market. In addition, CLOs also play an important role in the liquidity of the leveraged loan secondary market.

What is a CLO?

A Collateralized Loan Obligation (CLO) is a funding vehicle that buys leveraged loans as assets and issues rated debt tranches and an unrated equity tranche.

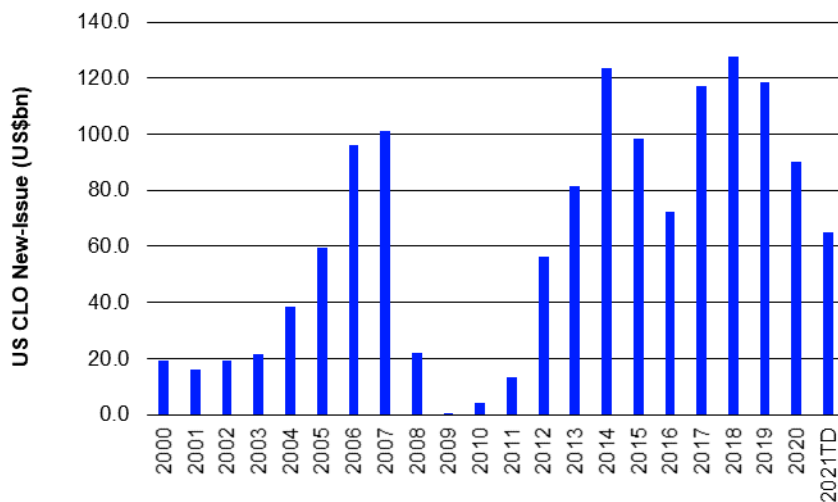
CLOs have a highly diversified loan portfolio. It is common to have more than 400 unique loan issuers across 15-25 industries. The portfolio needs to maintain certain metrics, which include tests on portfolio diversity, weighted average spreads (WAS) and weighted average rating factors (WARF), etc.

CLO portfolios can be static, wherein the assets that make up the CLO remain largely unchanged. These are usually created for the purposes of balance sheet management and are referred to as balance sheet CLOs. Or the portfolios can be dynamic, where the assets are actively managed and profit is created in the arbitrage between a CLO's portfolio assets and the cost of servicing its debt—these are called market-arbitrage CLOs. This paper will focus on market-arbitrage CLOs, the predominant structure.

CLO portfolio can be static or dynamic. The latter is the most common, known as market-arbitrage CLOs.

Exhibit 5 shows annual new issuance of U.S. CLOs since 2000. New issuance for 2020 amounted to \$90 billion (down 24% from 2019) due to COVID related market disruption. Issuance in 2021 has been very robust with \$65 billion in the first five months of the year. Post the great financial crisis (GFC), the U.S. CLO market has grown significantly with total outstanding assets-under-management surpassing \$782 billion.

Exhibit 5 – US CLO New Issue Volume



Source: Refinitiv LPC (May 2021).

There are two types of CLOs that are backed by leveraged loans – Broadly Syndicated CLOs (BSL) which is by far the most common CLO type, and Middle Market CLOs (MM), which include loans to smaller companies.

Middle Market loans typically have small-to-medium size (less than \$150 million) and issuer EBITDA of less than \$50 million. MM CLOs have much higher WAS and funding costs due to smaller issuers and a liquidity premium.

Unlike BSL CLO loans, MM loans are illiquid and don't have good price discovery.

In BSL CLOs, managers buy already issued corporate loans in the primary and secondary markets. On the other hand, MM CLOs typically source loans directly through the private credit market and a manager can be the originator of the loans.

Since MM loans are less liquid, smaller and largely unrated, investing in deals with good metrics at the time of origination and managers with a strong track record are very important.

As most CLO deals are BSL deals, we will focus on BSL CLOs in the rest of this paper.

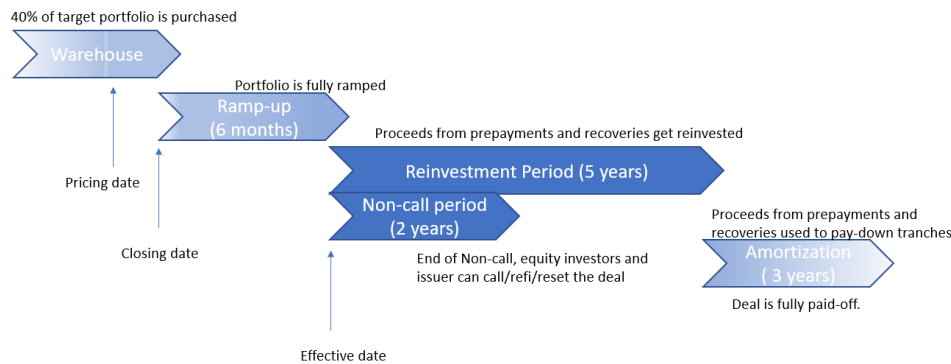
Post-GFC, CLOs changed significantly with increased credit enhancement for subordinate tranches and more restrictive indentures. The new deals post-GFC are generally called CLO 2.0. In response to regulation (Volcker rule and risk retention) some participants in the CLO market refer to deals issued after 2014 as CLO 3.0.

CLO life cycle

Exhibit 6 is the life cycle of a typical CLO deal, which has a 5-year reinvestment period (with the first two years as a non-call period) followed by a 3-year amortization period.

Deals usually start with a warehouse and a ramp-up period where the asset portfolio is built up to a target par balance, followed by a reinvestment period, which is one of the unique aspects of a CLO.

Exhibit 6 – CLO Deal Life Cycle



CLOs have many stages in their life cycles with the unique feature of a reinvestment period, followed by amortization.

Source: Yield Book (May 2021).

CLOs are actively managed vehicles. During the reinvestment period, the CLO manager actively manages the portfolio, e.g., buys/sells loans, and principal proceeds generated by assets (prepayments and recoveries) are used for reinvestment (i.e., manager buys new assets).

The non-call period, during which deals cannot be called, coincides with the first part of the reinvestment period. Equity investors with the approval of the CLO manager can decide to call the deal once the non-call period ends.

There are various reasons for an equity investor to call the deal. A common one is to refinance debt tranches, i.e., pay debt holders in full and reissue debt at a lower spread. Refinancing tranches enable the deal to reduce funding costs. If credit spreads tighten, the deal can take advantage of this and improve equity returns, however this comes at the cost of debt holders.

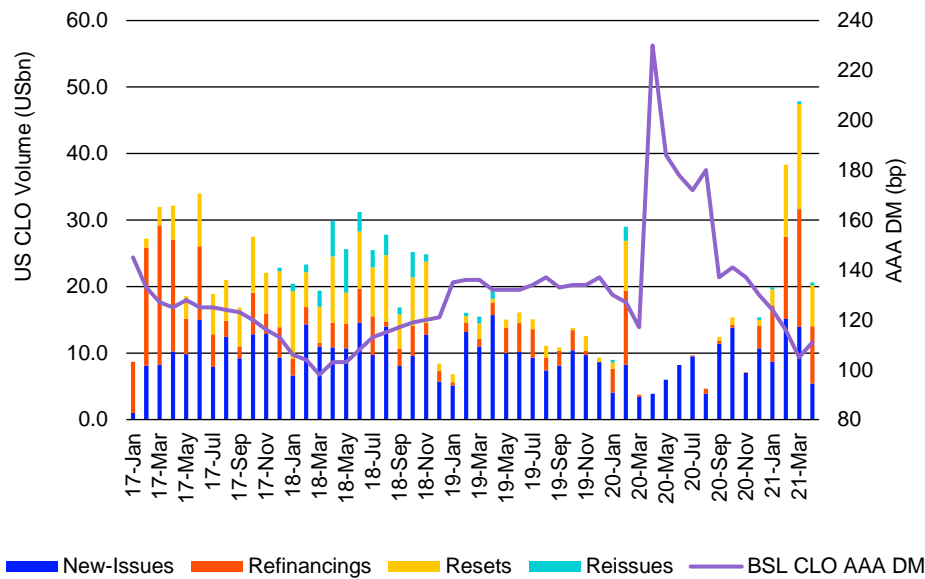
A refinancing can be for specific debt tranches, while a reset involves all the debt tranches. Managers can also reset a deal to extend the reinvestment period and lengthen the fee stream. The life of the deal can be extended multiple times before the SPV completely winds down.

Some deals have restrictions in the number of times a deal can be reset. When a deal reaches that limit, or when the structure needs to be changed significantly, equity holders can instead liquidate the asset portfolio and reissue a new deal. As the name implies, reissuing requires issuing the deal again i.e., setting up a new SPV.

CLO refinancing/reset volume jumped in the first few months of 2021 as the market rallied and equity holders/managers looked to lower capital costs (Exhibit 7).

CLO Deals have a non-call period after which equity investors have the right to redeem. Refinancing tranches, resetting the deal, and reissuing the deal are three ways to redeem.

Exhibit 7 – Monthly US CLO Issuance (New Issue/Refi/Reset/Reissue) vs. AAA Discount Margin (January 2017 – April 2021)



Source: Refinitiv LPC (May 2021).

Assuming the deal is not called, the amortization period starts after the reinvestment period ends. Proceeds from prepayments and recoveries are used to pay down tranches that start to amortize based on the order of their seniority in the structure. Some portion of principal proceeds can potentially still be reinvested if the deal language allows it and the manager is in compliance with

maintenance tests, with the remainder of principal proceeds used to pay down the tranches.

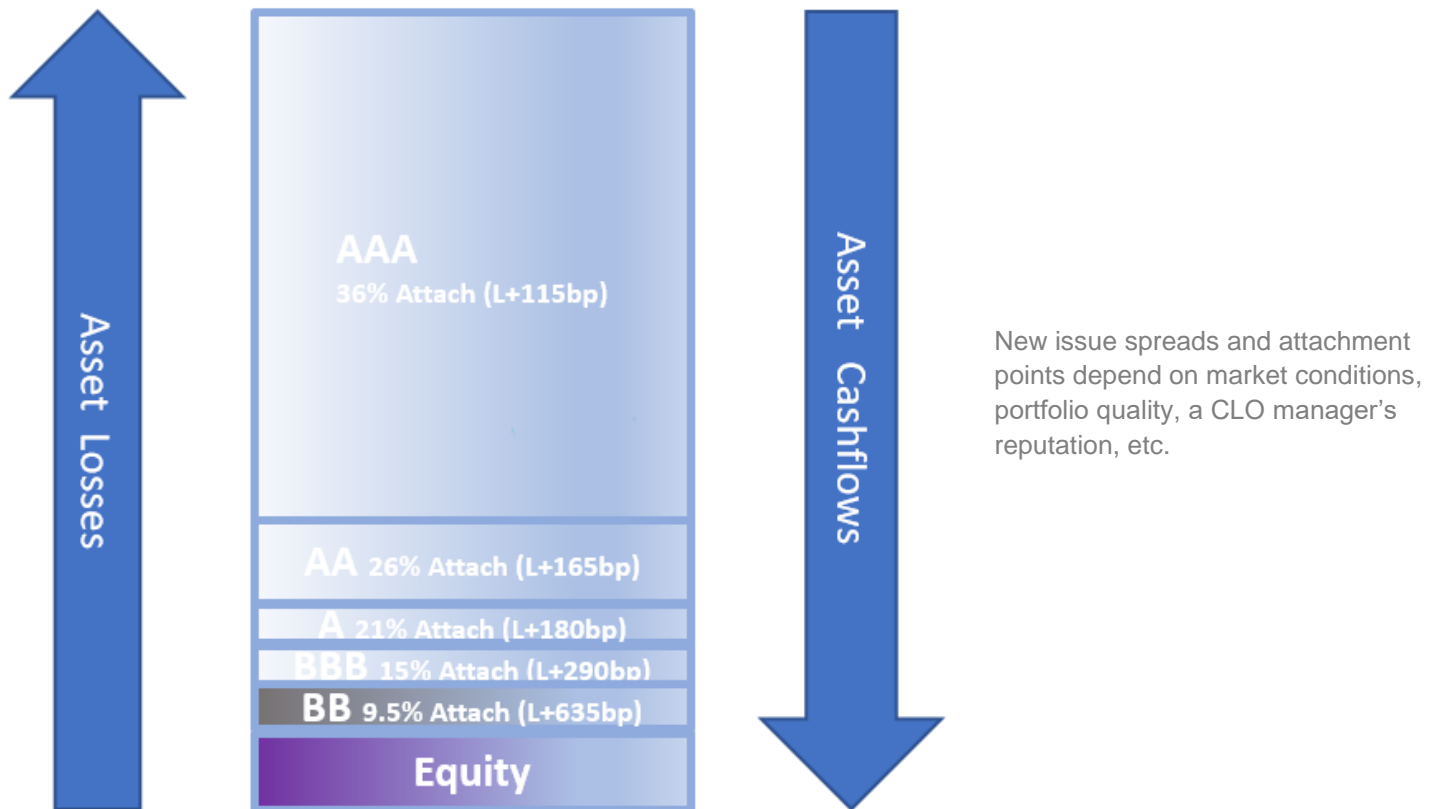
Deal structure

Exhibit 8 shows a generic CLO deal structure. CLOs issue floating-rate debt tranches, rated AAA through BB (sometimes B). Naturally, lower credit ratings correspond to lower credit enhancement levels (or attachment points) and wider spreads (to compensate for higher risk). The non-rated Equity tranche sits at the bottom of the capital stack.

In general, asset cash flows are paid to the CLO debt tranches from the top down (AAA to BB) and asset losses accrue from the bottom up (Equity to AAA). Cash flows are adjusted by trigger fail/pass of specific performance tests at each tranche.

Like other structured products, CLOs benefit from funding arbitrage (asset interest – liability cost). Asset portfolio's interest income typically exceeds debt tranches' interest (and management fees), and the excess interest goes to the Equity tranche which has high structural leverage (Debt Balance / Equity Balance = 10-11x) and can achieve cashflow yields of 15-20%.

Exhibit 8 – A Typical CLO Deal Structure



Source: Yield Book (May 2021). Tranche spreads and credit enhancement levels are for illustrative purpose only.

Tests, triggers, and concentration limits

CLO performance tests and associated triggers are designed to reduce the risk to senior tranches in the event of collateral underperformance (higher rate of downgrades/defaults).

CLOs generally have two main performance tests for debt tranches:

- Overcollateralization Ratio (OC) = Par amount of asset portfolio / Balance of debt tranches equally or senior to a given debt tranche
- Interest Coverage Ratio (IC) = Interest paid by the asset portfolio / Interest payable on debt tranches equally or senior to a given debt tranche

When an OC test is breached, coupon payments to junior tranches (relative to the given debt tranche of OC test) are withheld and redirected to pay down the principal of senior tranches so that the OC test can be cured. If junior tranches miss their coupon payments due to an OC test breach, the missed coupon amounts can sometimes be added back to the balance of the tranches via PIK (payment-in-kind).

When an IC test breaches its trigger, the cashflow waterfall follows the same mechanism as described above to reduce the senior debt tranche balance until the test cures.

For OC tests, there are some par value haircuts applied to adjust the varying levels of risk in the collateral. One is a CCC concentration test. Typically, CLOs have a limit (e.g., 7.5%) that determines the percentage of the portfolio that can be rated CCC or below. If the CCC bucket of the CLO goes above this limit, loans rated CCC or below are sorted by price in descending order, and any balance beyond the CCC limit is calculated at market price or at an assumed recovery instead of par.

Another haircut applied to the OC ratios comes from deeply discounted assets. If an asset is purchased at a deep discount (<\$80), it is recorded at the purchase price until it trades above \$80 for a period of time.

In addition, defaulted assets are recorded at the lower of the market price or assumed recovery for the OC calculation.

There are collateral quality tests that a CLO manager needs to monitor such as WAS, WARF, Weighted Average Life (WAL), and Diversity Score. These tests can limit a manager's trading by requiring the transaction maintain or improve the test.

Finally, concentration tests place certain limits specified in the deal documents that the manager needs to be compliant with. These limits include the percentage of second lien, percentage of cov-lite, percentage of single issuer, and percentage of same industry, etc.

Performance tests and triggers are key CLO structural protection features, making the CLO deal structure self-curing.

Lower quality assets, such as loans with CCC rating or deeply discounted price, are penalized in OC ratio calculation.

Role of the CLO manager

The CLO manager has a very important role in the performance of the portfolio, and refers to the investment firm/team which is responsible for many aspects of the deal, e.g., loan selection, trading decisions, deal structuring, compliance to tests/limits, and asset surveillance.

A manager's responsibility varies during different stages of the deal. As discussed earlier, a manager builds a portfolio to reach the initial target par balance during the ramp-up period. During the reinvestment period, a manager can trade in and out of loans and replace prepayment with new loans, ensuring the CLO passes maintenance tests and new loans are compliant with the deal documentation.

Because the underlying loans have an active secondary market, a manager can take advantage of loan price volatility to make trading gains. As an example, a manager can find value and buy a discounted loan in the secondary market, creating portfolio par, and sell close to par after a reduction in the perceived risk of the loan and/or a rating upgrade. Similarly, a manager can add significant value by avoiding problematic industries through underweighting, e.g. energy in 2016, or transportation during COVID.

In return for their services, managers are paid a senior management fee (usually 25bps), subordinate management fee (usually 15bps), and an incentive fee (based on equity tranche returns).

Managers need to balance risk/reward in managing the portfolio. For example, the equity investor may benefit from excess spread with riskier loans that other debt holders try to avoid. If a manager takes excessive risk on the asset side, there can be negative consequences including write-down or lower liquidity of the equity/debt tranche, non-compliance to WARF/Diversity tests, and reputational damage.

For CLO investors to understand and evaluate different CLO managers, some important considerations include:

- Portfolio turnover: Is the manager actively trading or running a "buy-and-hold" strategy?
- Credit selection: Does the manager have a robust credit selection process and a proven track record?
- WAS/WARF trade-off: Is the manager running high risk/high reward portfolio or vice versa?
- Facility size: Do the loans in the deal portfolio have a large concentration of small facility sizes, which may warrant higher spreads as compensation for company size risk?
- Portfolio liquidity: Do the loans in the deal portfolio have a highly liquid secondary market?
- Active exposure: Is the manager running a portfolio that is closer to loan indexes or are they taking active exposure and/or concentration risk?
- Specific concentration: Is the manager running a portfolio with a specific concentrated risk bucket (CCC/second liens/first time issuers/industry) to generate excess spread?
- Going concern: Does the manager have strong backing and long-term commitment to the CLO business?

Experienced managers with a strong credit selection skillset and a sound risk framework can add significant value by taking advantage of market volatility.

There are pros and cons of different manager styles, but no "good" or "bad" styles – it all depends on an investor's investment objective and risk/reward appetite.

Investors can use various quantitative and qualitative criteria to evaluate manager style/performance/tiering. Management style is also dynamic and may change based on personnel changes or the investment environment.

Investment in CLOs

CLOs offer unique investment opportunities with compelling relative values. It appeals to a broad investor base across the capital stack (Exhibit 9). In recent years, the CLO investor base has continued to grow as more and more investors come to understand and become comfortable with the product.

Exhibit 9 – Investor Base for CLO Capital Stack

Senior Tranches (AAA/AA)	Mezzanine Tranches (A/BBB/BB)	Equity Tranches
Insurance Companies	Hedge Funds	Private Equity Funds
Banks	Asset Managers	Structured Credit Funds
Pension Funds	Insurance Companies	Hedge Funds
Asset Managers	Banks	CLO Managers

Source: Yield Book, Refinitiv LPC (May 2021).

There are many ways CLO investments are attractive and can be accretive to a fixed-income portfolio.

- Spread pick-up compared to similarly rated tranches.
- Debt tranches have substantial credit support.
- Active management can add significant value if done right, e.g., building par through trading gains thereby increasing credit support.
- Underlying loan portfolios are senior secured loans with historically high recoveries.
- Transparency in CLO assets with public credit ratings and audited financial statements.
- Active secondary market for both collateral loans and debt tranches.
- CLO assets are not subject to mark-to-market, hence they are shielded from market volatility. Managers can take advantage of market volatility without being a forced seller.

The CLO is an attractive investment product offering many unique risk/return opportunities.

Meanwhile, investors should be aware of some risks associated with CLO investments. CLO deal structures are complex relative to some other securitized products. After the non-call period CLO tranches can be called at par (hence there is little price upside unless the tranches are bought at discount prices). The uncertainty around the duration and WAL of the debt tranches can also be a challenge due to deal call optionality and changes in loan prepayment speeds.

Exhibit 10 shows basic investment analytics on a sample CLO deal when running the market standard 20 CPR for prepayment speed, 2 CDR for default rate, and a 60% recovery rate with a no-call scenario. WAL ranges from 3.90 years to 6.95 years for tranches A to E.

Exhibit 10 – Sample CLO Deal Scenario Analytics

Tranche	Rating	Spread	Price	WAL	Mod Dur
A	AAA	L + 132	100	3.90	3.70
B	AA	L + 175	100	5.73	5.21
C	A	L + 250	100	6.30	5.51
D	BBB	L + 435	100	6.69	5.38
E	BB	L + 623	100	6.95	5.14

Source: Yield Book, Trepp (May 2021).

CLO debt investors are paid a premium for the call option they are short. Therefore, AAA tranches of CLOs are generally one of the highest yielding AAA tranches across various securitized products.

Mezzanine tranches benefit from strong credit enhancement levels and are well protected from credit losses in most cases. They also tend to have higher yield compared to other similarly rated credit products.

Equity tranches are one of the most unique investment instruments across the fixed income spectrum as they offer levered exposure to a diversified credit portfolio and can generate double digit returns post loss and fee.

CLOs in general have asset matching liabilities with both being Libor index floaters. When Libor rates are very low, Libor floors boost effective spreads and can increase the cash flow yield for Equity tranche. On the other hand, when Libor is increasing, total returns for debt tranches go up.

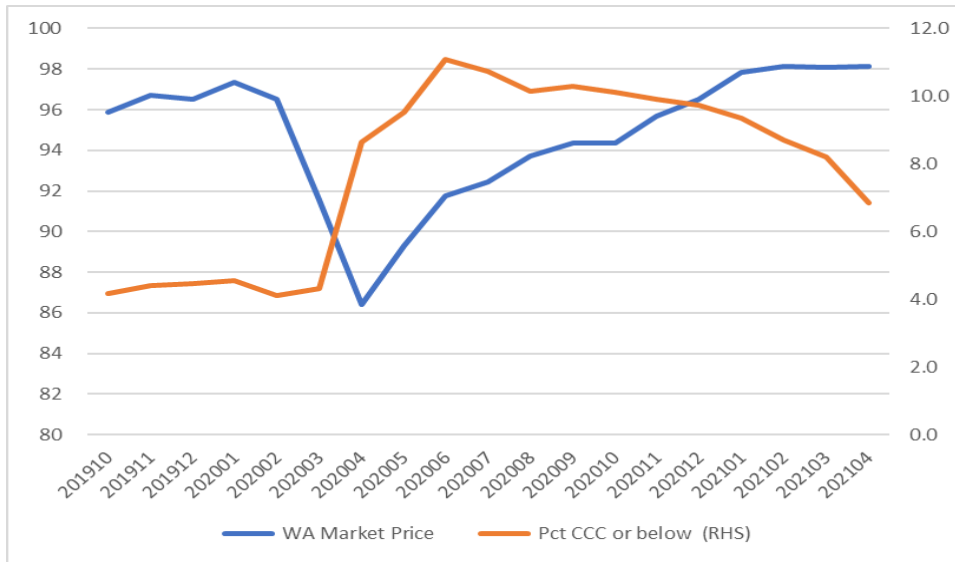
As the underlying risk of the CLO portfolio is corporate credit risk. CLOs can help diversify fixed-income portfolios consisting mostly of other asset-backed securities (consumer and mortgage).

CLO is well positioned for a rising rate environment, and is one of the few scalable floating rate asset classes.

Performance through COVID

Exhibit 11 shows how market prices and the percentage of loans rated CCC or below reacted to lockdowns and ratings downgrades following COVID. Loan prices suffered a steep loss in March 2020. But market liquidity came back quickly amid massive monetary and fiscal stimulus, and loan prices rebounded in April. The CCC percentage jumped from 4% in March to 11% in June amid a downgrade wave. With the vaccines rolling out and economy reopening, loan prices recovered, and CCC exposure also steadily declined as rating agencies updated their projections with more upgrades than downgrades.

Exhibit 11 – U.S. CLO Loan Price and CCC Percentage through COVID



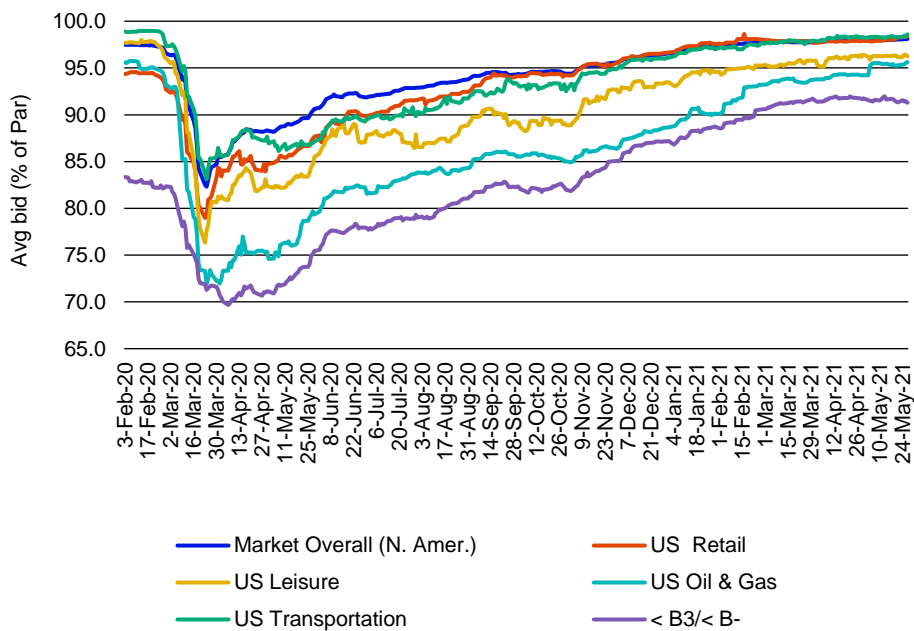
During COVID, market prices seemed to be leading indicator of downgrade and upgrade cycles.

Source: Yield Book, Trepp (May 2021). Past performance is no guarantee of future performance. Please see the end for important legal disclosures.

Exhibit 12 shows loan price movement by industry through the COVID pandemic, covering some of the major COVID impacted industries including Transportation, Retail, Leisure, and Oil & Gas. After the March shock, loan prices across these industries have risen steadily in the last 14 months and reverted back to pre-COVID levels as sector credit fundamentals gradually recovered.

Exhibit 12 – Loan Price (Secondary Average Bids) by Industries through COVID

Sectors battered by COVID have rebounded as market sentiment improves and fundamentals recover.



Source: LSTA-Refinitiv LPC MTM Pricing (May 2021). Past performance is no guarantee of future performance. Please see the end for important legal disclosures.

Another way to show loan price movement is to look at the price distribution over time (Exhibit 13). 34% of loans traded below 80 and 83% traded below 90 in March 2020, vs. only 3% and 5% respectively as of April 2021 (with 14% of loans trading above par).

Exhibit 13 – U.S. CLO Loan Price (Secondary Average Bids) Distribution through COVID

Avg bid	Mar-20	Apr-20	Dec-20	Mar-21	Apr-21
<70	12%	10%	3%	1%	2%
70 to <80	22%	11%	1%	1%	1%
80 to <85	25%	11%	1%	1%	1%
85 to <90	24%	16%	3%	2%	1%
90 to <95	16%	32%	7%	4%	4%
95 to <98	1%	18%	17%	12%	11%
98 to <99	0%	1%	20%	20%	19%
99 to <100	0%	0%	37%	50%	47%
>=100	0%	0%	10%	10%	14%

Source: Refinitiv LPC (May 2021). Past performance is no guarantee of future results. Please see the end for important legal disclosures.

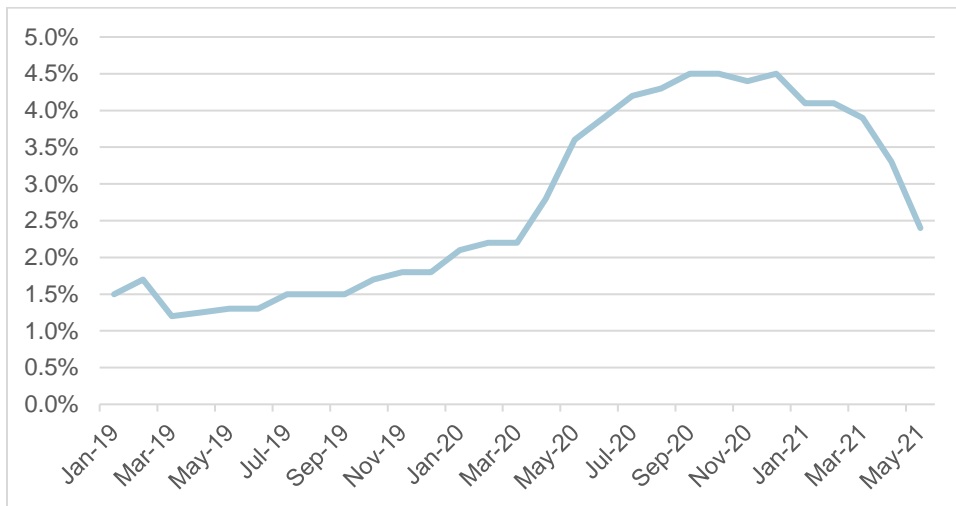
Historically AAA tranches of CLOs never defaulted, and only one AA tranche has ever defaulted. This is primarily due to the high credit enhancement and the risk protection mechanism embedded into the CLO’s performance tests which divert cash flows from junior tranches to pay down senior tranches in the event of deteriorating collateral performance. CLOs are also benefitting from no mark-to-market requirement and hence no forced liquidations due to sharp asset price declines in severe downturns.

Default risk is the likelihood of the issuer defaulting on interest or principal payment. Historically, the loan market experienced close to 2% default rate annually with default rates peaking in 2009 at 8%. Recovery rates typically range between 60-80%.

Looking at the Fitch U.S. Leveraged Loan Default Index (Exhibit 14), we see default rates hovered around 1.5% to 2% in 2019 and early 2020 pre-COVID, before rising rapidly following COVID and peaking at 4.5% in September 2020. Default rates are significantly down from the peak and are at 2.4% as of May 2021.

Default rates have been trending down since peaking in September 2020.

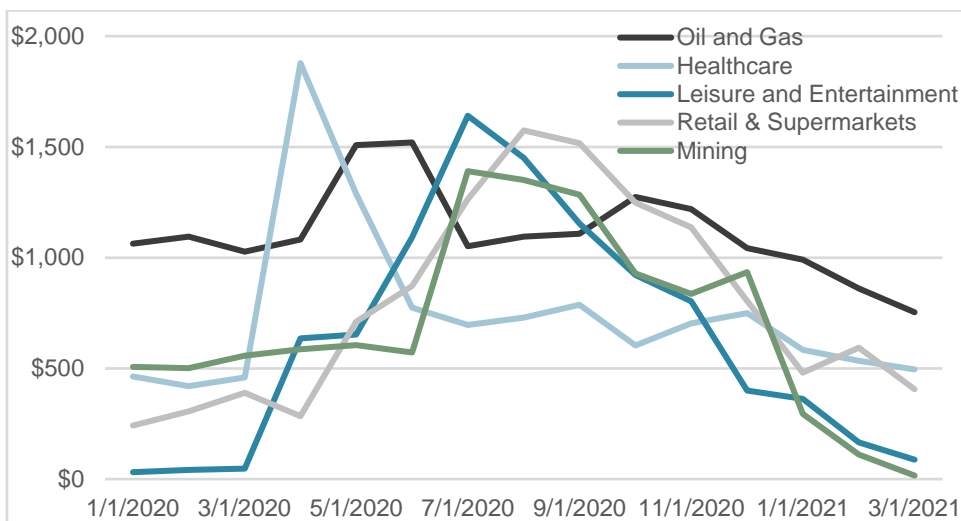
Exhibit 14 – TTM Institutional Leveraged Loan Default Rate



Source: Fitch, Refinitiv LPC (May 2021). Past performance is no guarantee of future performance. Please see the end for important legal disclosures.

Exhibit 15 shows the defaulted balance of selected industries hit by COVID (Healthcare, Oil and Gas, Leisure, Mining, and Retail). Healthcare and Oil & Gas had some early defaults following COVID, followed by Leisure/Mining/Retail which saw defaults peaking in July/August 2020. Default balances have since been declining steadily for all industries.

Exhibit 15 – Balance in Default by Industry – CLO 2.0 (in millions)



For most industries, the recent defaulted balances have declined to pre-COVID levels.

Source: Refinitiv LPC (May 2021). Past performance is no guarantee of future performance. Please see the end for important legal disclosures.

Exhibit 16 shows the distribution of CLO deal portfolios with their respective percentage of loan defaults. Defaults picked up quickly in the few months following COVID in 2020. Recently with liquidation, restructuring, and recovery of business fundamentals, the default percentages have reverted to or even outperformed February 2020 before COVID started.

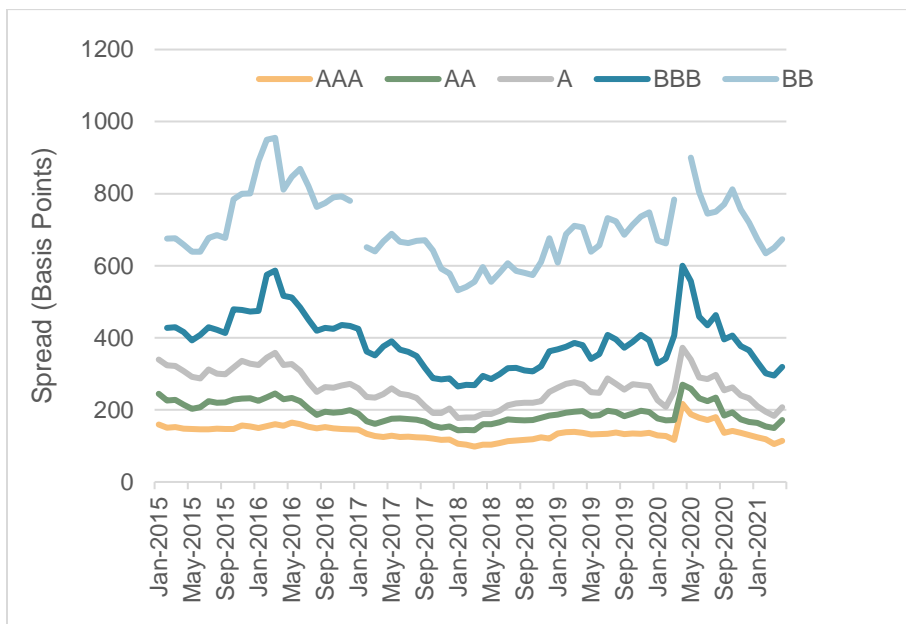
Exhibit 16 – Percent of Deal Balance in Default - Post-GFC CLOs (by % buckets)

% of Assets in Default	Feb-20	Mar-20	Jun-20	Sep-20	Dec-20	Mar-21	Apr-21
0%	40%	38%	17%	16%	26%	48%	53%
<1%	38%	38%	36%	31%	41%	34%	34%
1% to <2%	15%	15%	25%	28%	18%	10%	7%
2% to <3%	4%	4%	11%	12%	6%	3%	2%
3% to <4%	1%	2%	4%	5%	4%	1%	1%
4% to <5%	0%	1%	2%	2%	2%	1%	1%
5% to <10%	1%	1%	3%	3%	2%	1%	1%
10% to <15%	0%	0%	0%	1%	0%	0%	0%
15% to <20%	0%	0%	0%	0%	0%	0%	0%
>=20%	1%	1%	1%	1%	1%	1%	1%

Source: Refinitiv LPC (May 2021). Past performance is not guarantee of future results. Please see the end for important legal disclosures.

Exhibit 17 shows historical average new issue spreads for U.S. CLO tranches across all ratings since 2015. After peaking in April or May 2020, spreads have steadily tightened back to pre-COVID levels.

Exhibit 17 – Historical U.S. BSL CLO New Issue Tranche Spreads (2015-2021)

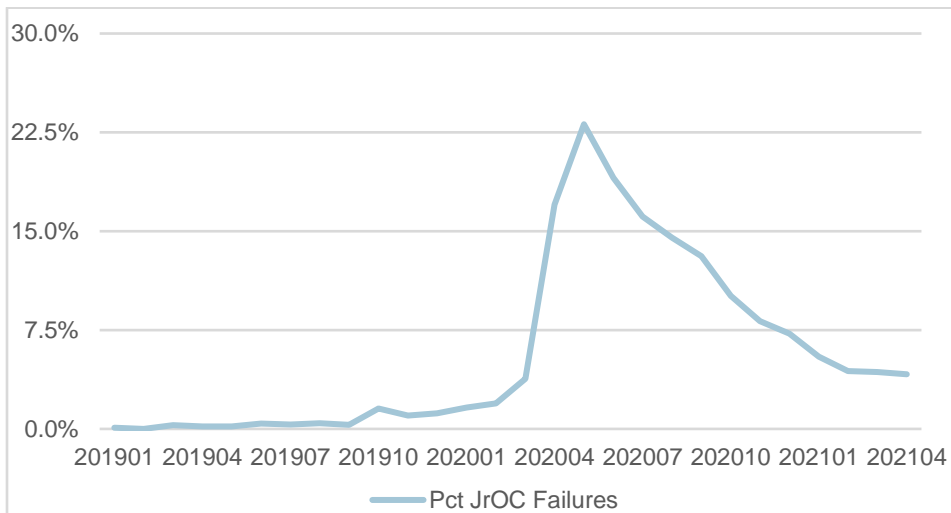


New issue primary market, similar to secondary trading market, has been very resilient through COVID with good liquidity.

Source: Refinitiv LPC (May 2021). Past performance is no guarantee of future performance. Please see the end for important legal disclosures.

The percentage of Junior OC failure paints another picture of how the market selloff and subsequent recovery have impacted the performance of CLO deals (Exhibit 18). Junior OC failure jumped from 4% in March 2020 to 23% in May 2020, before reverting back to 4% in April 2021.

Exhibit 18 – Percentage of Junior OC Failure (2019-2021)



Source: Yield Book, Trepp (May 2021). Past performance is no guarantee of future results. Please see the end for important legal disclosures.

Conclusion

In this paper, we discussed key features of leveraged loans and CLOs.

CLOs are a major financing source to the leveraged loan market. By investing in CLOs, investors get access to a diversified non-investment grade corporate credit portfolio.

While CLOs are not part of major fixed income indexes, the market has grown to be a key and unique securitized product asset class with strong historical performance and market liquidity. In particular, CLO floating rate notes appear to be very well positioned for a rising rate environment.

CLOs have proved to be resilient through economic downturns due to fundamental strength of leveraged loans, robust structural protection with credit enhancement and performance tests, and active management by CLO managers to mitigate portfolio risk.

Glossary

Non-call period end date: Date when equity holders can redeem the deal. The non-call period is generally two years but can range from one to three years.

Reinvestment period end date: Date when reinvestment ends, and deal starts to amortize. The reinvestment period ranges from three to five years.

Par build: Realized trading gain/loss and unrealized paper gain/loss based on the level loans are purchased at versus where they are trading (Price Adjusted Par Build) or par (Nominal Par Build). Positive par build can offset some of the losses generated by defaults. However, depending on market conditions and manager performance, par build can be also negative (par loss, par destruction).

WARF: Weighted average rating factor. WARF measures weighted average Moody's ratings of the assets where the loan's contributed balance is used as weight. The higher the WARF, the lower the average rating. It typically ranges from 2200 to 3500. There are high CCC bucket deals with very high WARF such as 4000. Depending on the rating agency downgrade/upgrade cycles, WARF can change significantly, month over month.

Moody's diversity score: It measures issuer and industry concentration and is based on the number of industries, the number of assets, and par value of each loan. It ranges from 60 to 110.

IC Test: Interest Coverage Test

Interest paid by the loan portfolio / Interest due on debt tranches equally or more senior to a given debt tranche.

It is tranche specific.

OC test: Overcollateralization Test.

Par Amount of Asset Portfolio / Balance of notes equally or more senior to a given debt tranche.

Certain haircuts are applied to par amount. It is tranche specific.

Interest diversion test: Similar to OC test but usually trips before OC test. Unlike what happens in event of OC test failure, interest payments to junior tranches are not diverted to pay down senior tranches, instead they are used to purchase additional collateral.

OC cushion: Difference between actual OC level and OC test limit.

MVOC: Market Value OC—market value is used on OC test instead of the loan's balance.

It is tranche specific. It depends heavily on market prices of the underlying collateral.

WAS: Weighted average floater spread of the portfolio. It usually includes Libor floors. It can range from 3.00% to 5.00%, depending on the credit risk of the portfolio.

WA collateral spread: Weighted average floater spread of the portfolio without Libor floors. When Libor floors are not effective e.g., when Libor is above 100bps, it is the same as WAS.

Equity NAV: (The market value of the asset portfolio - aggregate notional value of debt tranches) / equity tranche notional value. It can range from 30% to 80% when underlying collateral trade close to par. It is highly levered to loan prices and therefore very volatile.

Attachment point: Loss amount measured as a percentage of the portfolio that a tranche can withstand before taking write-downs. It is tranche specific, for BB tranches it can range from 7% to 9.5%, depending on the deal.

Detachment point: Loss amount measured as a percentage of the portfolio that would cause a tranche to be completely written down. It is tranche specific, for BB tranches it can range from 12% to 15%, depending on the deal.

Senior management fee: Fee that managers receive at the top of the waterfall. It ranges from 15bps to 25bps.

Subordinate management fee: Fee that managers receive when all debt tranches get paid interest. It ranges from 15bps to 25bps. CLO managers won't receive subordinate management fee if OC or IC tests are triggered.

Incentive fee: Fee that managers are paid after a pre-defined IRR hurdle (8-12%) for equity investors is achieved. It typically ranges from 10% to 20%.

S&P's CCC/Moody's Caa or below limit: Limit as measured by the percentage of the pool that is CCC/Caa or below to determine the level where haircuts to OC test are applied. For regular BSL CLO deals it is usually set at 7.5%.

X-note: A common variation of CLO deal structure is to have an amortizing AAA-rated note called X-note. This is used to divert excess spread away from equity and instead pay down the X tranche.

About Refinitiv LPC

Refinitiv LPC is the premier global provider of information on the syndicated loan and high yield bond markets. Our first-to-the-market news and comprehensive real-time and historic data help you stay informed about market trends and facilitate trading and investment decisions. With field offices around the world, we are the one source for comprehensive coverage of the global syndicated loan markets worldwide. Our publications, online news, interactive databases, analysis and valuation services are used daily by banks, asset managers, law firms, regulators, corporations and others to drive valuation, syndication, trading, and research and portfolio management activities.

About FTSE Russell

FTSE Russell is a leading global provider of benchmarks, analytics and data solutions with multi-asset capabilities, offering a precise view of the markets relevant to any investment process. For over 30 years, leading asset owners, asset managers, ETF providers and investment banks have chosen FTSE Russell indexes to benchmark their investment performance and create investment funds, ETFs, structured products and index-based derivatives. FTSE Russell indexes also provide clients with tools for performance benchmarking, asset allocation, investment strategy analysis and risk management.

About Yield Book

Yield Book by FTSE Russell is a trusted and authoritative source for fixed income analytics that enables market makers and institutional investors to perform complex analysis of their portfolios, benchmarks, trading decisions, historical performance, and risk. Yield Book products offer analytical insight into an extensive range of financial products in the fixed income space including governments, agencies, corporates, high yield, emerging markets, mortgages, ABS, CMBS, CMOs, and derivatives. The platform utilizes dedicated centralized servers that help ensure reliable, prompt data delivery.

To learn more, email sales@yieldbook.com; visit ftserussell.com; or call your regional Client Service Team office

Americas

+1 646 989 2200

EMEA

+44 20 7334 8963

Asia-Pacific

Hong Kong +852 2164 3333

Tokyo +81 3 4563 6346

Paipai +866 2 8726 9778

©2021 Refinitiv. All rights reserved. The Refinitiv content received through this service is the intellectual property of Refinitiv or its third party suppliers. Republication or redistribution of content provided by Refinitiv is expressly prohibited without the prior written consent of Refinitiv, except where permitted by the terms of the relevant Refinitiv service agreement. Neither Refinitiv nor its third party suppliers shall be liable for any errors, omissions or delays in content, or for any actions taken in reliance thereon. Contact Refinitiv at LPC.info@refinitiv.com

© 2021 London Stock Exchange Group plc and its applicable group undertakings (the "LSE Group"). The LSE Group includes (1) FTSE International Limited ("FTSE"), (2) Frank Russell Company ("Russell"), (3) FTSE Global Debt Capital Markets Inc. and FTSE Global Debt Capital Markets Limited (together, "FTSE Canada"), (4) MTSNext Limited ("MTSNext"), (5) Mergent, Inc. ("Mergent"), (6) FTSE Fixed Income LLC ("FTSE FI"), (7) The Yield Book Inc ("YB") and (8) Beyond Ratings S.A.S. ("BR"). All rights reserved.

FTSE Russell® is a trading name of FTSE, Russell, FTSE Canada, MTSNext, Mergent, FTSE FI, YB and BR. "FTSE®", "Russell®", "FTSE Russell®", "MTS®", "FTSE4Good®", "ICB®", "Mergent®", "The Yield Book®", "Beyond Ratings®" and all other trademarks and service marks used herein (whether registered or unregistered) are trademarks and/or service marks owned or licensed by the applicable member of the LSE Group or their respective licensors and are owned, or used under licence, by FTSE, Russell, MTSNext, FTSE Canada, Mergent, FTSE FI, YB or BR. FTSE International Limited is authorised and regulated by the Financial Conduct Authority as a benchmark administrator.

All information is provided for information purposes only. All information and data contained in this publication is obtained by the LSE Group, from sources believed by it to be accurate and reliable. Because of the possibility of human and mechanical error as well as other factors, however, such information and data is provided "as is" without warranty of any kind. No member of the LSE Group nor their respective directors, officers, employees, partners or licensors make any claim, prediction, warranty or representation whatsoever, expressly or impliedly, either as to the accuracy, timeliness, completeness, merchantability of any information or of results to be obtained from the use of the FTSE Russell products, including but not limited to indexes, data and analytics or the fitness or suitability of the FTSE Russell products for any particular purpose to which they might be put. Any representation of historical data accessible through FTSE Russell products is provided for information purposes only and is not a reliable indicator of future performance.

No responsibility or liability can be accepted by any member of the LSE Group nor their respective directors, officers, employees, partners or licensors for (a) any loss or damage in whole or in part caused by, resulting from, or relating to any error (negligent or otherwise) or other circumstance involved in procuring, collecting, compiling, interpreting, analysing, editing, transcribing, transmitting, communicating or delivering any such information or data or from use of this document or links to this document or (b) any direct, indirect, special, consequential or incidental damages whatsoever, even if any member of the LSE Group is advised in advance of the possibility of such damages, resulting from the use of, or inability to use, such information.

No member of the LSE Group nor their respective directors, officers, employees, partners or licensors provide investment advice and nothing contained herein or accessible through FTSE Russell products, including statistical data and industry reports, should be taken as constituting financial or investment advice or a financial promotion.

The information contained in this report should not be considered "research" as defined in recital 28 of the Commission Delegated Directive (EU) 2017/593 of 7 April 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council ("MiFID II") and is provided for no fee.

Past performance is no guarantee of future results. Charts and graphs are provided for illustrative purposes only. Index returns shown may not represent the results of the actual trading of investable assets. Certain returns shown may reflect back-tested performance. All performance presented prior to the index inception date is back-tested performance. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. However, back-tested data may reflect the application of the index methodology with the benefit of hindsight, and the historic calculations of an index may change from month to month based on revisions to the underlying economic data used in the calculation of the index.

This document may contain forward-looking assessments. These are based upon a number of assumptions concerning future conditions that ultimately may prove to be inaccurate. Such forward-looking assessments are subject to risks and uncertainties and may be affected by various factors that may cause actual results to differ materially. No member of the LSE Group nor their licensors assume any duty to and do not undertake to update forward-looking assessments.

No part of this information may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the applicable member of the LSE Group. Use and distribution of the LSE Group data requires a licence from FTSE, Russell, FTSE Canada, MTSNext, Mergent, FTSE FI, YB, BR and/or their respective licensors.