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Global CLO Primer

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PLEASE SEE ANALYST CERTIFICATIONS AND IMPORTANT DISCLOSURES BEGINNING ON PAGE 92.

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Overview

- **Collateralized loan obligations (CLOs)** are actively managed securitizations backed primarily by a pool of 150-300 BB and single-B rated issuers' loans and bonds (only in European CLOs)
- CLOs are primarily floating-rate products and are typically issued to take advantage of the funding gap between asset yields (e.g. loan spreads) and liability costs (e.g. CLO tranche spreads), or the "arbitrage"
- The CLO itself is capitalized via the sale of debt tranches (typically rated AAA through BB or single-B) and equity
- CLO equity holders receive the residual after asset income is used to pay tranches liabilities and deal fees
- CLO managers, which include credit funds, asset managers and insurance firms, receive fees for managing the portfolio. The pool of assets can usually be traded for 4-5 years before the CLO begins to wind down and the tranches amortize
- CLOs own about half the global loan market, and while a majority of the assets in the portfolio are not subject to mark to market factors, collateral quality tests ensure the portfolio does not become too concentrated or risky

Restricted - External

Overview

- Despite the continued negative headlines, CLOs have performed well over time, with no AAA or AA tranches ever taking a loss. Per Moody's, the 10-year cumulative impairment rate of CLO tranches originally-rated AAA is 0.0% versus global CDOs (ex-CLOs) at 39.1%
- Even after remaining resilient through the Global Financial Crisis, CLOs issued after the crisis tend to have less structural leverage, shorter reinvestment periods, more restrictions on asset holdings, and greater focus on matching asset cash flows to liabilities
- More importantly, CLOs today do not contain any market value triggers that would cause forced selling. Thus, CLO managers are incentivized to hold assets over the long term, rather than being forced to sell at the lows

Historical CLO Tranche Impairment Rates Have Remained Low

Orig. Rating	US CLO	Euro CLO	Global CLO	Global CDO (ex-CLO)	Global Corporates*
AAA	0.0%	0.0%	0.0%	39.1%	0.1%
AA	0.0%	0.0%	0.0%	48.2%	0.7%
A	0.1%	0.0%	0.1%	53.1%	2.1%
BBB	3.0%	0.0%	2.3%	62.4%	3.4%
BB	5.9%	4.9%	5.5%	60.7%	15.3%

For more detail, see "CLO Mythbusters: Fact-Checking the Headlines," February 15, 2019. Note: Global corporate default rate data is the 10-year cumulative issuer-weighted global default rate from 1983-2018. CLO impairments by original rating, 10-year cumulative impairments over 1993-2018. Source for all charts: Moody's, Barclays Research

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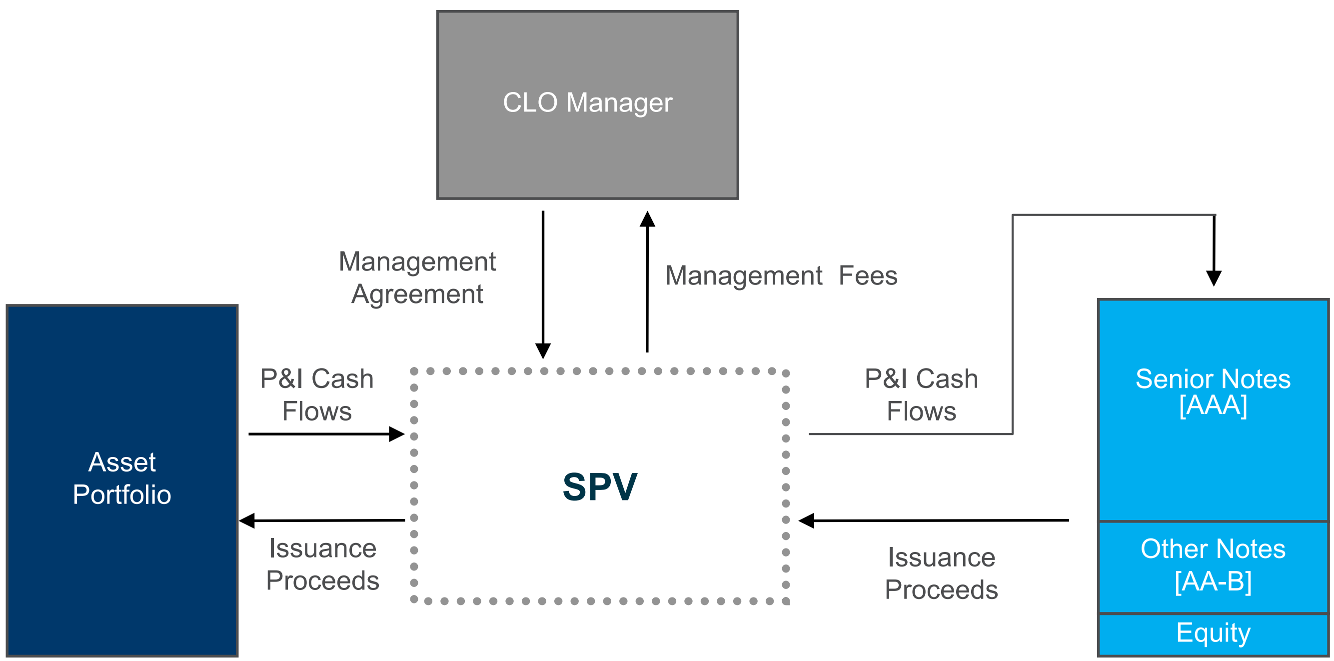
Structure Overview

- CLOs are vehicles that invest in a diversified pool of mostly leveraged loans
- The CLO itself is a bankruptcy-remote SPV, capitalized via the sale of debt tranches and equity
- The CLO manager receives fees for managing the pool of assets
- Income generated by the pool of assets is used to pay the tranche liabilities
- For “risk retention compliance”, CLO managers retain 5% of the deal through a vertical (smaller debt and equity pieces) or horizontal (equity) slice



Source for all charts: Barclays Research

Primary Types of CLOs

- CLOs are issued for two primary purposes: an **arbitrage** or **balance sheet** vehicle
- Most CLOs are arbitrage vehicles, meaning they are issued to capture the difference in asset spreads and liability costs and use structural leverage to enhance returns
- Balance sheet CLOs are used as an additional, cheaper source of funding for specialty finance companies or banks, where the underlying loans are typically self-originated and smaller in size
- Arbitrage CLOs are typically issued by credit funds, money managers and insurance firms where the underlying assets are purchased in the primary and secondary broadly syndicated markets
- Arbitrage vehicles will typically have an initial reinvestment period of 4-5 years, whereas balance sheet CLOs tend to be shorter or even static (e.g. no reinvestment period)

Arbitrage
(~95% of deals)

- Issued by credit funds, money managers, etc.
- Used to capture spread between assets and liabilities
- Assets purchased in primary/secondary
- Usually larger facility loans
- Typically 4-5 year initial reinvestment periods

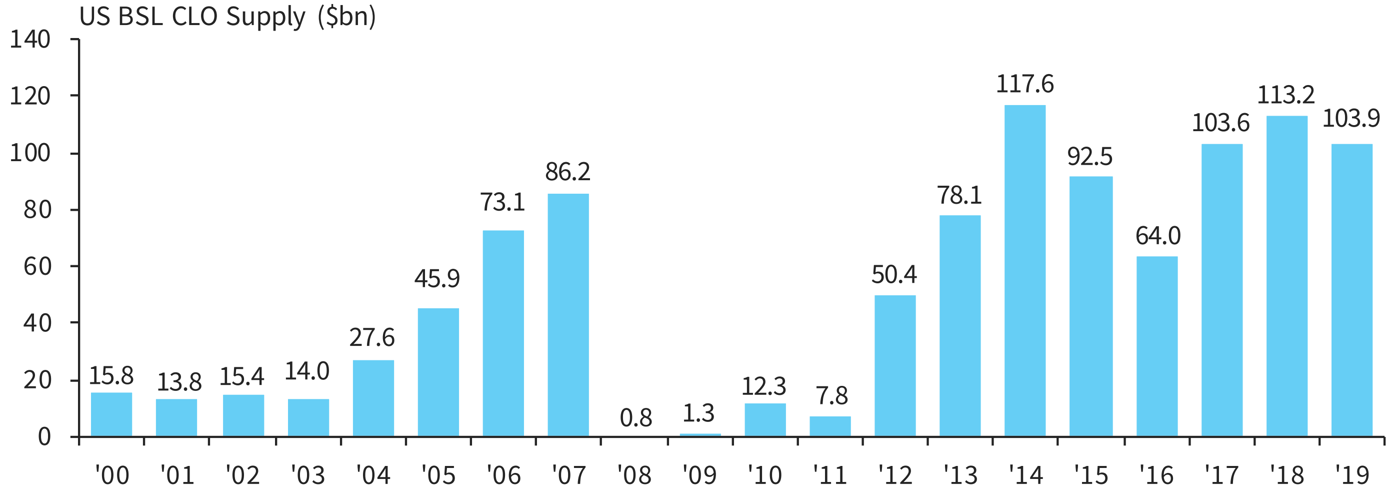
Balance Sheet
(~5% of deals)

- Issued by banks, specialty finance companies
- Used as cheaper source of funding
- Self-originated assets
- Typically smaller facility loans
- Shorter to no reinvestment period

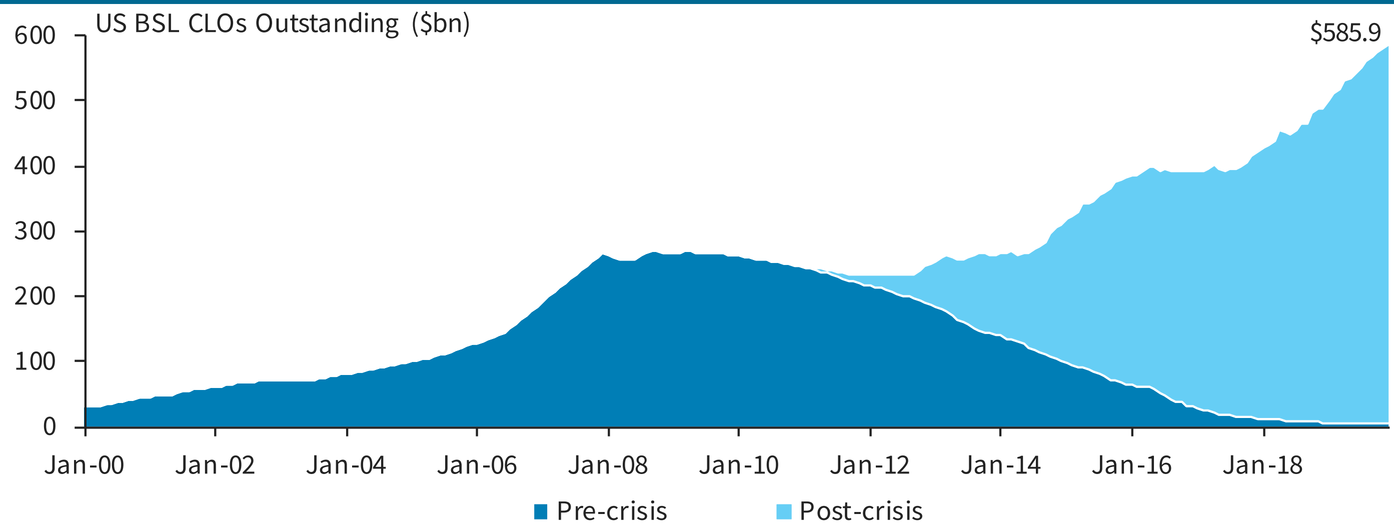
Source for all charts: Barclays Research

US BSL CLO Issuance and Outstanding

US BSL CLO New Issue Supply



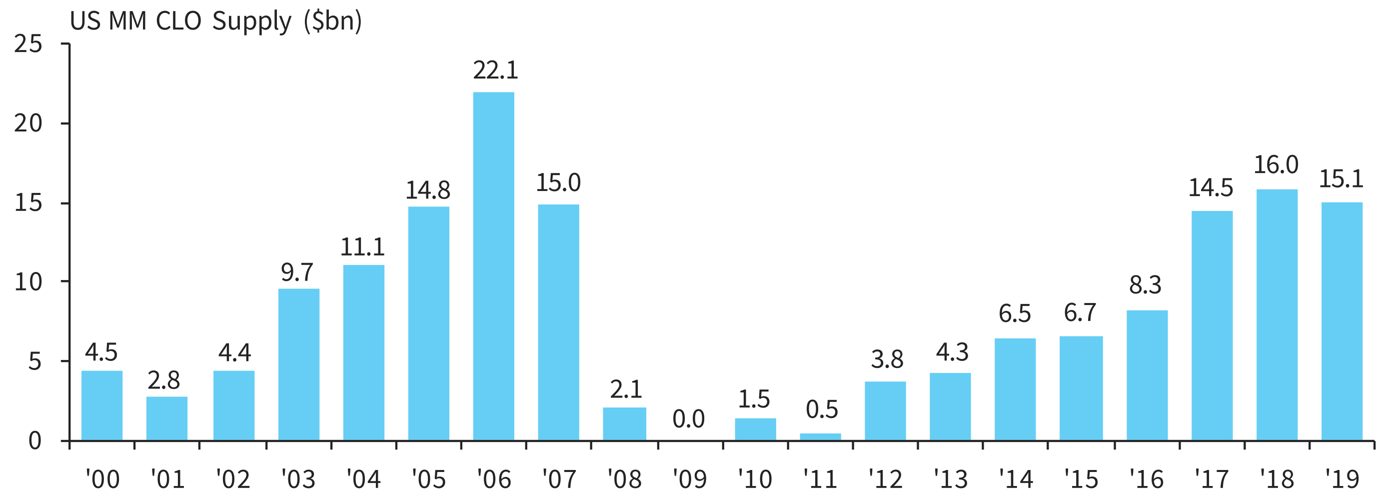
US BSL CLO Outstanding



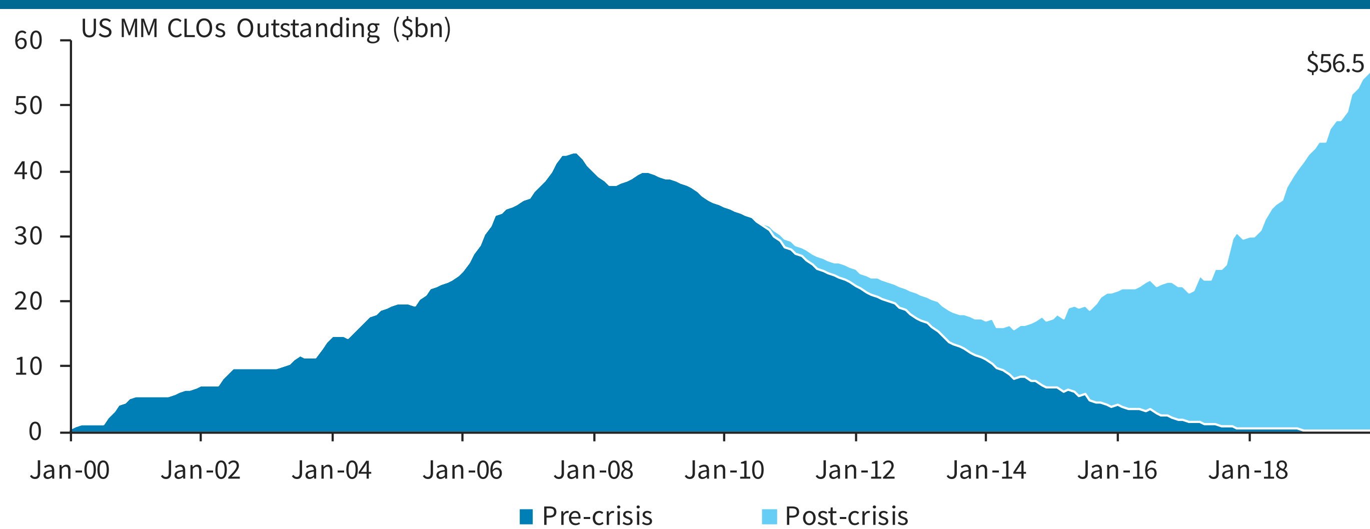
Source for all charts: S&P LCD, Intex, Bloomberg, Refinitv, Kanerai, Barclays Research

US Middle Market CLO Issuance and Outstanding

US Middle Market CLO New Issue Supply



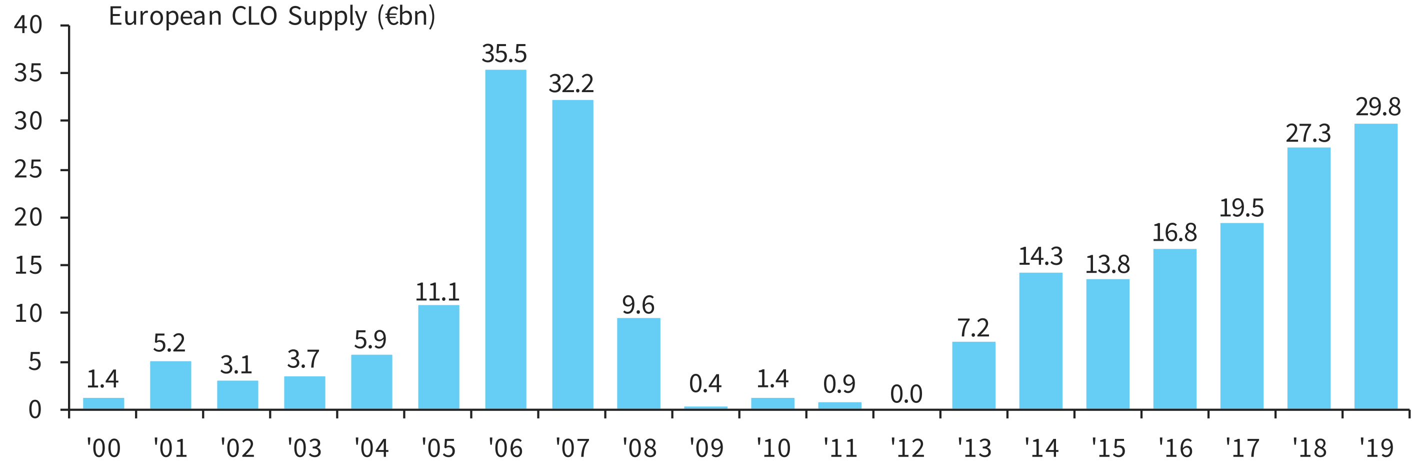
US Middle Market CLO Outstanding



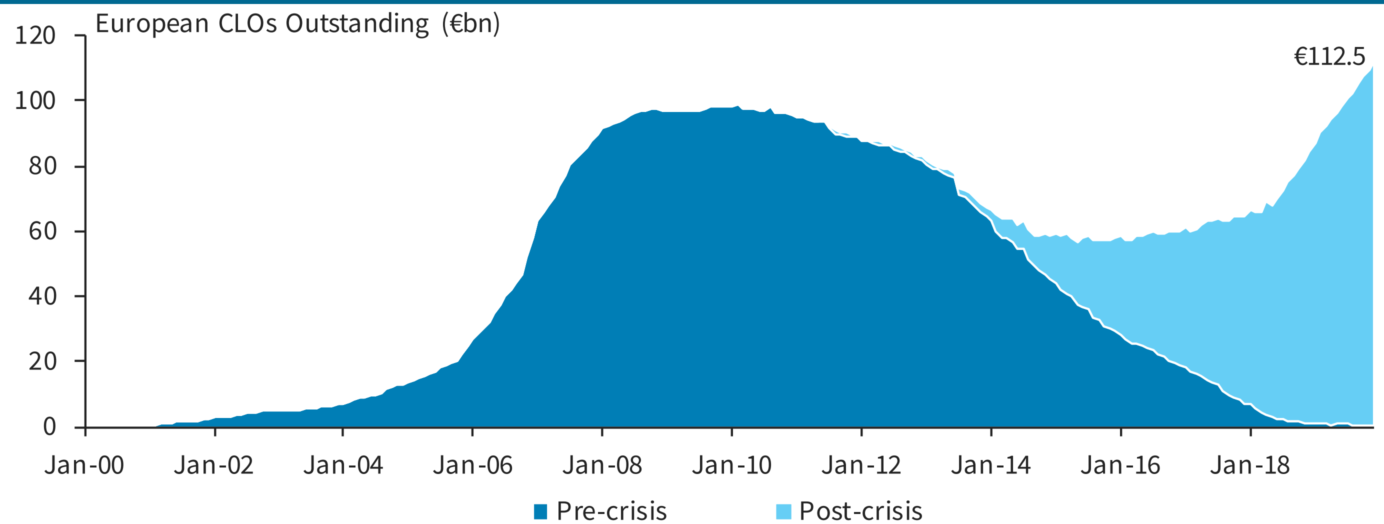
Source for all charts: S&P LCD, Intex, Bloomberg, Refinitv, Kanerai, Barclays Research

European CLO Issuance and Outstanding

European CLO New Issue Supply



European CLO Outstanding



Source for all charts: S&P LCD, Intex, Bloomberg, Refinitv, Kanerai, Barclays Research

Sample CLO Structure

Class	Size ($mn)	Rating (S&P/Fitch)	Coupon	Credit Enhancement	WAL	Discount Margin (DM)	Cash Price
X	1.0	AAA/NR	L + 60bp	-	1.8	60bp	100
A	256.0	AAA/AAA	L + 132bp	36.0%	6.2	132bp	100
B	48.0	AA/NR	L + 185bp	24.0%	8.2	185bp	100
C	24.0	A/NR	L + 285bp	18.0%	8.9	285bp	100
D	22.0	BBB-/NR	L + 395bp	12.5%	9.5	395bp	100
E	18.0	BB-/NR	L + 734bp	8.0%	10.0	825bp	94
Equity	33.1	NR/NR	Residual	N/A	-	-	-

Deal Size

- Total deal size is typically around $500mm in US and €400mn in Europe, where the senior rated tranche is ~60-65% of total
- Equity tranches are typically 9-10% of total notional (~9-10x levered)

Ratings

- AAA tranches are typically rated by 2-3 agencies and 1-2 for lower rated tranches
- Higher rated tranches can have the portfolio take more in losses before any principal loss is taken

Liabilities

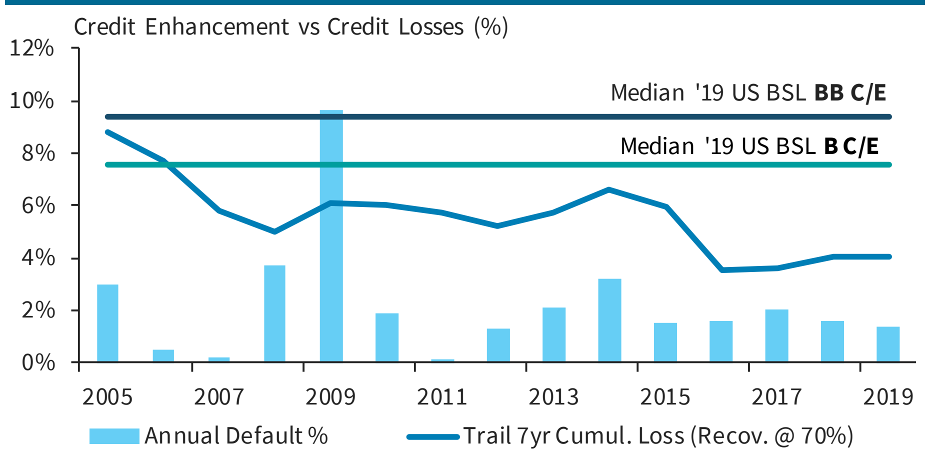
- CLO liabilities typically pay based on 3 month Libor/Euribor
- Fixed rate tranches can be used to decrease duration risk from holding fixed rate assets (EU CLOs), and help fulfil demand from fixed rate insurance buyers

Note: Representative 2019 US BSL CLO structure. Source for all charts: Intex, Barclays Research

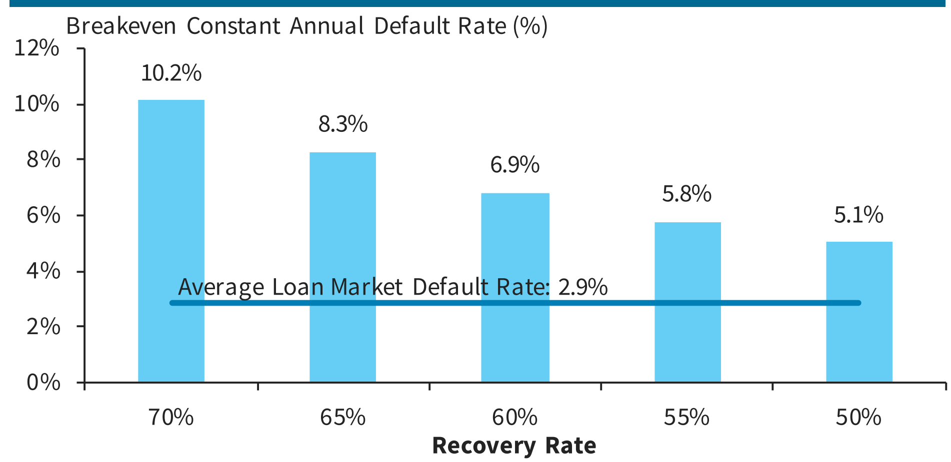
Structural Enhancements

- For CLO tranches to get higher ratings than the underlying assets (typically rated BB and single-B), CLOs have several structural protections built-in, including cash-diverting tests, excess spread and credit enhancement
- **Credit enhancement (C/E)** is essentially how much the portfolio's value (not market value) can decline before a CLO tranche begins taking a principal loss
- Even though cumulative losses have exceeded lower mezz C/E levels, manager trading and cash diversion tests have kept default rates for these CLO tranches low
- Assuming average recovery rates decline to 60%, annual default rates would have to reach nearly 7% before a new issue US BSL BB tranche is impaired (average since 1999 is ~3%)

Credit Enhancement vs. Credit Losses



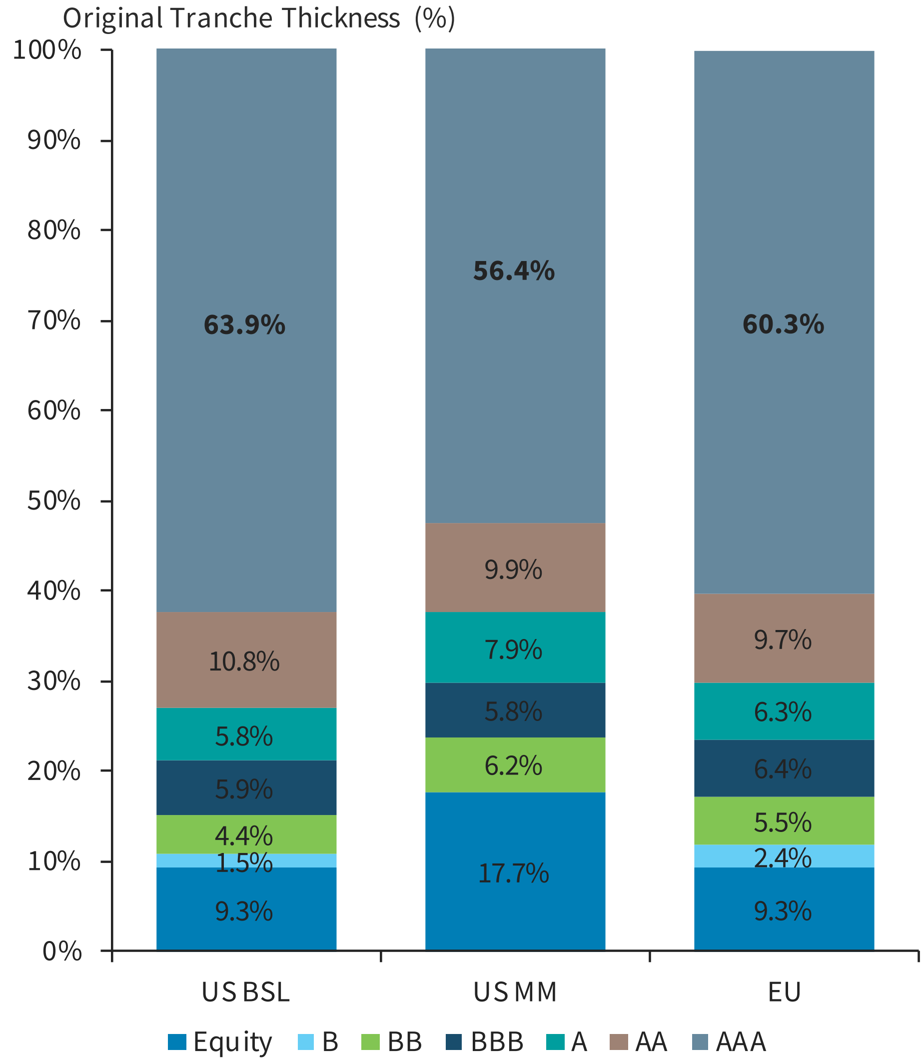
Default Rate Needed for BB Impairment



Assumptions: 20% constant prepayment rate, forward rate curve as of January 14, 2020, default recovery lag of 12 month, no reinvestment after reinvestment ends, assets reinvested at 99.5 price and L+325bp spread. Sample of 2019 vintage US BSL CLOs. Long-term annual default rate based on average of S&P/LSTA default rate from 1999-2019. Results only for illustrative purposes.
Source for all charts: Intex, S&P LCD, Barclays Research

Global CLO Structural Comparison

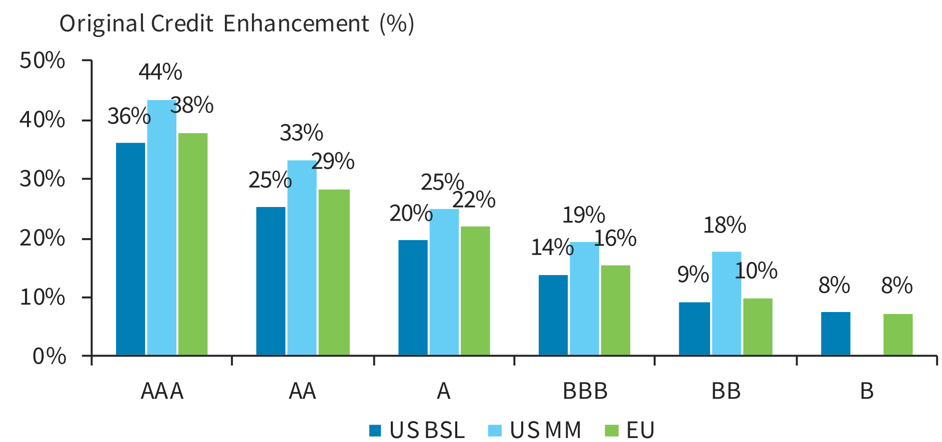
New Issue Tranche Thickness



New Issue CLO Stats

	US BSL	US MM	EU
AAA C/E	36.1%	43.6%	38.0%
CLO Leverage (debt/equity)	9.8x	4.6x	9.7x
AAA Coupon	3mL+134bp	3mL+175bp	3mE+108bp
Wtd. Avg. Cost of Capital	199bp	257bp	196bp
Reinv. Period	~5 yrs	~4 yrs	~4.5 yrs
Deal Size (mm)	$496.4	$402.5	€409.2
Issuers	239	81	121
Top 5 Issuers	5.3%	12.3%	8.8%
Top 5 Industries (Moody's)	47.4%	56.0%	51.6%
Top 5 Industries (S&P)	35.4%	43.8%	40.3%

New Issue Credit Enhancement

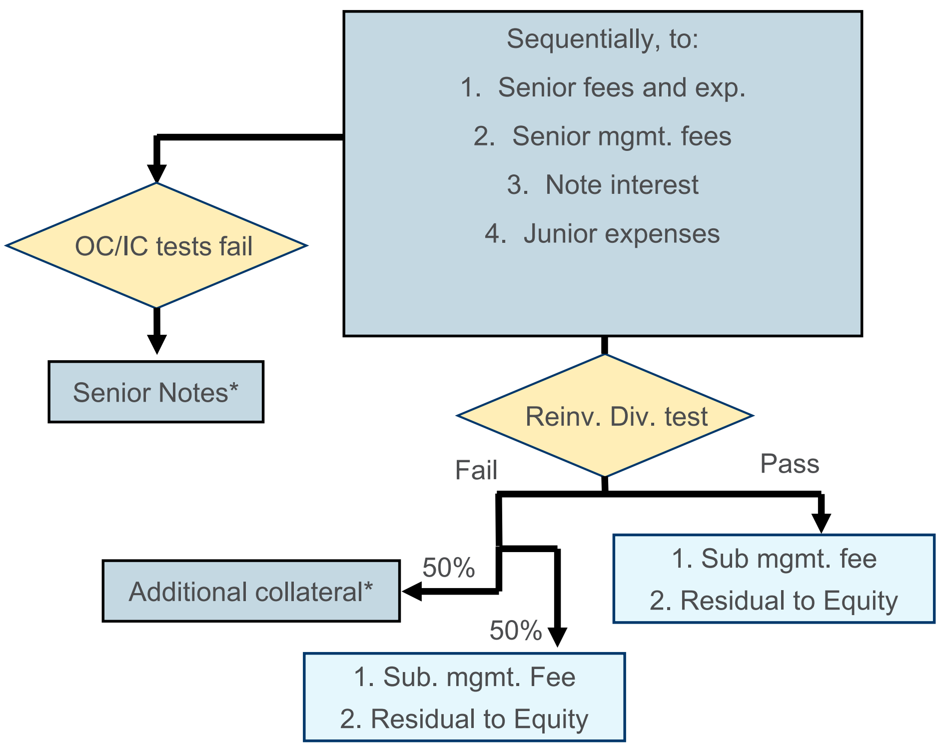


Note: All data is median of 2019 vintage deals, thus tranche thickness does not add to 100%. Source for all charts: S&P LCD, Intex, Barclays Research

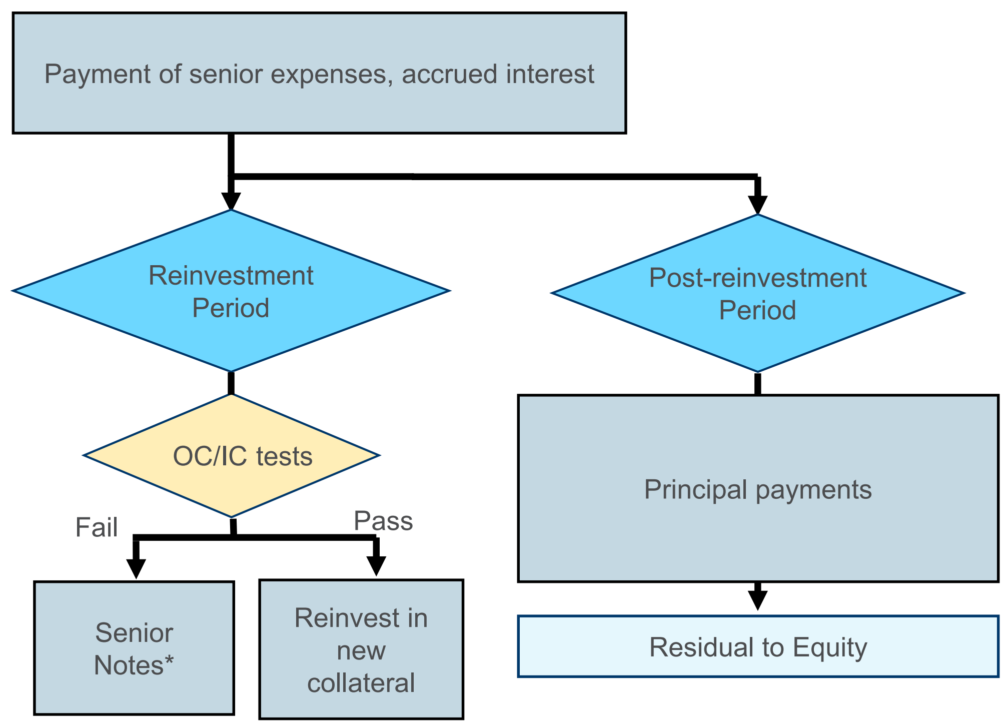
Waterfall Basics

- CLOs distribute interest and principal cash flows in accordance with a set of “waterfalls” on each quarterly payment date
- Coverage tests are performed at different stages of the waterfall to divert cash flows if deal performance has declined

Interest Waterfall

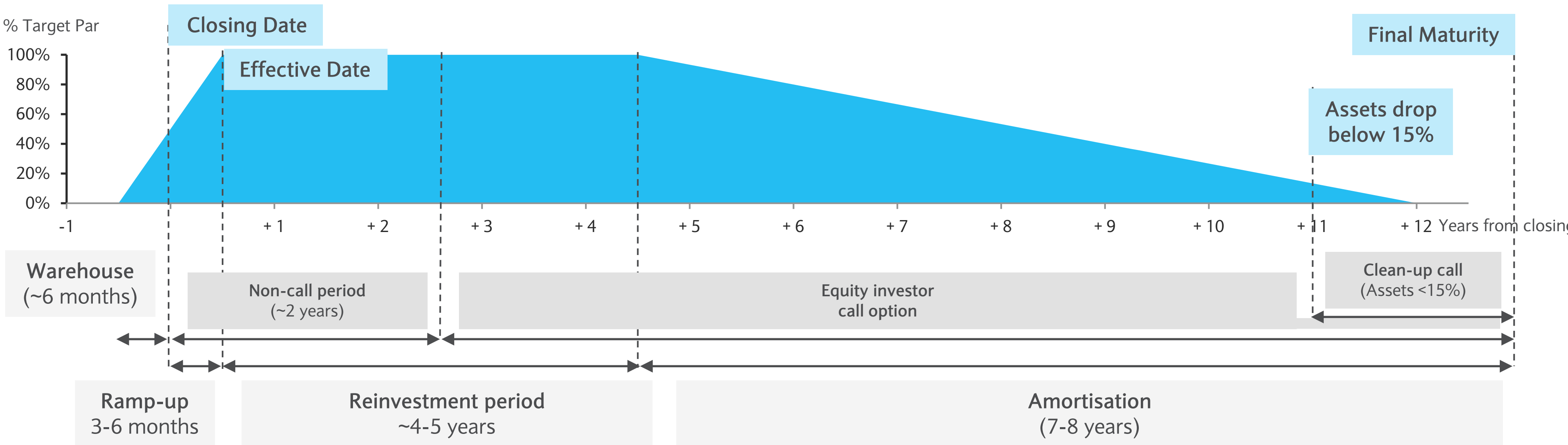


Principal Waterfall



*Extent necessary to satisfy tests Source for all charts: Deal documents, Barclays Research

CLO Life Cycle



Source: Barclays Research

- **Warehouse:** An arranger/underwriter (ie, an investment bank) typically provides financing to the collateral manager to purchase assets several months before the issuance of the CLO
- **Ramp-up:** A period during which the remainder of the portfolio is purchased following the Closing Date (the date on which the arranger buys the CLO liabilities and resells them to investors)
- **Reinvestment:** Commences on the Effective Date or when Target Par is reached. Manager is allowed to reinvest loan principal repayments or sales proceeds into new collateral, subject to interest/principal tests and portfolio limits
- **Calls:** After the Non-call Period (typically two years) the majority of the equity holders can direct the issuer to redeem the notes at any time (referred to as optional redemption), either to wrap up the deal or to perform a Refi or Reset. A deal is typically called 2-3 years after reinvestment ends as liability costs increase from note pay downs, decreasing equity distributions. A clean-up call option also becomes available once the portfolio falls below 15% of original balance
- **Amortisation:** After the Reinvestment Period, portfolio principal and sales proceeds (usually excluding unscheduled principal repayments or sale of deteriorating credits, subject to stricter tests) must be used to redeem the CLO notes sequentially, starting with the most senior (ie, AAA rated) notes

CLO Warehousing Period

- Warehouse financing, either in the form of a total return swap, or more commonly through an SPV, is often the first aspect in a CLO's lifecycle, completed well in advance of the debt and equity tranches being marketed to investors
- Warehousing provides an opportunity for the CLO manager to capture assets in the primary market where the assets are more likely to offer OIDs compared with purchases in the secondary market
- CLOs without a warehouse run the risk of primary supply being light during the "print and sprint" ramp-up phase, making asset accumulation difficult and costly by forcing more secondary purchases
- Key features of warehouse financing:
  - **Maximum reinvestment period** of typically 6-12 months, after which (if still in use) an amortisation period begins. In practice, most CLOs price within six months of launching the warehouse
  - **Senior lenders** provide funding commitment for a significant majority (c.70-80%) of the pre-pricing warehouse amount, and (in most cases) all of the remainder when the warehouse expands between pricing and closing. The CLOs arranging bank is often a participant in the senior lender group
  - **Subordinated lenders** are subject to first losses on the collateral up to the entire amount of their investment. The collateral manager is usually required to contribute at least 5% of deal balance, as warehouses are generally considered to be securitisations, and thus subject to risk retention in European and US Middle Market CLOs
  - **Portfolio profile tests** are similar to priced CLOs, including limits on unsecured collateral, obligor concentration, fixed rate securities, and CCC rated assets, among others
  - **Senior mark-to-market ratio test** (MV of the portfolio divided by the amount of senior funding outstanding), where a drop below a minimum threshold triggers a Drawstop Event, preventing the manager from drawing down additional funding, halts reinvestment and causes the amortisation period to start
    - However, only in a minority of warehouses are there actual market-value triggers that will cause the warehouse to default and technically be forced to liquidate
    - Similar to senior noteholders in priced CLOs, senior lenders are well insulated from losses, and negotiations to sell the pool via an auction or even hold the pool of loans on the arranger's balance sheet can keep the assets from being liquidated

Ramp-up and Reinvestment Period

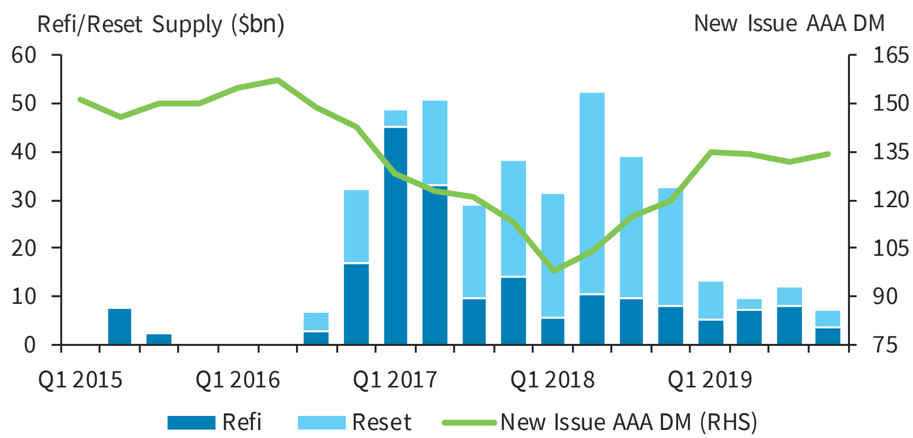
- To close a CLO warehouse, the facility can either pay-down through structured amortization, liquidated, or it can be priced
- Since warehoused CLOs are often not fully ramped when priced, the deal then shifts into the **Ramp-up Period** after pricing, where the CLO manager purchases assets in the primary and secondary loan market to fill up the rest of the CLO portfolio
- When the value of assets reaches the pre-defined **Target Par Amount**, the deal becomes **Effective** and the **Reinvestment Period** begins
- Portfolio tests then become active, where the deal must be in compliance with the collateral quality and coverage tests and concentration limitations to continue trading, or if failing, the test must be maintained or improved for future trades. These portfolio tests, as discussed later, include:
  - **Eligibility criteria** – Characteristics each new asset must have to enter the CLO portfolio
  - **Portfolio profile tests (PPT)** – Portfolio-level minimum and maximum concentration limits generally meant to guarantee the minimum diversity and quality of the portfolio
  - **Collateral quality tests (CQT)** – Set of minimum and maximum tests to ensure portfolio is balanced with respect to spread, rating, recovery rating, diversity and recovery ratings
- During the reinvestment period (usually 4-5 years), the manager will continue to reinvest funds
- Typically, the manager is allowed to trade in and out of positions on a discretionary basis, up to a limit of 20-30% each year, with more flexibility to reinvest proceeds from Credit Improved and Credit Risk sales. Larger portfolio reallocations can also be done via a “Trading Plan”
- The Reinvestment Period can end early, though, should the manager decide further reinvestment would not be beneficial or if certain CLO tranches are downgraded (specific to deal documents)

Restricted - External

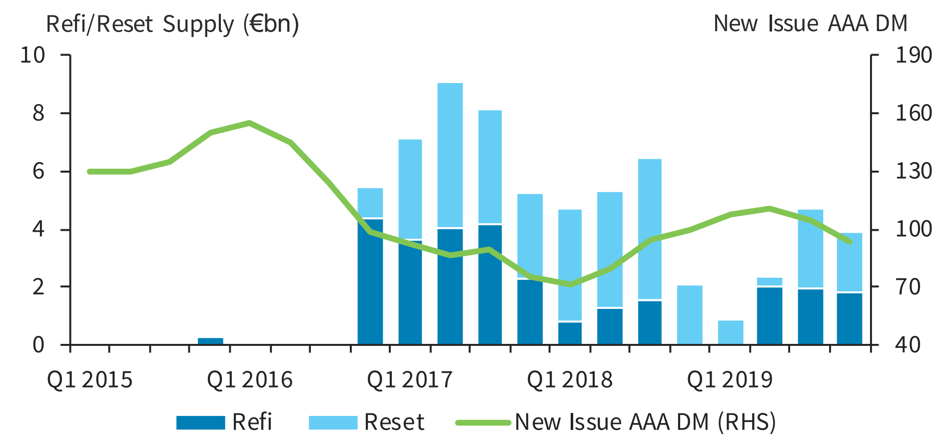
Post Non-Call

- After the Non-call Period (typically two years), equity holders can vote to:
  - **Call** - Where the assets are sold, CLO liabilities are paid down and equity holders get the rest
    - *Why?* Equity holder thinks PV of future cash flows < value that can be realized today
  - **Refinance** - Where tranches (all or even just AAA tranche) can have their coupons reduced
    - *Why?* Reduction in debt cost enhances CLO equity distributions
  - **Reset** - Where the reinvestment period is extended, documents can be amended, assets can be swapped, equity can be injected and coupons are reset close to new issue levels
    - *Why?* Allows reinvestment to continue without the time and cost associated with calling a deal and rolling the assets into a new CLO

US CLO Refi/Reset Supply



European CLO Refi/Reset Supply

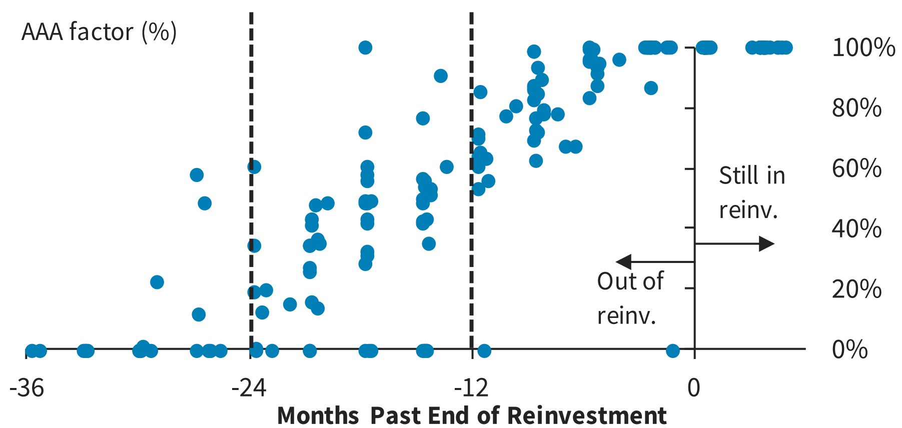


Source for all charts: Kanerai, Intex, S&P LCD, Barclays Research

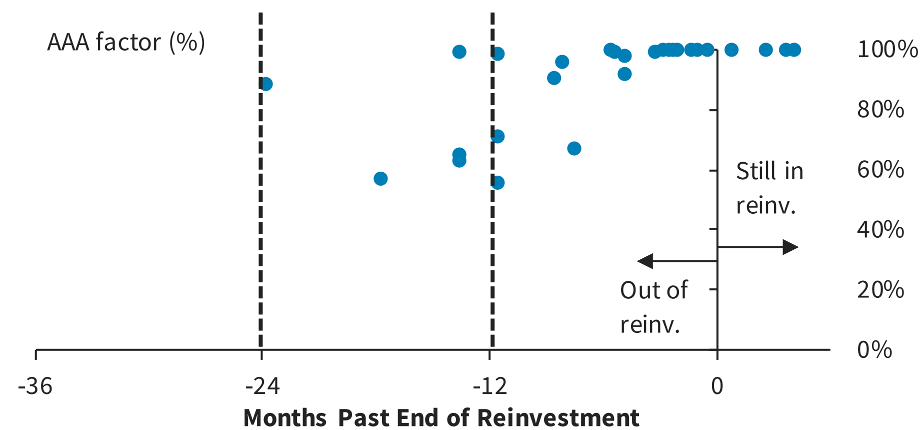
Post Reinvestment Period

- Despite the name, CLOs still typically allow the manager to reinvest principal proceeds from certain collateral proceeds after the Reinvestment Period ends
- This is subject to meeting certain performance criteria, though, that are described in the deal's documentation
- Differences in deal language and portfolio construction lead to differences in debt balance pay down speeds, though the WAL test tends to be a larger constraint
- But proceeds must be used to pay down the liabilities before the final maturity date
- Most MM CLOs prohibit against reinvestment after the reinvestment period ends

US BSL CLO AAA Factors



European CLO AAA Factors



Source for all charts: Kanerai, Intex, Barclays Research

Events of Default

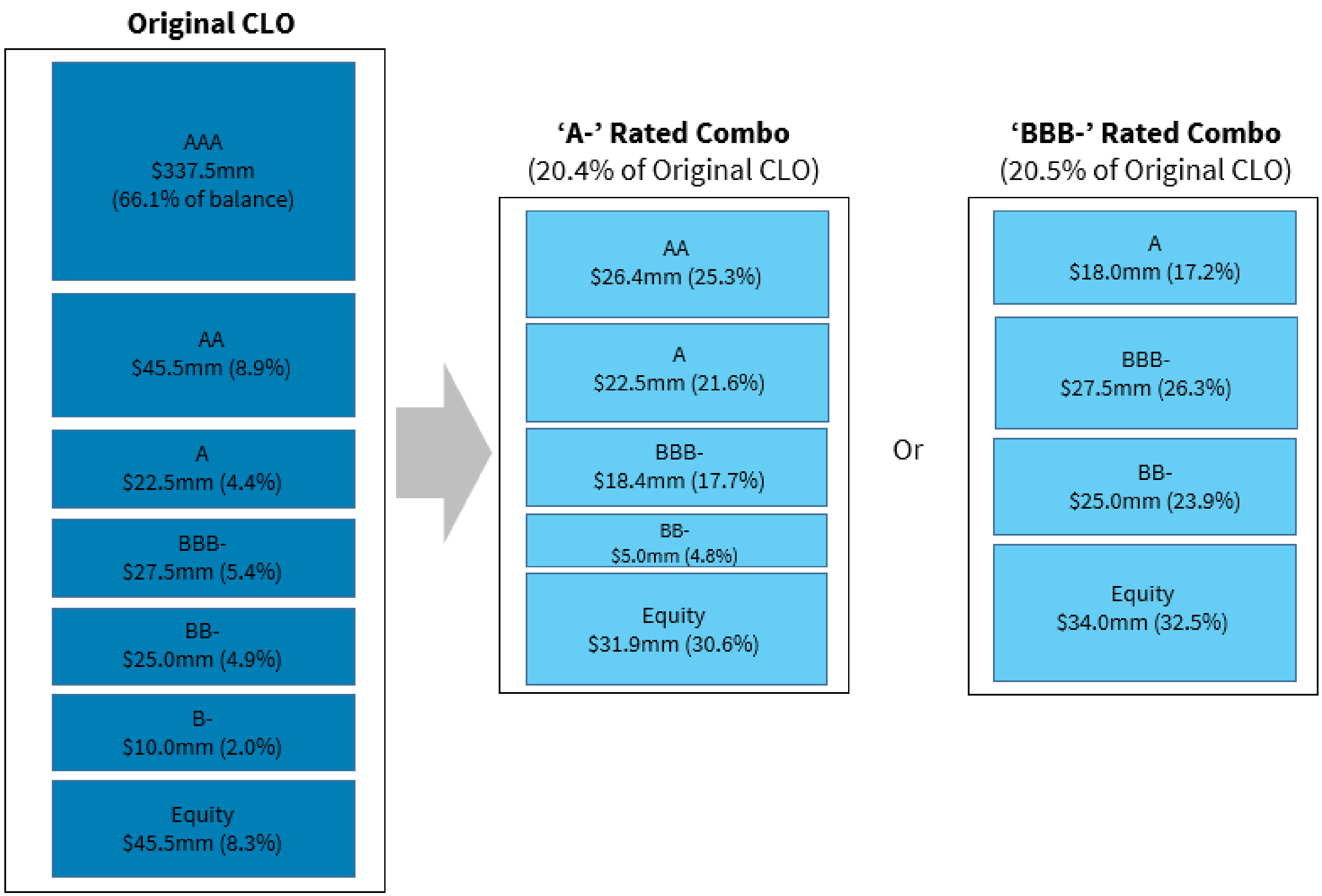
- CLO documents have event of default (EOD) stipulations that protect noteholders from severe portfolio underperformance and breach of manager duties
- Events of Default are difficult to achieve, with typical requirements being:
  - Missed interest on AAA/AA-rated tranches
  - Non-payment of principal at maturity
  - The senior OC tranche ratio falls below ~102.5%
  - Issuer insolvency
  - Manager breach of duty
- For the senior OC ratio to fall to such a low level would require the par value of the portfolio to decline over 30%, based on typical starting overcollateralization tranche levels
- In the rare event an EOD occurs, the reinvestment period terminates and the Controlling Class (most senior tranche outstanding) can declare the notes immediately due and payable
- If all the CLO debt can be paid back in full, the trustee can direct the collateral to be liquidated and pay down the tranches
- Senior note holders could also waive an EOD, avoiding a forced selling event

Other Structural Variations – Combo Notes

- Combination notes, or **combo notes**, are created by combining CLO debt and equity into a single structure, either inside or outside the original SPV
- Combo notes allow investors to get exposure to a higher-yielding IG-rated asset by combining a mix of higher-rated CLO tranches with CLO equity
- The notes can be structured to meet an investor's specific coupon and ratings target
- Combo notes typically have a principal-only rating with a zero to low coupon, with underlying note interest and equity distributions used for the combo note's principal amortization
- The combination of tranches introduces refinancing risk (when the underlying CLO tranches are repaid and refinanced) and ramp risk (not acquiring the planned portfolio profile or having to amortize earlier than expected)
- Refi risk can be mitigated by having the combo note hold a controlling vote of the equity tranche, and specific document stipulations to prevent a refinancing unless certain conditions are met
- US insurers have traditionally been the primary buyers of combo notes, which receive a NAIC 2 designation (lower risk capital required), despite packaging equity exposure that would otherwise be mapped to a NAIC 6
- The ability to use external ratings could change, though, as the Securities Valuation Office reconsiders its methodology for NAIC designations of principal protected notes
- A move away from using rating agency ratings to using a look-through approach to create a new NAIC designation may change the attractive relative value perspective of CLO combo notes for US insurers

Combo Note Example

Combo notes are created by combining CLO debt and equity into a single structure, allowing investors to get exposure to a higher yielding, investment-grade rated asset



Note: Percentages not shown to scale. Source for all charts: KBRA, Barclays Research

Other Structural Variations – Class X Notes

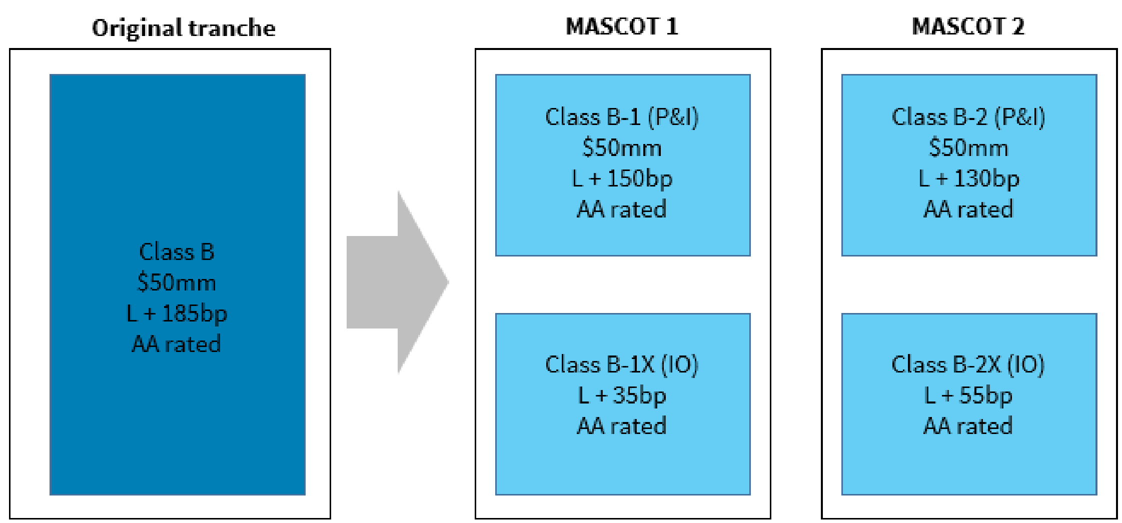
- A newly issued CLO will occasionally include an **X tranche**
- In 2019, roughly 17% and 56% of new issue US BSL and European CLOs included an X tranche, respectively
- An X tranche is typically less than 1% of the total deal balance, rated AAA (though the coupon is lower than the typical, larger AAA tranche), have a WAL of less than 2 years and is not included in the coverage tests
- The tranche is issued as a way to fund the initial interest reserve and closing date expenses
- The deal can essentially fund these costs via more equity or by issuing an X tranche, which initially lowers equity distributions
- Principal on the X tranche is generally paid on a fixed amortization schedule, starting around the first or second payment date of the deal
- For example, for the CLO on slide 11, the X tranche will amortize over 10 periods at $100,000 per period beginning on 2nd payment date after the Closing Date

Other Structural Variations – MASCOTs

- A **Modifiable and Splittable or Combinable Tranche** (MASCOT) can be split into an interest-only (IO) note and principal and interest (P&I) note
- Similar to mechanics in the mortgage market, MASCOTs provide optionality to CLO investors based on their view of future spread movements
- As spreads widen, the likelihood that the CLO tranches will be refinanced decreases, increasing the value of the IO notes. Owning the IO piece is essentially being short material CLO spread tightening
- However, the PO note should appreciate given spread tightening

MASCOT Example

- An example of a $50mm AA-rated tranche that pays L+185bp
- Different combinations of IO and P&I notes can be constructed, per deal documents



Source for all charts: Deal documents, S&P, Barclays Research

Other Structural Variations – AMRs

- An **Applicable Margin Reset** (AMR) is a method to reduce the inefficiencies of a traditional CLO tranche refinancing
- Post non-call period, the AMR allows for a reset of the coupon of the AMR-applicable tranches through a Dutch auction (e.g. coupon reduced until buyer found)
- The lowest coupon for which bids fully account for the principal balance of the tranche will become the new coupon for the AMR-applicable tranche
- The failure of one tranche auction does not affect the success or failure of another
- The auction initiation process is deal-dependent (automatically or through majority of equity holder and/or manger) and occurs through an AMR auction service provider
- An AMR does not require the cost (paid by equity holders) and time associated with traditional refinancing process
- Different from a typical “repricing”, if an AMR auction is successful, the coupon of the AMR-applicable tranches automatically resets and no consent is required from holders of those tranches

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Portfolio Tests

- There are a series of tests and criteria to ensure assets purchased and held in the portfolio are in compliance with the CLO documents:
  - **Eligibility Criteria** – Characteristics each new asset must have to enter the CLO
  - **Portfolio Profile Tests (PPT)** – Portfolio-level minimum and maximum concentration limits generally are meant to guarantee the minimum diversity and quality of the portfolio. If a PPT is failing, the manager must maintain or improve the test to continue trading
  - **Collateral Quality Tests (CQT)** – Set of minimum and maximum tests to ensure portfolio is balanced with respect to spread, rating, recovery rating, diversity and recovery ratings. If a CQT is failing, the manager must maintain or improve the test to continue trading

Eligibility Criteria
Not be a defaulted, deferring or equity security
Not be a synthetic or structured finance security
Be rated at least CCC- or equivalent by each of the rating agencies
Have a legal maturity prior to the legal maturity of the CLO notes

Portfolio Profile Tests
At least 90% of senior secured assets
At least 70% of senior secured loans
Not more than 4% of Mezzanine loans
Not more than 20% of non-euro assets
Not more than 10% of fixed rate assets

Collateral Quality Tests
Minimum WAS
Minimum Moody’s WARR
Minimum S&P WARR
Minimum Moody’s Diversity Score
Minimum Moody’s WARF
Maximum S&P Breakeven
Maximum WAL

Source for all charts: Deal documents, Barclays Research

Eligibility Criteria

- The CLO's assets must meet certain **Eligibility Criteria** at the time it is added to the collateral portfolio
- Eligibility criteria usually refer to general features of the respective asset
- For example, they define whether the CLO is allowed to only invest in loans, or whether the CLO manager is also free to buy bonds
- If it is discovered that the eligibility criteria were not met at the time of purchase (and the collateral manager acquired the asset despite ineligibility), the collateral manager must sell the asset immediately
- The criteria will also typically note whether the CLO must comply with negative screening ESG language

European CLO Eligibility Criteria Example

Criteria
Senior Secured Loan, a Senior Secured Bond, an Unsecured Senior Loan, an Unsecured Senior Bond, a Mezzanine Obligation, a Second Lien Loan, a Corporate Rescue Loan, or a High Yield Bond
Denominated in Euro; or denominated in a Qualifying Currency other than Euro and no later than the settlement date of the acquisition
Not a Defaulted Obligation or a Credit Impaired Obligation
It has a Fitch Rating of not lower than "CCC" and a S&P Rating of not lower than "CCC"
Not a Structured Finance Security, letter of credit or a Synthetic Security
Not a Zero Coupon Security
Not a debt obligation that pays scheduled interest less frequently than annually
Not a Project Finance Loan
Not a Deferring Security
Not a Step-Down Coupon Security
Not an obligation for which the total potential indebtedness of the Obligor(s) thereof under all underlying instruments governing such Obligors' indebtedness has an aggregate principal amount of less than EUR 150,000,000
Shall have been acquired by the Issuer for a purchase price of not less than 60% of the par value thereof, unless such obligation is a Swapped Non-Discount Obligation
Not an Equity Security, including any obligation convertible into an Equity Security
Not an ESG Excluded Obligation

For more detail, see "A Breath of Fresh Air: ESG in Loans and CLOs," July 19, 2019. Note: Representative 2019 European CLO. Source for all charts: Deal documents, Barclays Research

Portfolio Profile Tests

- The **Portfolio Profile Tests (PPTs)** or **Concentration Limits** define the minimum and/or maximum exposures permitted, acting as parameters governing the CLO manager's investment style
- For example, this deal requires at least 90% of collateral in the CLO to be invested in 1st lien senior secured loans
- Like the eligibility criteria, the portfolio profile tests usually include a criterion that is potentially relevant for the CLO's Volcker rule compliance: whether or not the collateral manager is allowed to purchase bonds in addition to loans
- If a test is failing, the CLO manager must generally maintain or improve the test to continue trading

US BSL CLO Eligibility Criteria Example

Test	Limit
Senior Secured Loans, Cash and Eligible Investments	Min. 90%
Second Lien and Unsecured Loans	Max. 10%
Single Obligor	Max. 2% [Top 5 - 2.5%]
CCC/Caa Collateral Obligations	Max. 7.5%
Interest Paid Less Frequently than Quarterly	Max. 10%
DIP Loans	Max. 7.5%
Delayed Drawdown/Revolvers	Max. 10%
Moody's Rating derived from S&P Rating	Max. 10%
Single Industry	Max. 10% [Top 3 - 12%, Top 1 - 15%]
Cov-Lite Loans	Max. 65%
Fixed Rate Obligations	Max. 5%
Step-Up Obligations	Max. 2.5%
Long-Dated Obligation	Max. 2%
Bridge Loans	Max. 0%
Discount Obligations	Max. 20%
Obligor with Total Indebtedness <$250mm but >=$150mm	Max. 5%

Note: Representative 2019 US BSL CLO. Source for all charts: Deal documents, Barclays Research

Collateral Quality Tests

- **Collateral Quality Tests (CQTs)** provide a set of control measures for managers to actively trade their portfolios against, and prevent CLO portfolios from becoming too concentrated in riskier credits or are at least being compensated for such risk through higher coupon assets
- **Min. Diversity Score (DS) test**: Measures collateral concentration and correlation of individual issuers and industries. Attempts to ensure portfolio is relatively diversified across holdings
  - Higher diversity score = more diverse collateral pool
- **Max. Weighted Average Rating Factor (WARF) test**: Weighted average of the underlying assets' default probability ratings. Moody's WARF is based on Corporate Family Ratings. Attempts to ensure portfolio is not concentrated in lower-rated assets
  - Higher portfolio WARF = riskier collateral
- **Min. Weighted Average Spread (WAS) test**: Weighted average nominal spread of the underlying floating-rate assets. Attempts to ensure asset interest is sufficient to pay interest on CLO liabilities
  - Lower WAS = lower asset interest income
- **Min. Weighted Average Recovery Rate (WARR) test**: Weighted average recovery rate assigned to the underlying assets, which tends to be more conservative than historical recoveries. Attempts to ensure manager invests in assets with a certain level of expected recoveries in case of default
  - Lower WARR = lower expected recoveries on the underlying assets
- **Max. Weighted Average Life (WAL) test**: Weighted average remaining life of the collateral pool, not assuming any voluntary prepayments (typically declines over time). Attempts to ensure deal amortizes over time and does not become concentrated in longer dated assets
  - Higher WAL = longer average maturity of the collateral

Source for all charts: Deal documents, S&P, Barclays Research

Collateral Quality Tests

- Unlike **PPTs**, which set strict minimums or maximums of the type of assets held by the CLO, **CQTs** are moving targets based on a matrix to provide flexibility for CLO managers to trade the portfolio based on evolving market conditions
- Each matrix is a three-way combination grid of the criteria. For example, in a Moody's matrix, the combination of the current minimum diversity score and minimum WAS set the portfolio's maximum WARF

CQTs Based on a Moving Matrix

Min. WAS	Min. Diversity Score					
	65	70	75	80	85	90
3.20%	2,433	2,449	2,464	2,475	2,487	2,497
3.30%	2,505	2,523	2,539	2,552	2,565	2,576
3.40%	2,525	2,544	2,592	2,628	2,642	2,654
3.50%	2,549	2,594	2,640	2,677	2,693	2,706
3.60%	2,571	2,616	2,688	2,725	2,744	2,757
3.70%	2,594	2,639	2,737	**2,772**	2,790	2,803
3.80%	2,638	2,684	2,786	2,818	2,835	2,849
3.90%	2,694	2,719	2,828	2,865	2,882	2,896
4.00%	2,807	2,839	2,871	2,912	2,928	2,942

For more detail, see "A CLOser Look Inside the Matrix," March 15, 2019. Source for all charts: Deal documents, Barclays Research

Global CQT Comparison

- Depending on the rating agency used for each deal and denoted in the deal documents, different CQTs can be used
- On a comparative basis, US MM CLOs tend to have higher WARFs and lower Diversity scores compared to US BSL CLOs – due to the lower rated and more concentrated collateral pools in MM CLOs
- European CLO WARRs tend to be smaller versus US CLOs since European CLOs allow for more subordinated assets such as a large bucket for bonds

CLO Collateral Quality Test Comparison

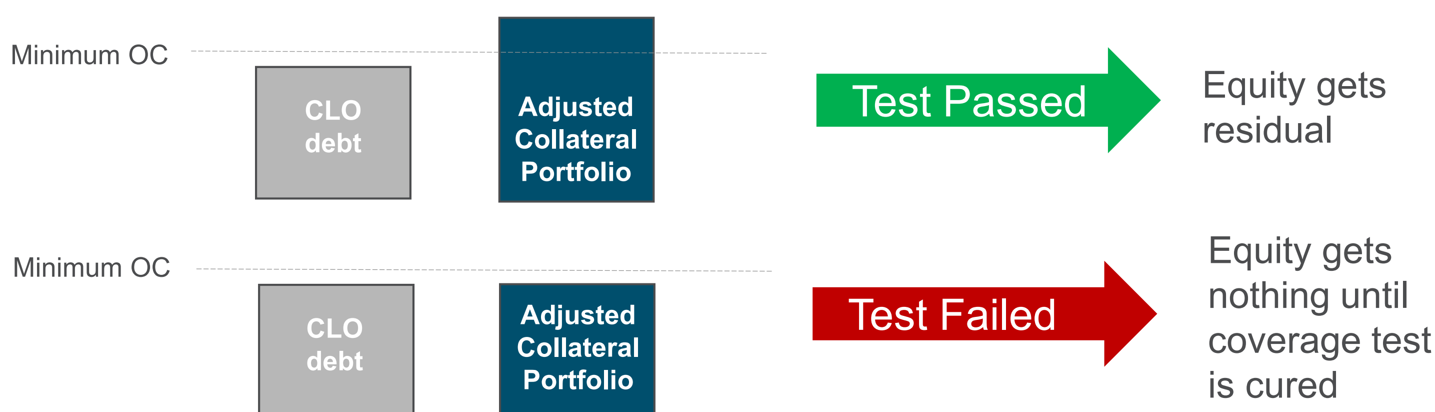
	US BSL CLO		US MM CLO		European CLO	
	Actual	Test	Actual	Test	Actual	Test
Weighted Average Spread (WAS)	3.56	3.30	5.18	4.60	3.80	3.60
Weighted Average Life (WAL)	5.1	8.5	4.0	7.5	5.4	8.0
Moody's Diversity Score	75	65	37	36	50	46
Moody's WARF	2,801	2,997	3,346	3,757	2,877	3,021
Fitch WARF	N/A	N/A	38	41	32	34
Moody's WARR	48	43	47	43	46	43
Fitch WARR	N/A	N/A	72	65	67	64
S&P WARR	44	42	49	41	38	36

Note: All data is median of 2019 vintage deals. Source for all charts: Kanerai, Intex, Barclays Research

Coverage Tests

- Primary coverage tests are **Overcollateralization (OC)** and **Interest Coverage (IC)** tests
- If the coverage tests fail, interest that would have been paid to the junior notes is diverted to redeem the senior notes sequentially until the coverage tests pass again
- CLOs may also have an **Interest Diversion (ID)** test (also known as Reinvestment Test), where cash is used to purchase more collateral instead of amortizing the CLO notes
- The ID test is set just above the lowest OC test, meaning the ID test will trip first. When it trips, ~50% of cash that would have gone to equity is instead used to purchase more collateral
- Actual calculations are deal-dependent and can be found in the CLO deal documentation

Overcollateralization (OC) Test	Interest Coverage (IC) Test
$\dfrac{Adjusted\ Collateral\ Portfolio}{Par\ value\ of\ CLO\ debt\ (tranche\ and\ all\ snr\ to\ \mathrm{it})}$	$\dfrac{Asset\ Interest\ (net\ of\ senior\ expenses)}{CLO\ interest\ due\ (tranche\ and\ all\ snr\ to\ \mathrm{it})}$

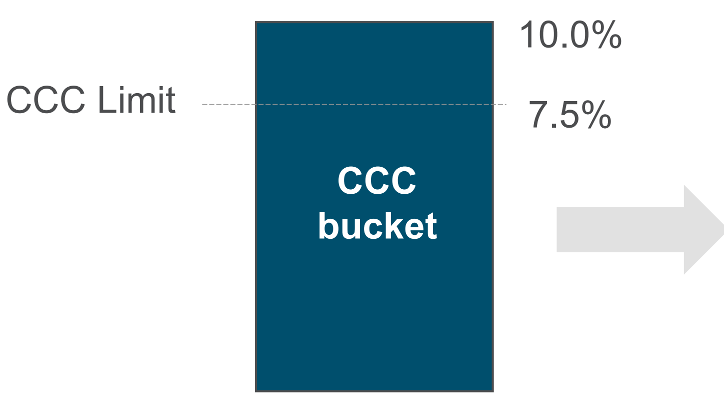


Source for all charts: Barclays Research

OC Test Haircuts

- OC tests are based on par value – riskier assets are “haircut” to get an Adjusted Collateral Portfolio
- Typical OC haircuts include:
  - CCC/Caa assets above the 7.5% limit → excess held at market value
  - Defaulted assets → held at lower of market value and recovery value
  - Assets bought below ~80% → held at purchase price
  - Equity received from reorg → held at zero

CCC Haircut Example – Excess Uses Lowest MV First



CCC asset	CCC bucket %	Current price	Price used for OC test*
Loan A	2.5%	$90	$100
Loan B	2.5%	$85	$100
Loan C	2.5%	$40	$100
Loan D	2.5%	$30	$30

*Assumes assets purchased above $80. Source for all charts: Deal documents, Barclays Research

OC Test Example

- We can estimate when OC tests might trip based on single-B exposure today and historical rating transitions
- Based on rating exposure today and using the average single-B to CCC downgrade rate during the Global Financial Crisis, CCC exposure would have to reach nearly 15% before the min. OC test (the tightest OC test) begins to fail
- But this does not consider defaults (held at lower of market value and recovery value) and other document nuances
- Additionally, while most deals use Moody's facility rating for Caa % bucket purposes, approximately 10-15% use the corporate family rating

OC Test Example

Assumptions		
Downgrade Rate from B to CCC	15.0%	
CCC Market Price	50%	
CCC/Caa Excess Limit	7.5%	
Lowest OC Test Trigger	103.8%	
Orig. CLO Asset Balance	541	
Orig. CLO Debt Balance	500	
Current 2.0 Averages	**U.S. BSL**	**Euro**
Lowest OC Test Cushion	4.1%	4.3%
Highest CCC/Caa Bucket	3.7%	2.4%
B+/B/B- Exposure	67.7%	66.8%
Downgrade Effects		
CCC/Caa Bucket After Downgrades	13.86%	12.42%
CCC/Caa Bucket Excess	*6.36%*	*4.92%*
The Math		
CLO Assets (ex-CCC/Caa Excess)	506.6	514.4
CLO Assets (CCC/Caa Excess @ MV)	17.2	13.3
New CLO Asset Balance	523.8	527.7
New Lowest OC Test	104.8%	105.5%
Lowest OC Cushion Change	-3.1%	-2.5%
New Lowest OC Test Cushion	**1.0%**	**1.7%**

Source for all charts: Kanerai, Intex, Moody's, Barclays Research

Table of Contents

Overview

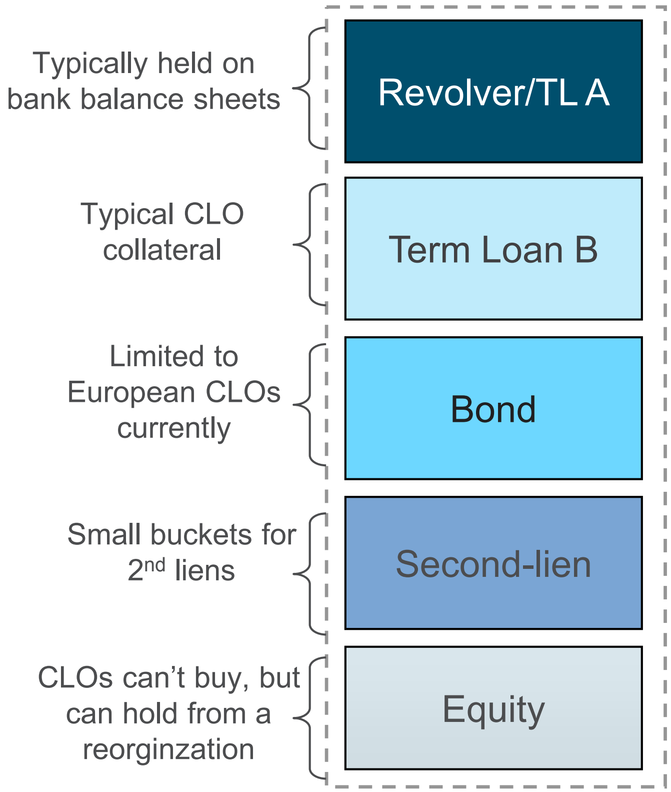
Leveraged loans are the main source of CLO collateral, making up most collateral pools for US CLOs (due to Volcker) and ~85% of European CLO collateral pools

	Leveraged Loans	Senior Secured HY Bond	Unsecured HY Bond
Coupon:	Floating (Libor/Euribor +)	Mostly fixed, some FRN	Fixed
Maturity:	5-7 years	5-7 years	7-10 years
Non-Call Period:	6-12 month soft call	Typically 1yr for FRN, 2-5yr for Fixed	Typically 3-5 years
Prepayment:	Usually 101 during soft call, par after	After non-call. Can have make-whole before	After non-call. Can have make-whole before
Financial Covenants	Mostly incurrence now (cov-lite)	Incurrence only	Incurrence only
Security:	Secured by assets of the Issuer	Secured by assets of the Issuer	Unsecured
Historical Recovery Rates:	~67% for 1st lien, ~32% for 2nd lien	~54%	~38%
Rating:	Larger facilities publicly rated, smaller have private/shadow ratings	Publically rated	Publically rated
Documentation:	Bespoke	Fairly standardised	Fairly standardised
Disclosure:	Typically private – to lenders only	Mostly public	Mostly public

Note: Recoveries are average issuer-weighted recoveries from 1983-2018. Source for all charts: Moody's, Barclays Research

Broadly Syndicated Loans

Typical Capital Structure



General Characteristics

- Leveraged loans are used to finance the senior parts of the capital structure of:
  - Leveraged buyouts (LBO) or mergers and acquisitions (M&A)
  - Sub-investment grade, fallen angel and cross-over credits
- Leverage loan features:
  - **Floating rate instruments**
    - Relative insensitivity to interest rate movements
  - **Short non-call**
    - Flexibility to refinance when spreads tighten
  - **Diversification**
    - Access to credits/sectors beyond the public markets
  - **Higher recoveries**
    - Security on the assets of the company and seniority in the capital structure

Source for all charts: Barclays Research

CLO Industry Exposure

- Industry exposure in CLOs tends to closely match the overall loan indices
- In the US, this is the S&P/LSTA Leveraged Loan Index (LLI – BBG:SPBDALB Index)
- In Europe, this is the European Leveraged Loan Index (ELLI – BBG:SPBDELB Index)

Top US BSL CLO Industry Exposure

	Industry	Exposure
1	Healthcare & Pharmaceuticals	10.8%
2	High Tech	9.8%
3	Services: Business	8.3%
4	Banking, Finance, Insurance & Real Estate	8.2%
5	Hotels, Gaming & Leisure	5.5%
6	Telecommunications	5.5%
7	Media: Broadcasting & Subscription	5.0%
8	Chemicals, Plastics & Rubber	4.1%
9	Services: Consumer	3.6%
10	Beverage, Food & Tobacco	3.4%
11	Construction & Building	3.3%
12	Retail	3.0%
13	Capital Equipment	3.0%
14	Automotive	3.0%
15	Energy: Oil & Gas	2.8%

Top European CLO Industry Exposure

	Industry	Exposure
1	Healthcare & Pharmaceuticals	15.3%
2	Services: Business	9.5%
3	Chemicals, Plastics & Rubber	8.0%
4	High Tech	7.8%
5	Hotels, Gaming & Leisure	6.7%
6	Telecommunications	5.2%
7	Banking, Finance, Insurance & Real Estate	4.8%
8	Retail	4.5%
9	Beverage, Food & Tobacco	4.2%
10	Services: Consumer	4.2%
11	Construction & Building	3.8%
12	Capital Equipment	3.6%
13	Media: Broadcasting & Subscription	3.2%
14	Containers, Packaging & Glass	3.1%
15	Automotive	2.8%

Note: Only assets within in-reinvestment CLOs. Data as of January 14, 2020. Source for all charts: Kanerai, Intex, Barclays Research

CLO Issuer Exposure

- CLOs hold 150-300+ issuers, with positions rarely making up more than 1-2%
- Leveraged loans are issued by commonly known companies like Dell or Ziggo

Top US BSL CLO Issuer Exposure

	Issuer	Bal. ($mm)	Deals w/ exp.	Med. Exp.
1	CenturyLink	$2,380	73.5%	0.6%
2	Envision Healthcare	2,328	77.7%	0.6%
3	Dell Technologies	2,326	78.6%	0.6%
4	Berry Plastics Group	2,031	78.6%	0.5%
5	Panther BF Aggregator 2 LP	2,012	77.6%	0.5%
6	Starfruit Finco B.V.	1,927	77.8%	0.5%
7	Scientific Games	1,887	66.1%	0.6%
8	Financial & Risk US Holdings	1,805	58.2%	0.6%
9	Univision Communications	1,792	55.5%	0.6%
10	Bass Pro Group	1,707	59.3%	0.5%
11	RegionalCare Hospital Partners	1,674	54.4%	0.6%
12	Brookfield WEC Holdings	1,617	63.2%	0.5%
13	Amneal Pharmaceuticals	1,520	53.3%	0.5%
14	Virgin Media	1,515	65.1%	0.4%
15	Radiate Holdco	1,487	57.7%	0.5%

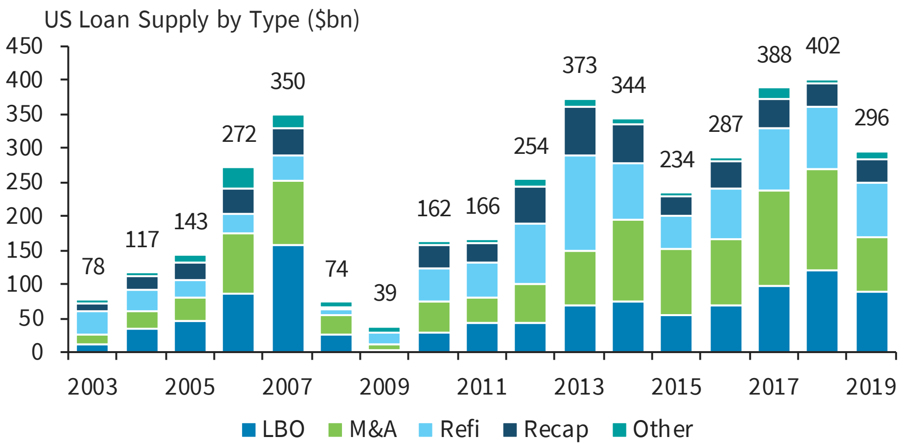
Top European CLO Issuer Exposure

	Issuer	Bal. (€mm)	Deals w/ exp.	Med. Exp.
1	EG Group Limited	€985	79.3%	1.2%
2	Flora Food Group	926	82.4%	1.0%
3	Springer Science & Business	909	74.2%	1.2%
4	Ziggo	891	75.4%	1.1%
5	Verisure Holding	881	77.3%	1.1%
6	ION Trading Technologies	871	74.6%	1.1%
7	Ceva Sante Animale	852	90.2%	0.9%
8	Auris Luxembourg III	848	89.5%	0.9%
9	Action Holdings	847	78.9%	1.0%
10	Techem Verwaltungsgesellschaft 675 MBH	845	78.9%	1.0%
11	Starfruit Finco B.V.	806	89.1%	0.9%
12	Panther BF Aggregator 2 LP	804	84.4%	0.9%
13	Financial & Risk US Holdings	792	70.7%	1.0%
14	Ahlsell AB (publ)	756	82.8%	0.8%
15	Elsan	744	76.2%	0.9%

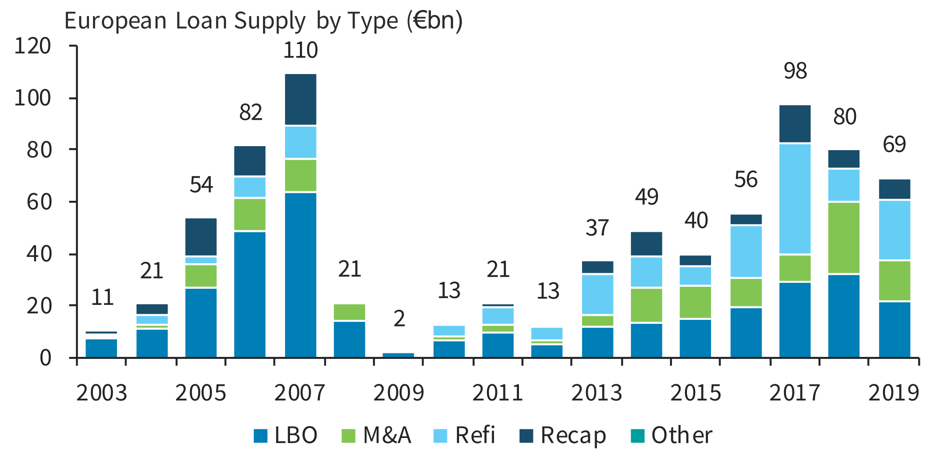
Note: Only assets within in-reinvestment CLOs. Data as of January 14, 2020. Source for all charts: Kanerai, Intex, Barclays Research

Loan Supply, Outstanding and Primary Buyers

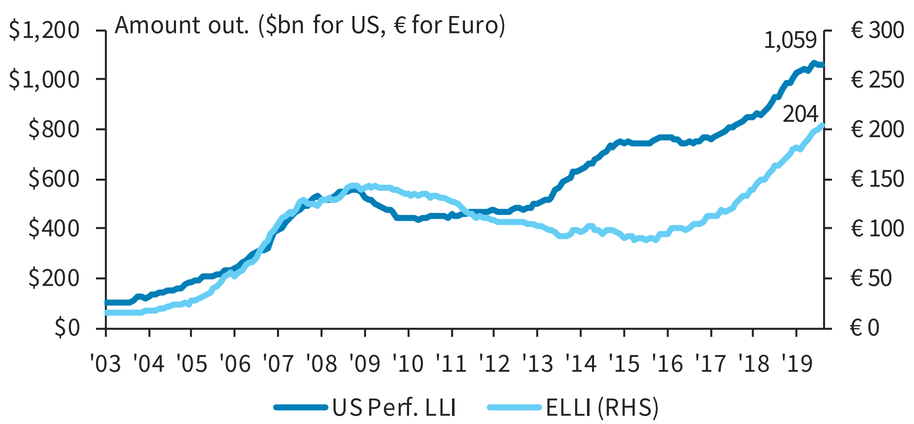
US Leveraged Loan Supply



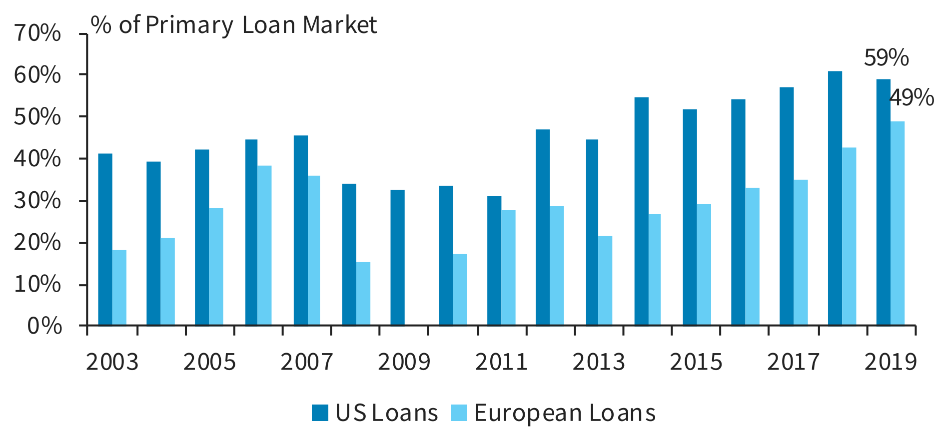
European Leveraged Loan Supply



Outstanding Loan Market Size



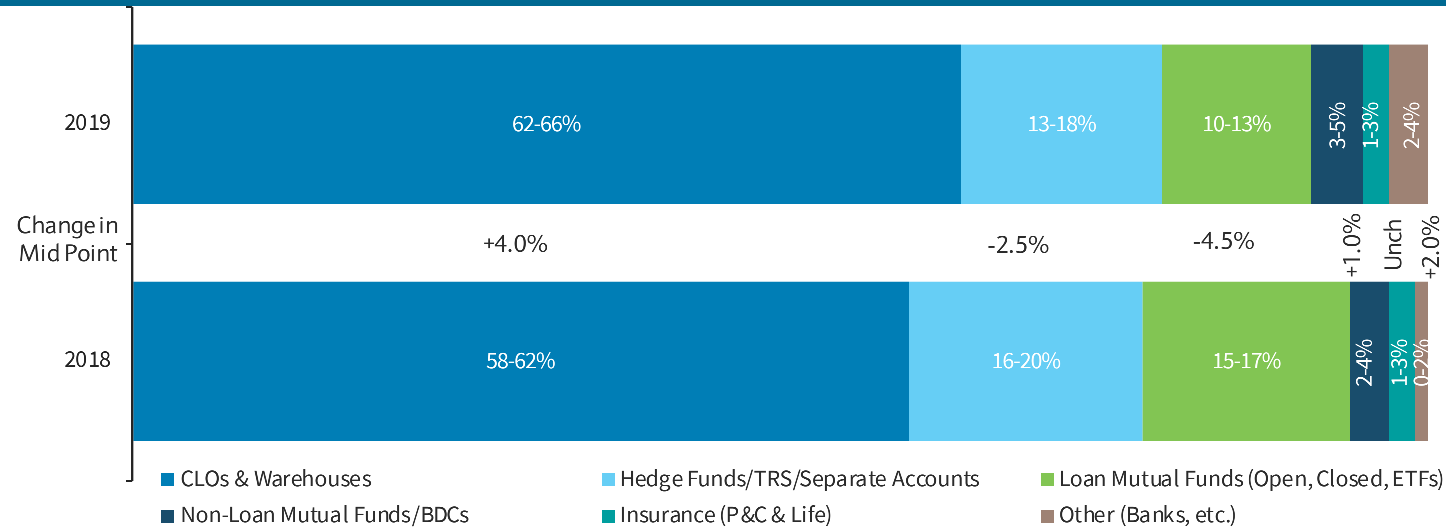
CLOs Purchases of Primary Loan Market



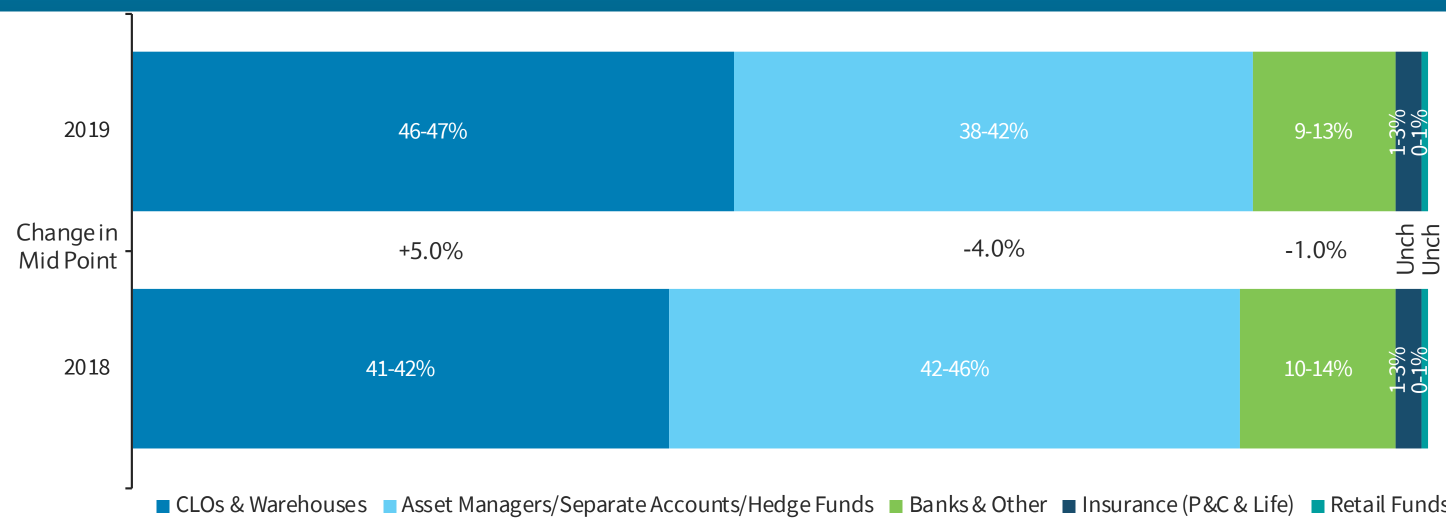
For more detail, see "Rumble in the CLO Jungle: US versus Europe," May 17, 2019. Note: Supply is ex-repricing. Source for all charts: S&P LCD, Barclays Research

Loan Holder Base

US Loan Market Holder Base



European Loan Market Holder Base

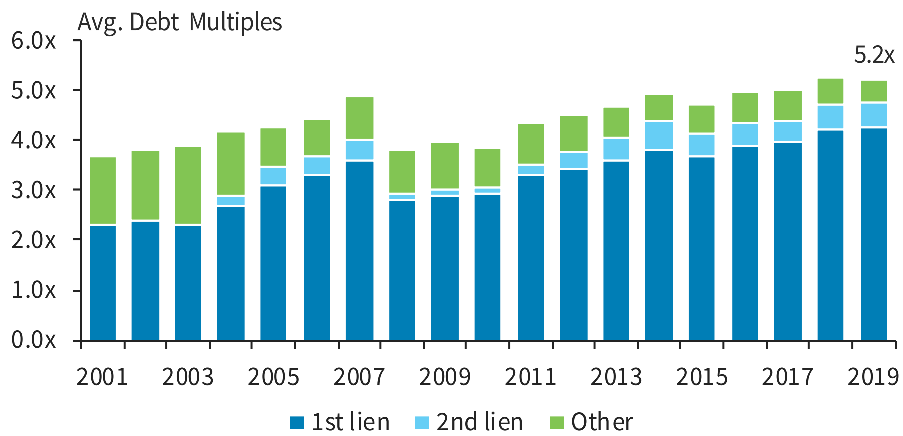


For more detail, see "CLOs Take More of the Demand Pie," November 1, 2019 and "European CLOs Increasing Loan Market Share," November 22, 2019.
Source for all charts: S&P LCD, Lipper, Bloomberg, EPFR, HFR, Creditflux, Federal Reserve, Refinitiv, Kanerai, Bloomberg Barclays Indices, Barclays Research

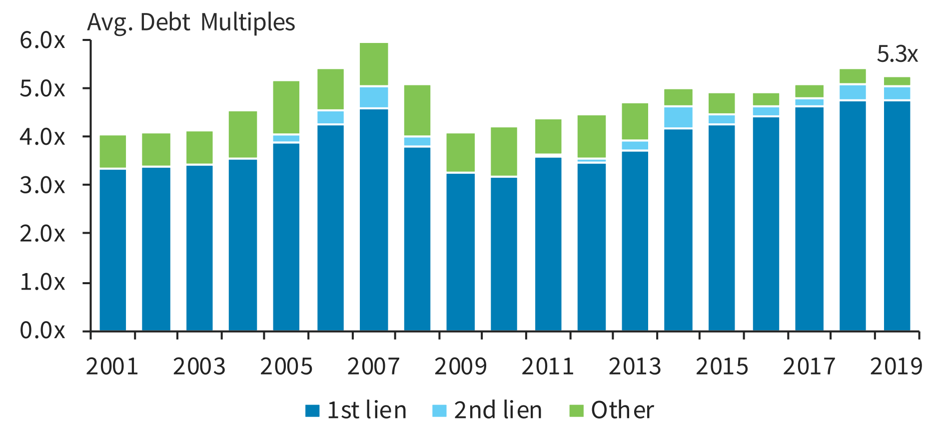
Restricted - External

New Issue Loan Credit Stats

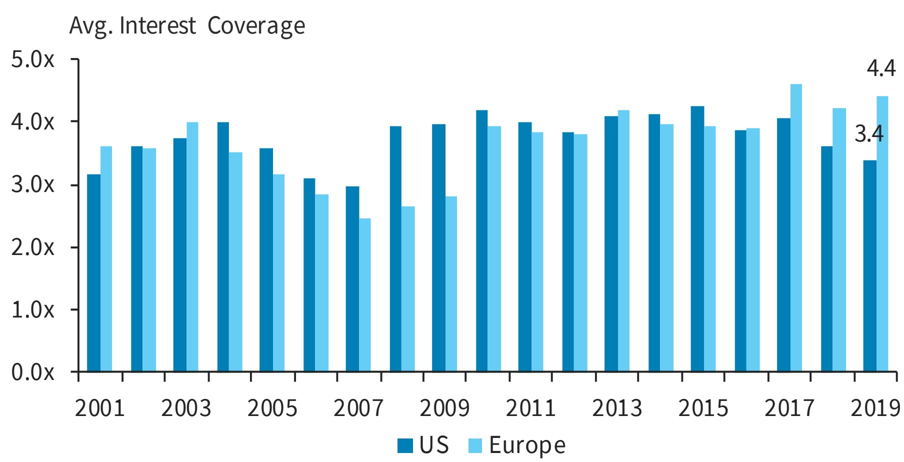
US New Issue Leverage



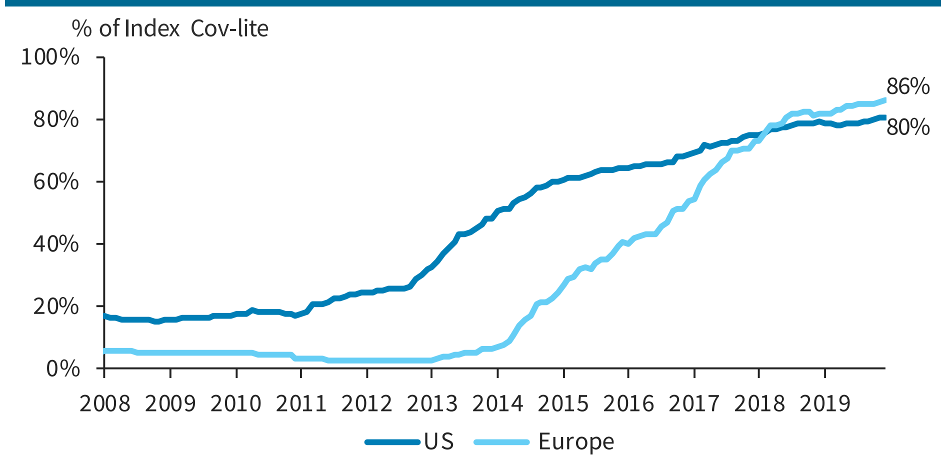
European New Issue Leverage



New Issue Interest Coverage



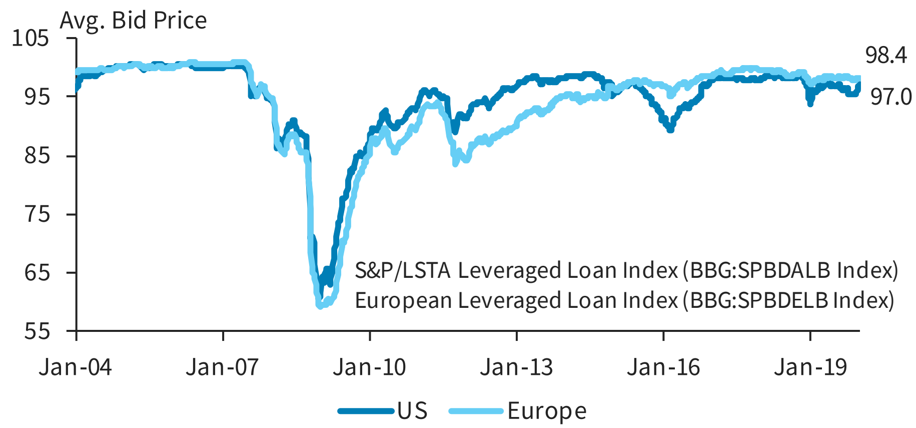
Cov-Lite % of Loan Index



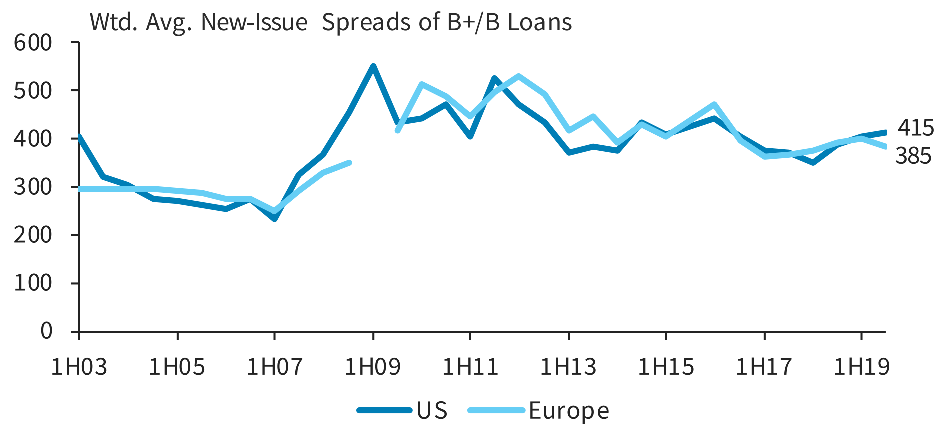
Source for all charts: S&P LCD, Barclays Research

Loan Market Stats

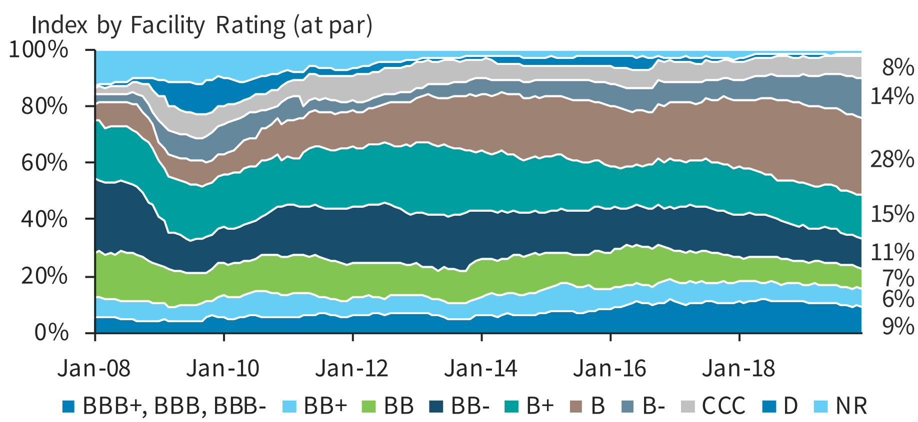
Average Bid Price



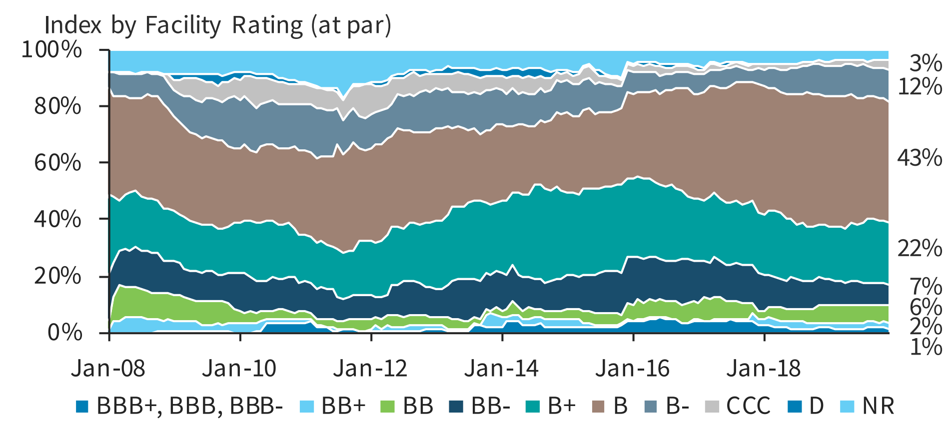
New Issue Spreads



US Loan Market Ratings



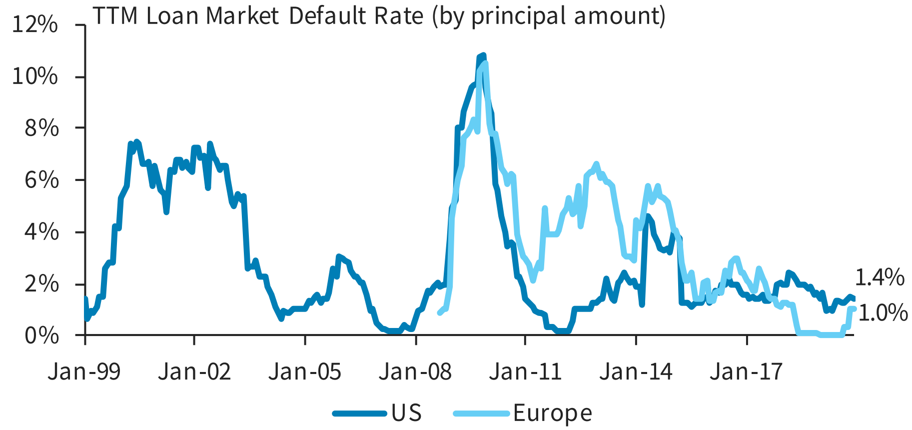
European Loan Market Ratings



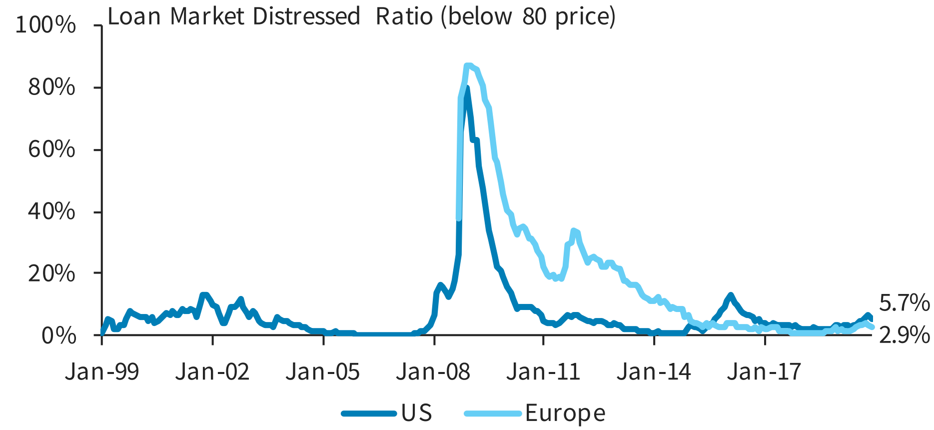
Source for all charts: S&P LCD, Barclays Research

Loan Defaults, Maturities and Repayments

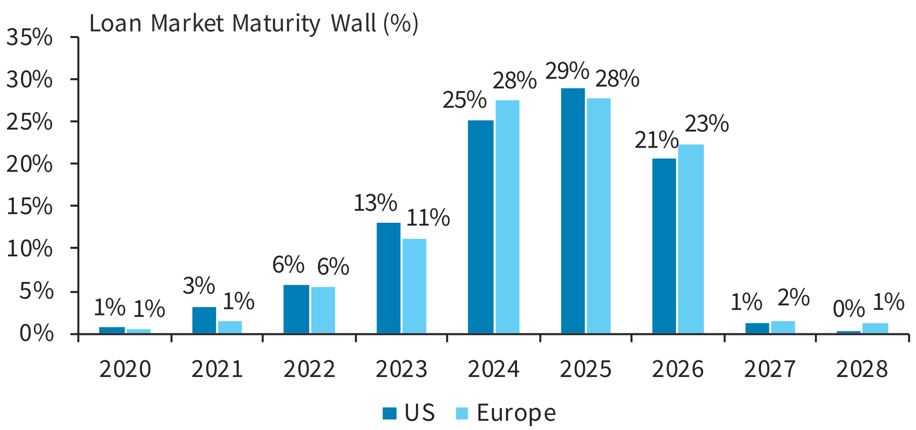
Default Rates



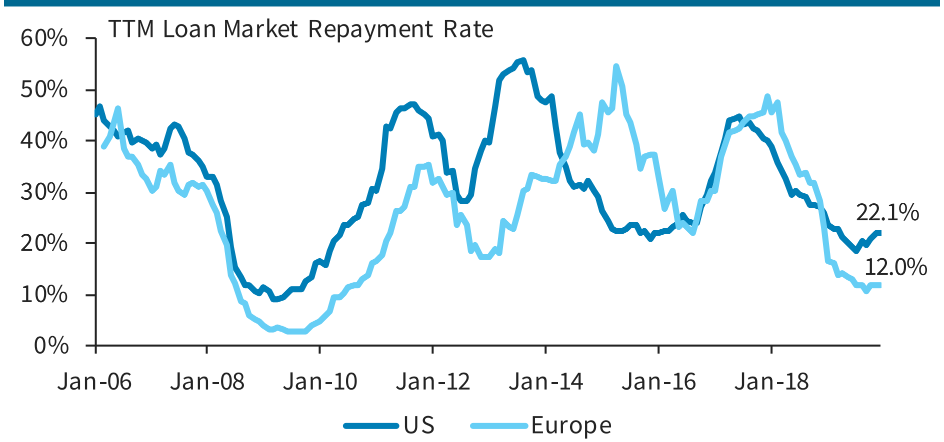
Distressed Ratios



Loan Market Maturity Wall



Loan Market Repayments

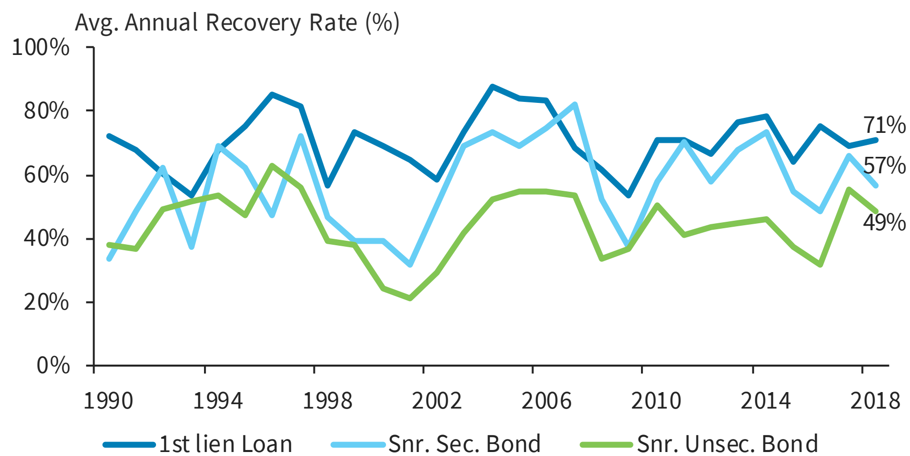


Source for all charts: S&P LCD, Barclays Research

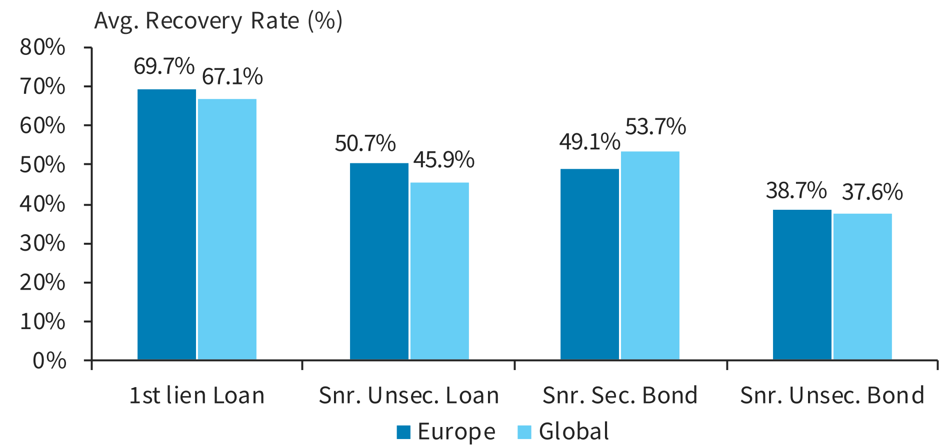
Asset Recovery Rates

- Historical 1st lien loan recovery rates have averaged around 70% in the US and Europe
- We think recoveries will be lower going forward, though, due to the increase in total leverage for loan issuers, primarily through more first-lien debt and the lack of unsecured capital behind loans compared with the past
- The increase in the amount of loan-only capital structures to almost 60% in the US and 77% in Europe is likely to pressure recoveries as well
- We believe that over a full cycle, recoveries could be as much as 10pts lower ($60 versus $70)
- Our conclusions of lower recoveries are supported by rating agency recovery data on covenant-lite loans, which now represent at least 80% of the market

US Recovery Rates



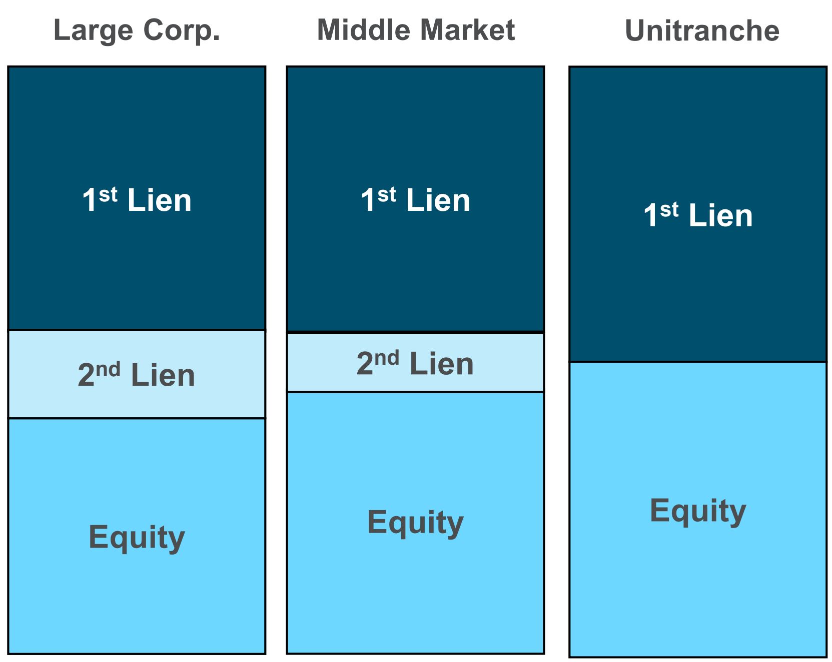
European Recovery Rates



For more detail, see "Downside to Recoveries after a Long Recovery," July 12, 2019. Note: EU recovery rates based on 1998-2017 data. Source for all charts: Moody's, Barclays Research

Middle Market Loans

Typical Capital Structures



- Middle market lending has traditionally been split into:
  - **Syndicated lending** (larger deals)
  - **Club lending** (few non-bank lenders join together)
  - **Direct lending** (a single non-bank lender underwrites the full loan)

General Characteristics

- Middle market (MM) loans tend to be smaller, more private assets versus typical corporate loans
- MM CLO managers tend to self-originate the underlying loans vs. purchasing in primary/secondary for BSL CLOs
- Large corporate leveraged loan comparisons:
  - **Size**
    - Issuers are smaller (EBITDA is $50-100mm or less)
    - Traditional MM deal size US$100mm or lower
    - Large MM deal size >US$100mm to US$500mm
  - **Liquidity**
    - Lower liquidity since smaller loans and self-originated
  - **Diversification**
    - Lower industry and obligor diversification
  - **Recoveries**
    - Tend to be higher for MM 1st lien (+6% from 2010-'18)
  - **Ratings**
    - Typically lower and are based on annual, point-in-time credit estimates
  - **Fundamentals**
    - Tend to have lower leverage, higher spreads, shorter maturities and more covenants for lower MM issuers

Source for all charts: S&P, Moody's, Fitch, Refinitiv, Barclays Research

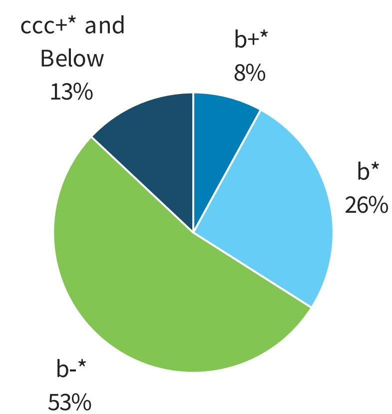
CLO Industry and Rating Exposure

- US MM CLOs tend to feature lower obligor and industry diversity, with about half as many unique obligors within a BSL CLO (eg, Healthcare exposure is ~11% in US BSL CLOs versus ~21% in MM CLOs)
- MM loans generally also tend to not be publically rated, thus asset ratings in MM CLOs usually rely more on annual credit estimates
- S&P depends on the CLO manager (as most loans are self-originated) to provide historical financial statements to determine a credit estimate that remains valid for typically one year
- MM CLOs typically have lower average asset ratings versus US BSL CLOs since MM issuers tend to be smaller, have higher customer concentrations and limited product and/or geographic diversification

Top Industry Exposures

	Industry	Exposure
1	Business Services	21.9%
2	Healthcare	20.8%
3	Computers & Electronics	12.3%
4	Industrial and Manufacturing	8.4%
5	Consumer Products	7.8%
6	Food, Beverage & Tobacco	4.2%
7	Gaming, Leisure & Entertainment	2.9%
8	Energy Oil & Gas	2.7%
9	Retail	2.4%
10	Auto & Related	2.1%

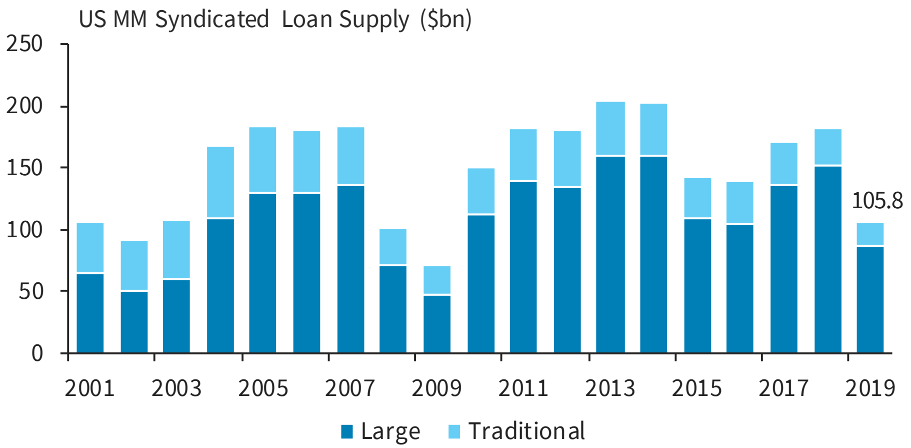
Rating Exposure



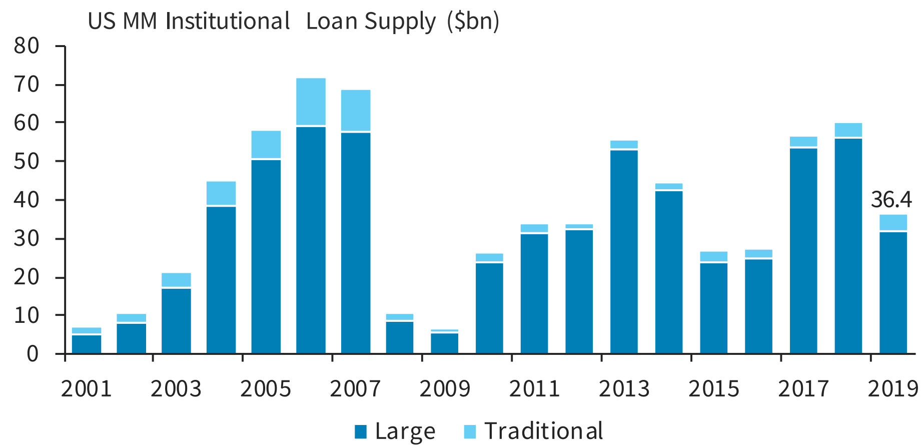
Note: Fitch rated MM CLOs only. Ratings are Fitch Credit Estimates. Data as of October 28, 2019. Source for all charts: Fitch, Barclays Research

Loan Supply

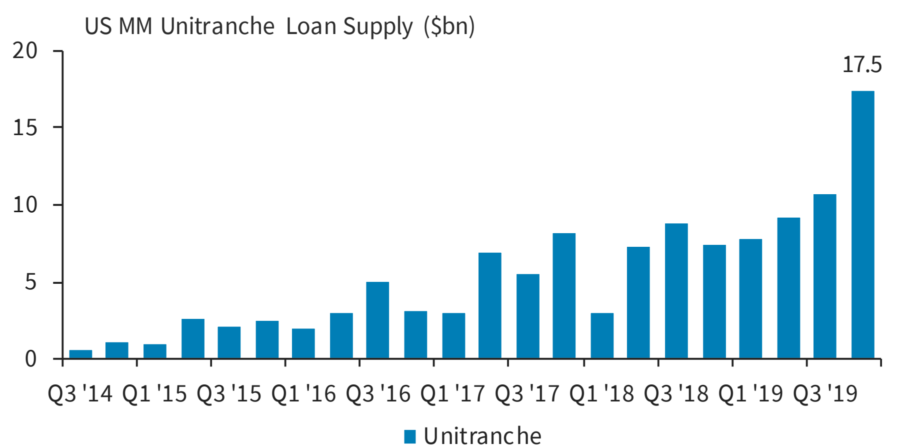
US MM Syndicated Loan Supply



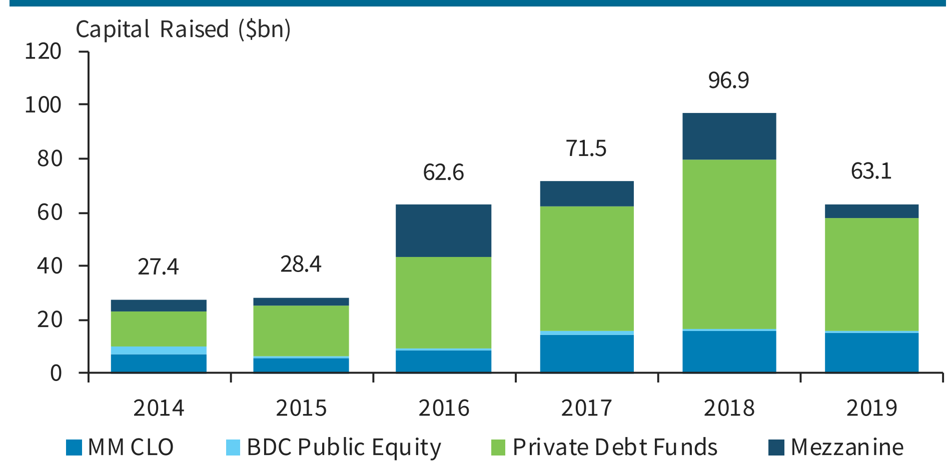
US MM Institutional Loan Supply



US MM Unitranche Supply



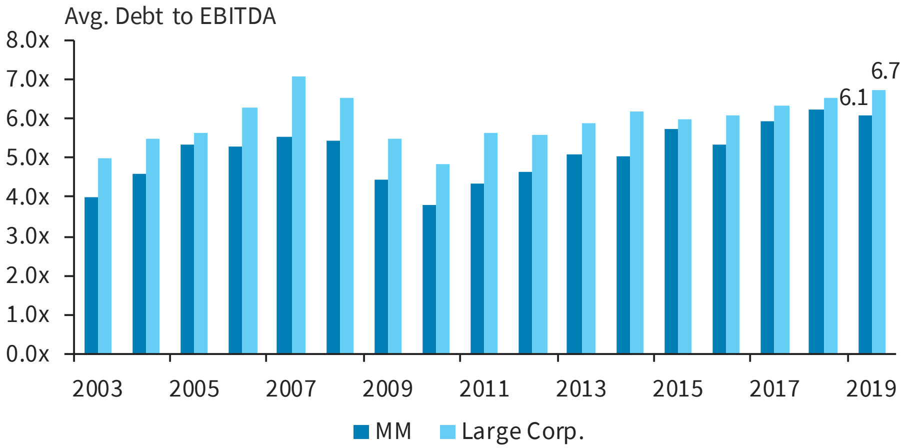
US MM Loan Fundraising



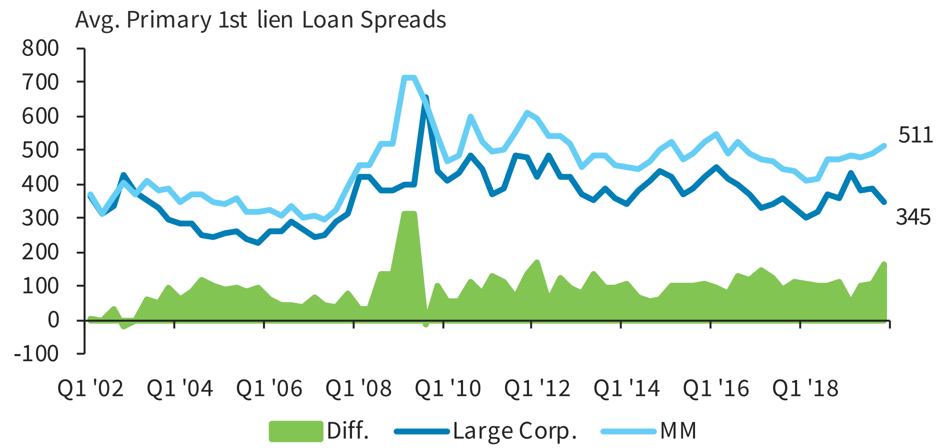
Note: Traditional MM is deal size US$100mm or lower, Large MM is deal size >US$100mm to US$500mm. Source for all charts: Refinitiv, Barclays Research

Loan Market Stats

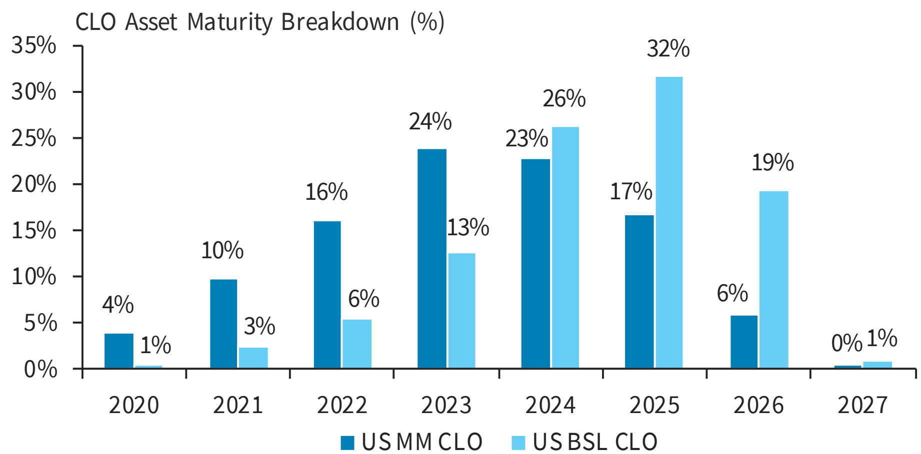
US New Issue Institutional MM Leverage



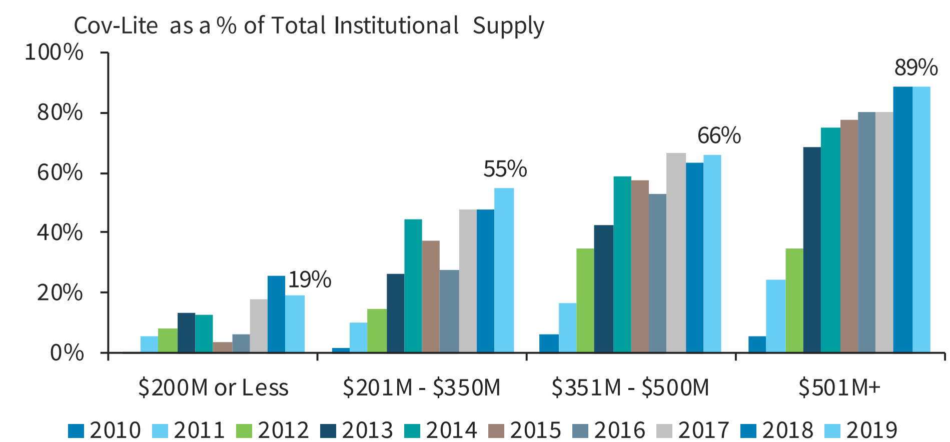
New Issue MM Loan Spreads



CLO Asset Maturity Wall



Cov-Lite % of New Issue Facility Size

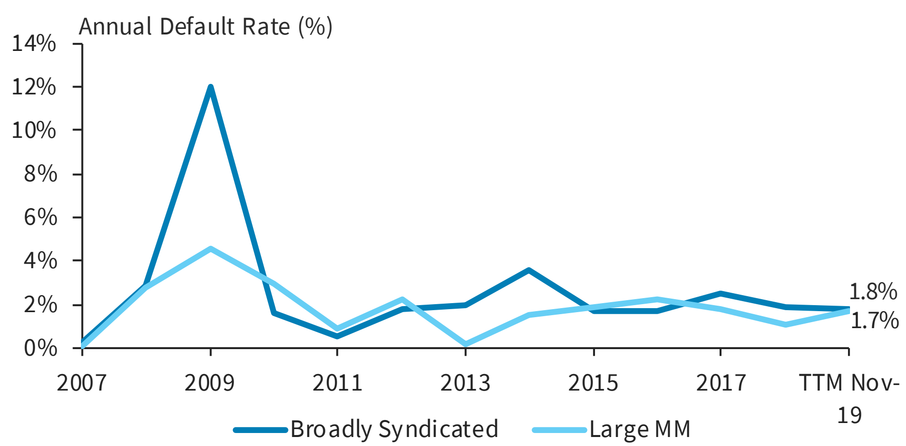


Source for all charts: S&P LCD, Refinitiv, Kanerai, Intex, Barclays Research

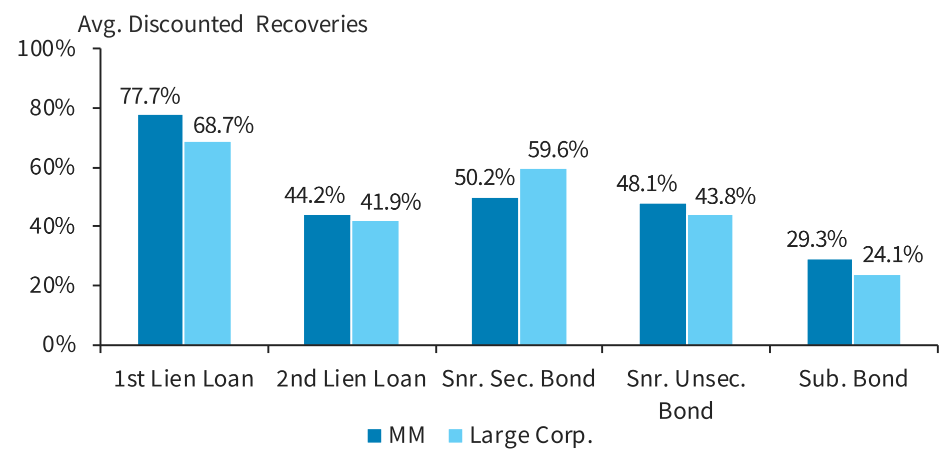
Loan Default & Recovery Rates

- Default rates for MM loans have tended to be in-line or lower than larger corporate loans
- MM CLOs often include ability to substitute deteriorating or defaulted loans for performing loans, allowing the structure to maintain par while the manager processes the loan through a work-out outside of the CLO structure
- Recovery rates for MM loans have tended to be higher than larger loans – 78% vs 69%
- But the gap has shrunk over time, from nearly 12% before 2010 to just 6% from 2010-2018
- MM recoveries tend to be more concentrated at the higher end of the range – more than 35% of the loans in S&P's sample recovered par or greater versus 20% for larger corporates
- MM defaults and recoveries tend to be better than broadly syndicated loans due less leverage in the structure (higher equity cushion) and greater coordination with the borrower and lenders

US BSL vs MM Default Rates



US BSL vs MM Recovery Rates



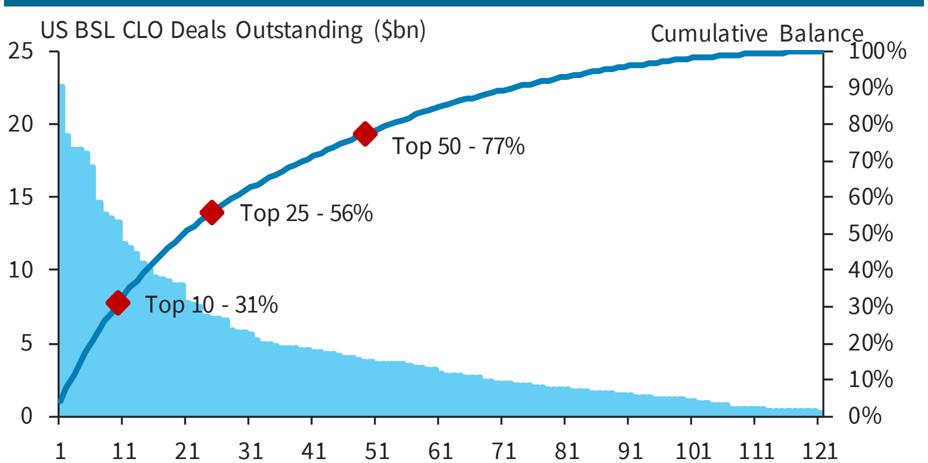
Note: Default for large MM is deal size >US$100mm to US$500mm. MM recoveries defined as those with $350mm or less in total debt outstanding at time of default. Data from 1987 to June 2018. Senior secured bonds tend to be the most subordinated debt in a MM structure, thus no cushion available for losses. Source for all charts: Refinitiv, S&P, Barclays Research

Table of Contents

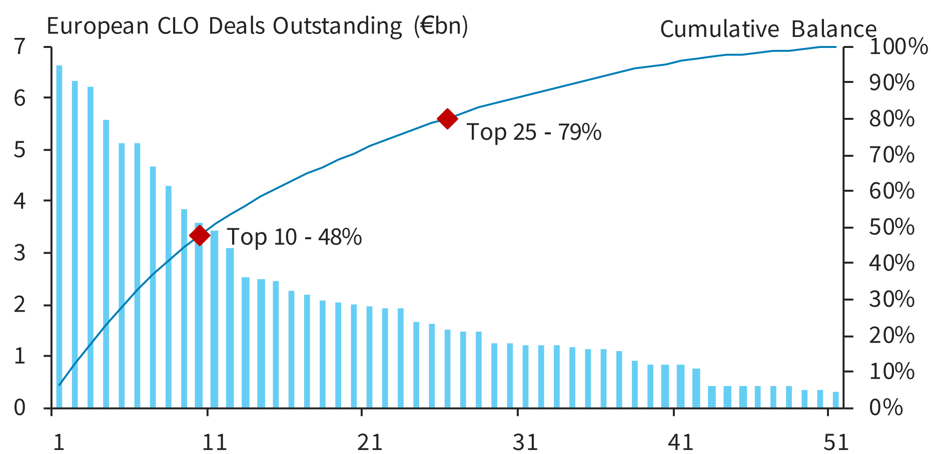
CLO Manager Overview

- CLO managers, typically affiliates of asset managers, credit funds and insurers, are responsible for trading the portfolio with the goal of maximising returns to CLO investors through asset selection
- CLO managers not only must have exceptional credit picking skills, but also have the proficiency to manage the portfolio within a CLO structure and the necessary resources to achieve such
- Investors closely monitor managers' track records, creating market perception of a manager which can affect debt pricing for new deals
- In order to understand a manager's incentives when trading the portfolio, as well as longevity in a sustained downturn, we encourage investors to analyze how a manager is compensated for a deal (do they own equity in the deal?) and their dependence on management fees
- CLO managers can resign or typically be removed for cause, which usually includes a willful violation of the deal documents, an Event of Default, or an unresolved "Key Person" departure

US BSL CLO Managers



European CLO Managers



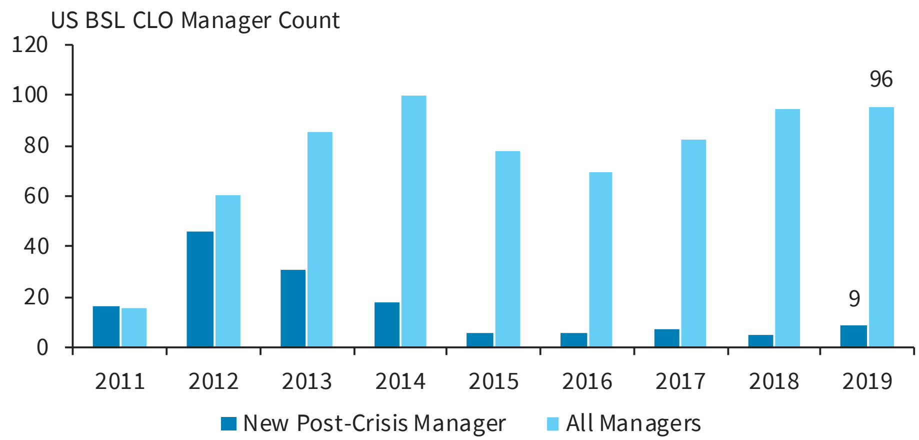
For more detail, see "European CLO AAA Relative Value Update," October 18, 2019.
Note: Only deals in reinvestment. Data as of January 14, 2020. Source for all charts: Kanerai, Intex, Barclays Research

US BSL CLO Managers

New Managers

- New **US BSL CLO** managers in 2019:
  - Elmwood Asset Mgmt.
  - Birch Grove Capital
  - Goldman Sachs Asset Mgmt.
  - Whitebox Capital Mgmt.
  - Fort Washington Investment Advisors
  - AGL CLO Credit Mgmt.
  - Morgan Stanley Investment Mgmt.
  - East West Investment Mgmt.
  - Halsey Point Asset Mgmt.

Manager Count



US BSL CLO Managers by Deal Balance

	Manager	#	Bal. ($bn)
1	Credit Suisse Asset Mgmt.	30	22.6
2	CIFC Asset Mgmt.	32	19.2
3	Octagon Credit Investors	31	18.3
4	GSO/Blackstone Debt Funds	29	18.2
5	Carlyle Investment Mgmt.	32	18.0
6	PGIM	31	17.0
7	MJX Asset Mgmt.	25	14.7
8	Sound Point Capital Mgmt.	22	13.8
9	Voya Alternative Asset Mgmt.	25	13.5
10	Ares CLO Mgmt.	22	13.3
11	Sculptor Loan Mgmt.	22	11.7
12	THL Credit Advisors	21	11.5
13	Apollo Capital Mgmt.	16	11.1
14	KKR Financial Advisors II	20	10.5
15	BlueMountain Capital Mgmt.	20	10.0
16	Neuberger Berman Investment Advisors	19	9.5
17	CBAM CLO Mgmt.	10	9.4
18	Anchorage Capital Group	19	9.2
19	LCM Asset Mgmt.	18	9.0
20	CVC Credit Partners	16	8.9

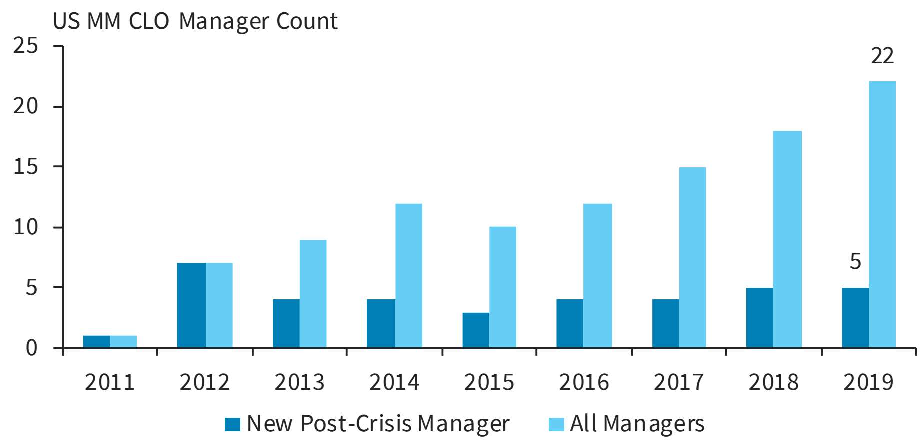
Note: Only deals in reinvestment. Source for all charts: Kanerai, Intex, LCD, Barclays Research

US MM CLO Managers

New Managers

- New **US MM CLO** managers in 2019:
  - THL Credit Advisors
  - Owl Rock Capital Advisors
  - Audax Mgmt.
  - PennantPark Investment Advisors
  - FS KKR

Manager Count



US MM CLO Managers by Deal Balance

	Manager	#	Bal. ($bn)
1	Golub Capital	17	12.8
2	Antares Capital Advisers	6	6.6
3	MidCap Financial Services Capital Mgmt.	6	3.5
4	Ivy Hill Asset Mgmt.	7	3.4
5	Fortress	4	3.2
6	Cerberus Capital Mgmt.	7	2.7
7	AB Private Credit Investors	6	2.1
8	MCF Capital Mgmt.	6	2.1
9	Monroe Capital Mgmt.	5	2.1
10	First Eagle Private Credit	3	1.3
11	BMO Asset Mgmt. Corp.	3	1.1
12	Garrison Investment Group	3	1.1
13	Maranon Capital	2	1.0
14	Bain Capital Credit	2	1.0
15	Tennenbaum Capital Partners	3	0.9
16	Barings	2	0.9
17	NXT Capital Investment Advisers	2	0.8
18	THL Credit Senior Loan Strategies	2	0.7
19	Owl Rock Capital Advisors	1	0.6
20	GSO/Blackstone	1	0.6

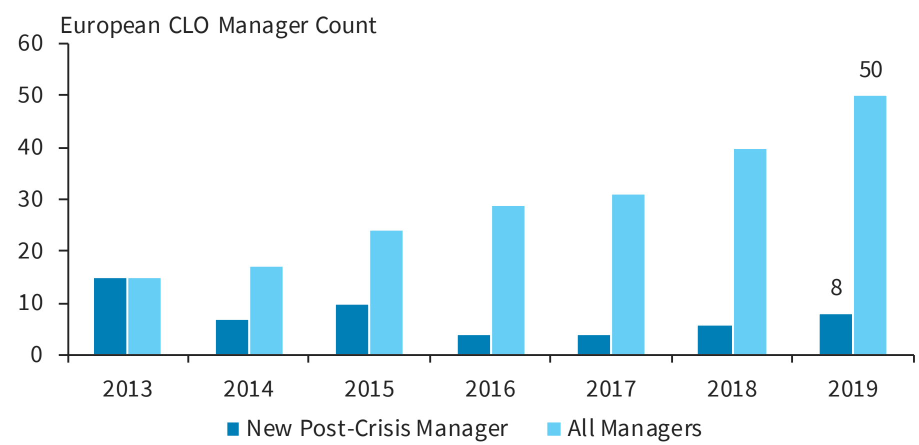
Note: Only deals in reinvestment. Source for all charts: Kanerai, Intex, LCD, Barclays Research

European CLO Managers

New Managers

- New **European CLO** managers in 2019:
  - Sound Point
  - Fair Oaks Capital
  - Napier Park Global Capital
  - CIFC Asset Mgmt.
  - MeDirect Bank
  - Angelo Gordon
  - Mackay Shields
  - Capital Four

Manager Count



European CLO Managers by Deal Balance

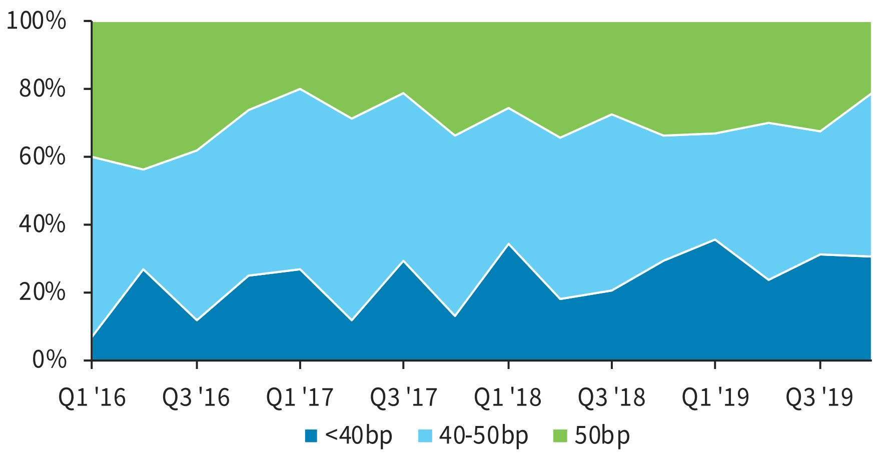
	Manager	#	Bal. (€bn)
1	GSO/Blackstone Debt Funds	15	6.6
2	PGIM	14	6.3
3	CELF Investment Advisors	14	6.2
4	Investcorp Credit Mgmt.	13	5.6
5	CVC Credit Partners Group	12	5.1
6	KKR Credit Advisors	11	5.1
7	Credit Suisse Asset Mgmt.	10	4.7
8	Intermediate Capital Group	10	4.3
9	Alcentra	9	3.9
10	Barings	8	3.6
11	BlackRock Investment Mgmt.	8	3.4
12	Ares European Loan Mgmt.	7	3.1
13	Apollo Credit Mgmt.	6	2.5
14	Cairn Loan Investments	7	2.5
15	Sculptor Europe Loan Mgmt.	6	2.5
16	Bain Capital Credit	6	2.3
17	Oak Hill Advisors	5	2.2
18	Bardin Hill Loan Advisors	6	2.1
19	Oaktree Capital Mgmt.	5	2.0
20	Spire Partners	5	2.0

Note: Only deals in reinvestment. Source for all charts: Kanerai, Intex, LCD, Barclays Research

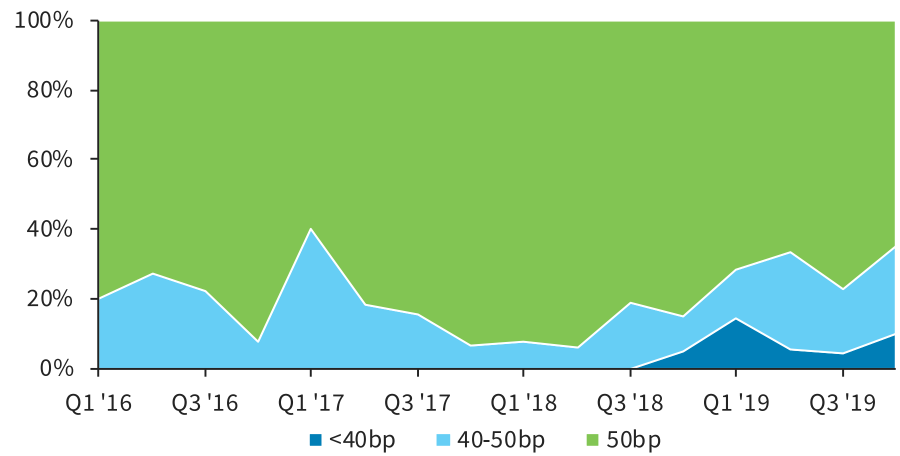
CLO Management Fees

- The CLO manager is paid a fee for managing the pool of assets:
  - **Senior Fee (~15bp)** – Paid near the top of the waterfall, typically after deal fees
  - **Subordinate Fee (~25-35bp)** – Paid just before equity holders, so susceptible to shortfall if OC or ID test is failing. This fee accumulates until the test is passing
  - **Incentive Fee** – Paid when the equity IRR exceeds a specified return (return hurdle, typically 12%, and initial price for IRR provided in deal documents). Typically 20% of the cash that would go to equity holders then goes to the manager. The fee is back-end loaded, though, and usually only kicks in when the deal is called or in run-down

US BSL CLO Total Management Fees



European CLO Total Management Fees

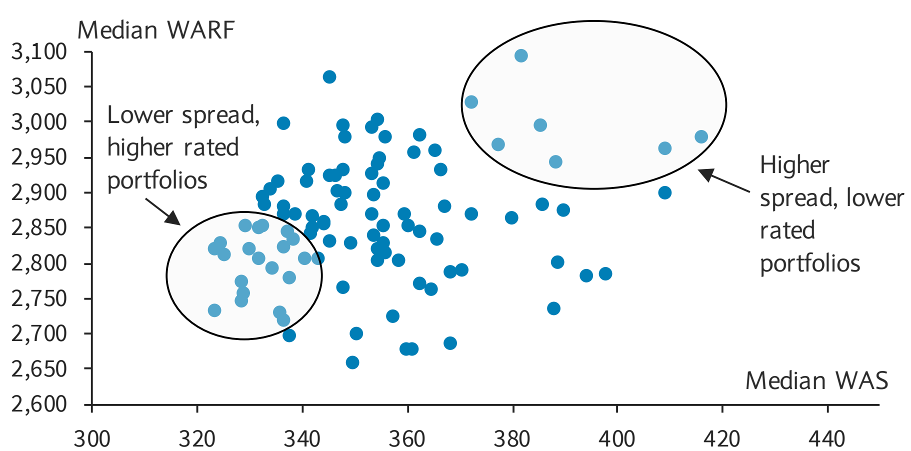


For more detail, see "CLO Equity: The Long and Short of It," April 12, 2019. Note: Data by deal closing dates. Source for all charts: Kanerai, Intex, Barclays Research

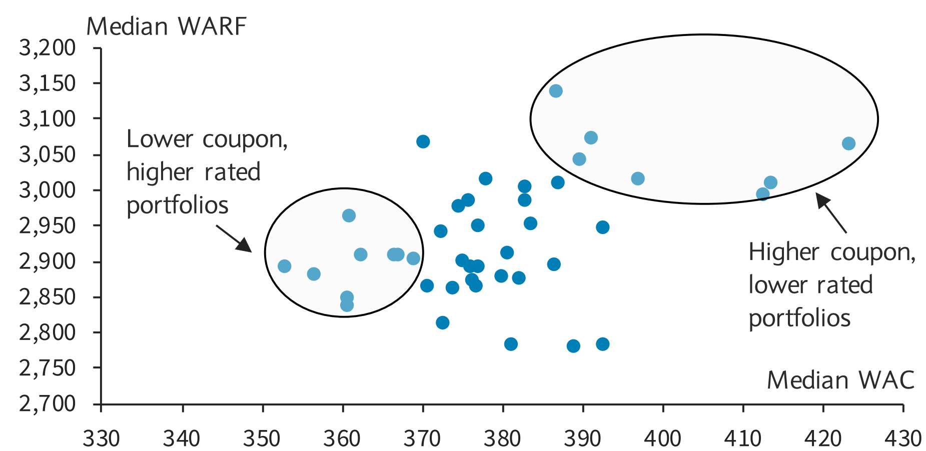
BSL CLO Manager Strategy Analysis

- A manager has to carefully balance asset ratings and asset spreads to ensure CQTs are managed so trading (and hopefully par building) can continue. It is important for CLO investors to understand how CLO managers are achieving this through portfolio construction
- A CLO investor should be able to answer questions such as:
  - Does the manager have a higher spread, lower rated portfolio that tends to make higher equity distributions? Or is the portfolio generally more conservative?
  - What is the distribution of asset ratings? Is the portfolio barbelled with more higher rated assets (e.g. BBs) but more lower rated assets (e.g. B3s)?
  - How liquid are the underlying assets? Does the manager tend to hold lower facility size loans?
- One method to understanding a manager's strategy is by comparing the WARF versus WAS/WAC

WARF vs WAS in US BSL CLOs



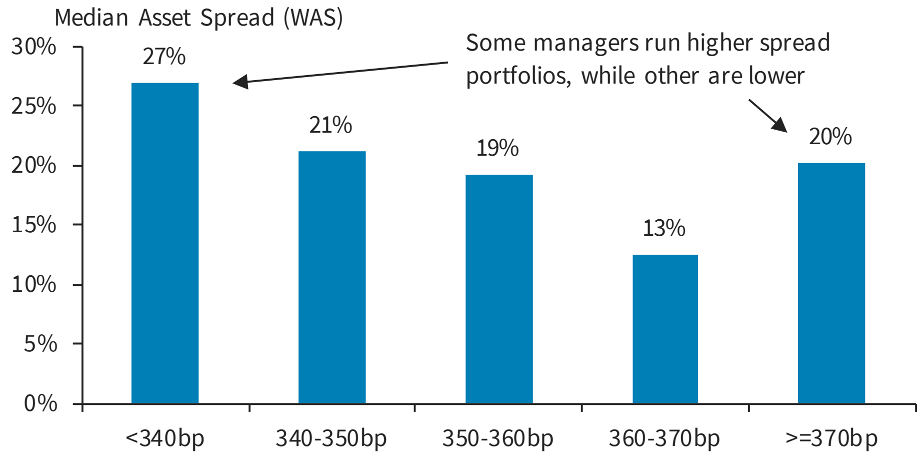
WARF vs WAC in European CLOs



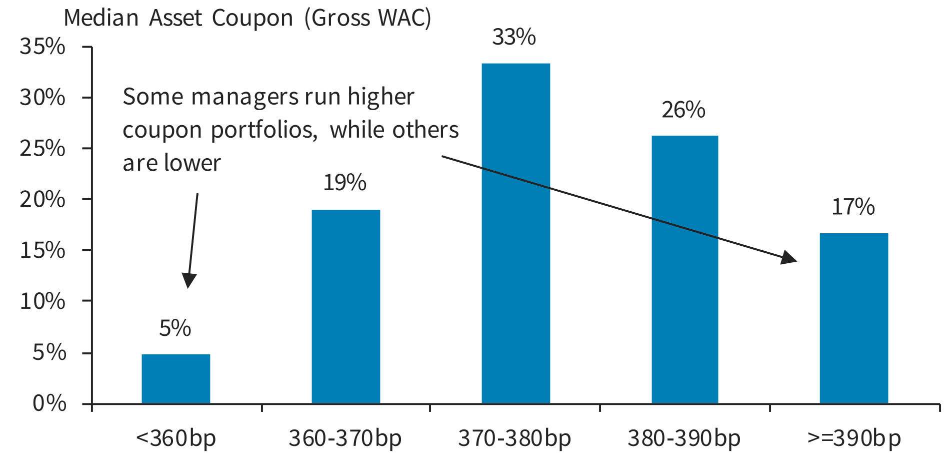
For more detail, see "Loan Downgrades on the Rise: Implications for CLOs," June 21, 2019 and "Global CLO Update", October 29 2019. Note: Only managers with at least two deals in reinvestment. Data as of 14 January 2020. Source for all charts: Kanerai, Intex, Barclays Research

BSL CLO Manager Strategy Analysis

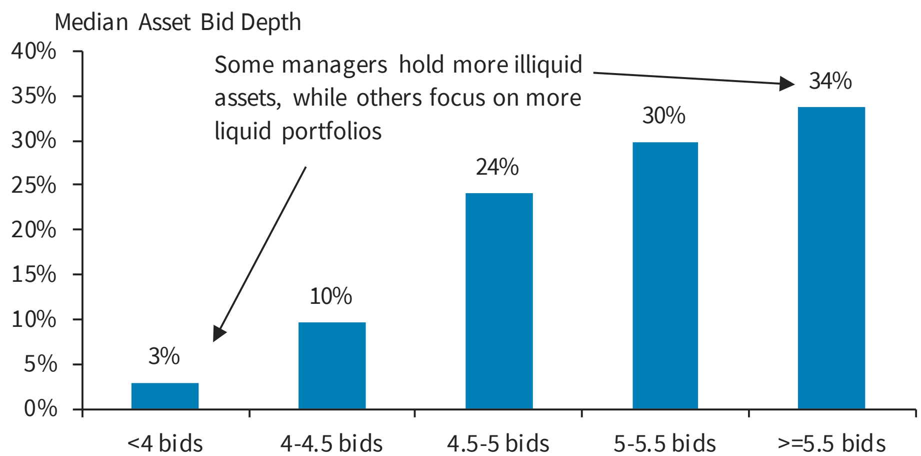
US BSL CLO Asset Spreads



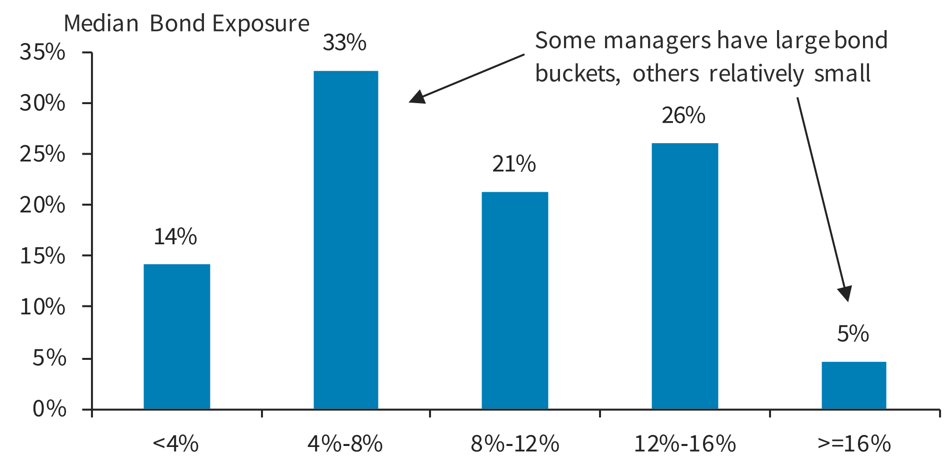
European CLO Asset Coupons



US BSL CLO Asset Liquidity



European CLO Bond Exposure

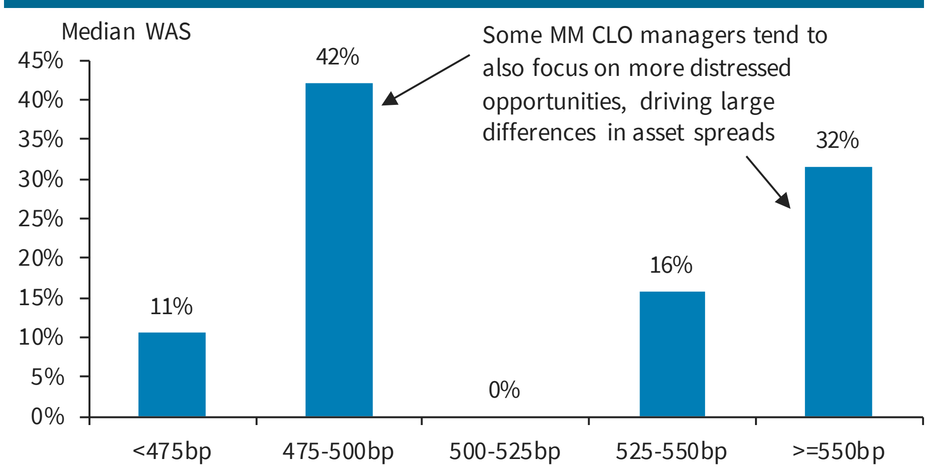


Note: Only managers with at least two deals in reinvestment. Data as of 14 January 2020. Source for all charts: Kanerai, Markit, Intex, Barclays Research

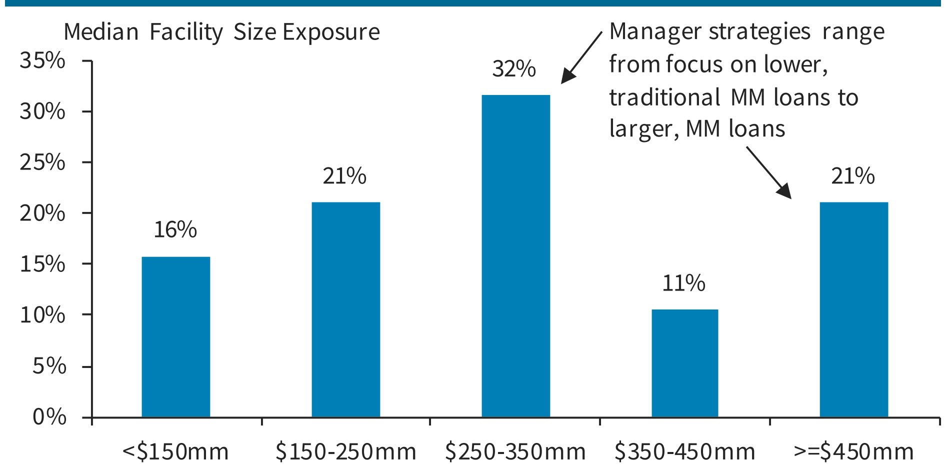
MM CLO Manager Strategy Analysis

- Understanding a manager's strategy in the MM CLO space is arguably even more important than for broadly syndicated loan managers
- The mindset of holding self-originated loans is quite different than the BSL space, where portfolio turnover is achieved through refi's and reinvestment as opposed to buying and selling in the primary and secondary market
- Some MM CLO managers focus on the smaller, more traditional MM lending space, while some CLO managers focus on the larger MM opportunities
- Some managers will also use MM CLOs as relatively cheaper funding for more distressed opportunities in the MM space

US MM CLO Asset Spreads



US MM CLO Facility Size Exposure



For more detail, see "Loan Downgrades on the Rise: Implications for CLOs," June 21, 2019 and "Global CLO Update", October 29 2019. Note: Only managers with at least two deals in reinvestment. Data as of 14 January 2020. Source for all charts: Kanerai, Intex, Barclays Research

Table of Contents

CLO Tranche Investor Overview

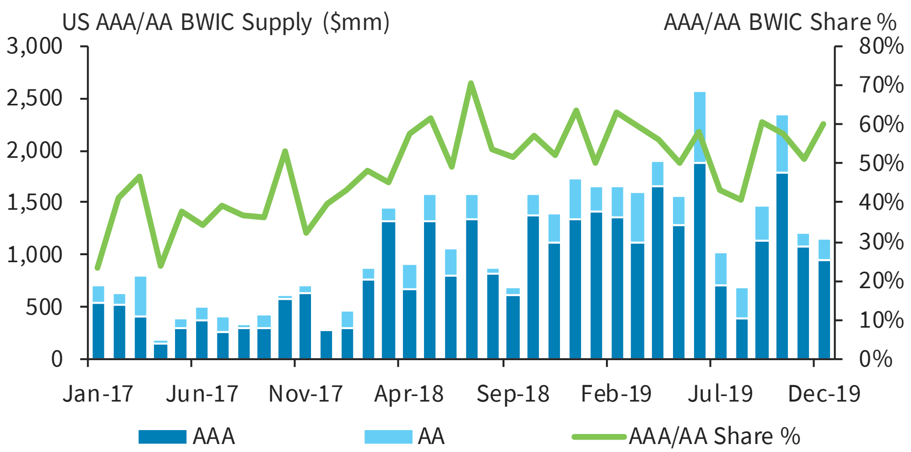
Rating	Investor Types	Investor Priorities	Investor Concerns
AAA-AA	Banks Asset Managers Insurers Pensions	• Safety of principal • Predictability of amortization speed	• Reinvestment risk due to uncertainty regarding timing of principal repayment • Strength of indenture language limiting manager latitude after reinvestment period
A-BBB	Asset Managers Insurers Pensions Credit Funds	• Safety of principal • Predictability of amortization speed • Secondary market liquidity	• Reinvestment risk due to uncertainty regarding timing of principal repayment • Strength of indenture language limiting manager latitude after reinvestment period
BB-B	Asset Managers Pensions Credit Funds	• Credit loss avoidance • Acceleration of discount amortization • Secondary market liquidity	• Collateral portfolio composition and potential tail risks • Manager track record for uninterrupted payments to all liability tranche holders
Equity	Asset Managers CLO Managers Credit Funds BDCs Insurers (e.g. combo notes) Risk Retention Vehicles	• Credit loss avoidance • Residual cash flow maximization • Maintaining leverage & low cost of debt	• Collateral portfolio composition and growing tail risks • Manager track record for maintaining equity distributions • Manager risk retention

Source for all charts: Barclays Research

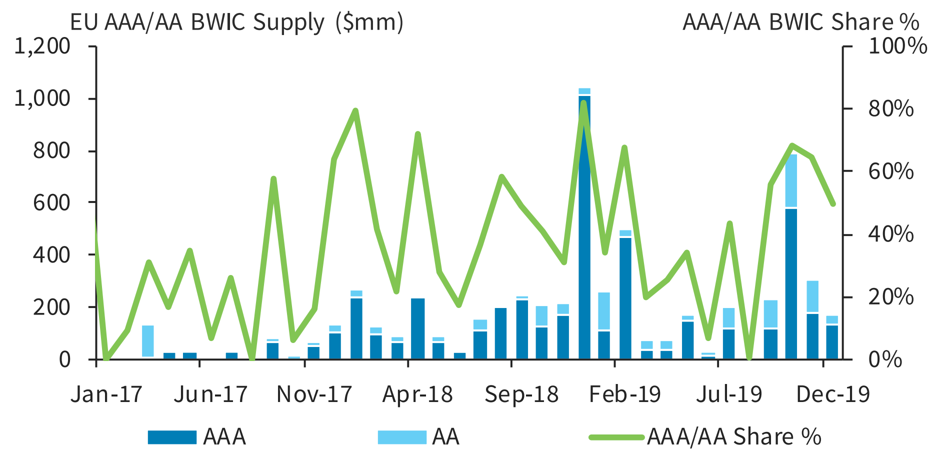
CLO AAA-AA Tranche Profile

- CLO AAA tranches account for nearly 60% of the ratings stack, meaning the AAA buyer base is, by definition, larger in size than all other tranches combined
- Banks across the globe continue to be the largest holders of CLO tranches, where a vast majority of their holdings are concentrated in AAA tranches (~60% of global CLO AAA tranches). Insurers' participation in AAs is especially evident in the mix of floating versus fixed rate coupons
- The default risk in AAA and AA tranches is considered to be very remote thanks to their significant overcollateralization and position within the cash flow waterfall
- Thus, these tranche buyers tend to focus less on the details of a CLO's actual collateral portfolio and more on factors such as manager reputation and track record, documentation strength (particularly around post-reinvestment limitations), and expectations of secondary liquidity

US CLO AAA/AA BWIC Activity



European CLO AAA/AA BWIC Activity



for more detail, see "Tracking Global CLO Ownership", November 8 2019. BWIC stands for "Bids Wanted in Competition", an auction style process to buy and sell tranches through dealers.
Source for all charts: Kanerai, Intex, BOE, BOJ, FED, FDIC, Lipper, HFR, NAIC, Fitch, Bloomberg, company financials, Barclays Research

Restricted - External

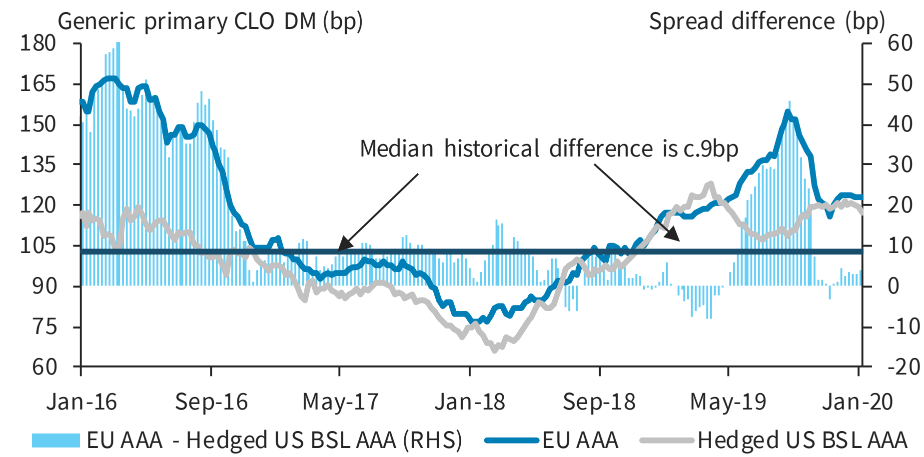
CLO AAA-AA Tranche Profile

- Despite the protection afforded to senior rated CLO tranches through higher credit enhancement, typically non-deferrable status (missed interest payment would cause EOD) and a history of strong performance (no AAA or AA tranches experienced a loss), AAA/AA CLO tranches have remained wide versus IG and other structured credit
- We think this is likely due to:
  - Illiquidity of CLO tranches versus IG and HY bonds
  - Uncertainty in timing of cash flows post-reinvestment
  - Inability for investors to underwrite the constantly changing portfolio of assets
  - Steep-learning curve of CLO deal documentation and stipulation definitions
  - Trust needed for CLO manager to follow document rules and avoid strategy drift
  - A similar acronym as CDOs
  - Headline risks
  - Short non-call period (e.g. refi risk)
  - Not qualify as a High Quality Liquid Asset for banks (not STS eligible) or Solvency Type I asset
- We think these general issues and more provide senior CLO tranche investors that understand the product, and are not hampered by regulatory burdens, an opportunity to find attractive highly rated floating-rate exposure

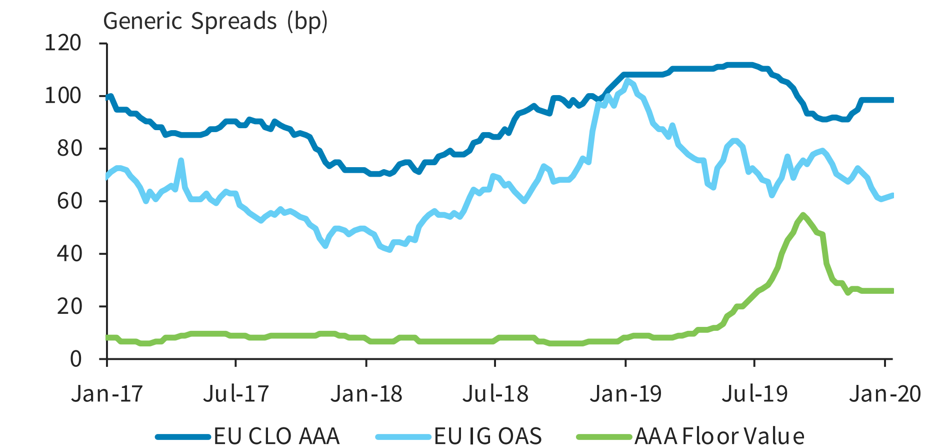
Restricted - External

CLO AAA Tranche Relative Value

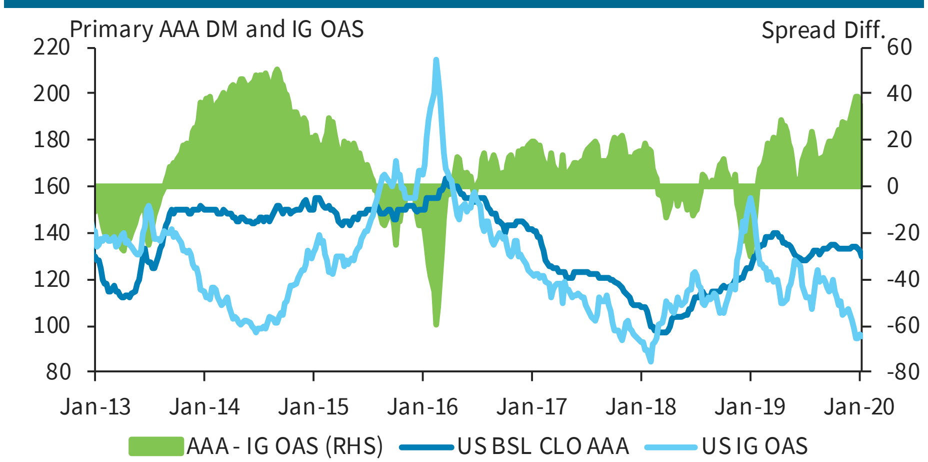
Global CLO AAA Relative Value



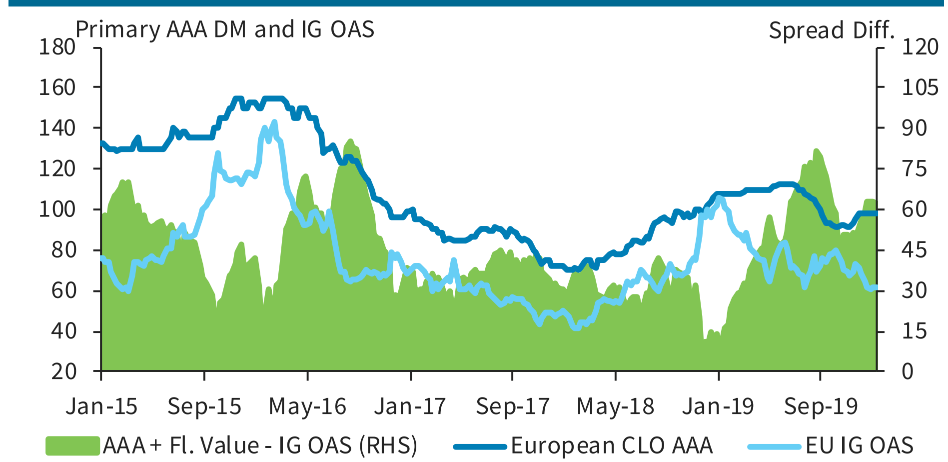
European CLO AAA Euribor Floor Value



US BSL CLO AAA versus IG OAS



European CLO AAA versus IG OAS

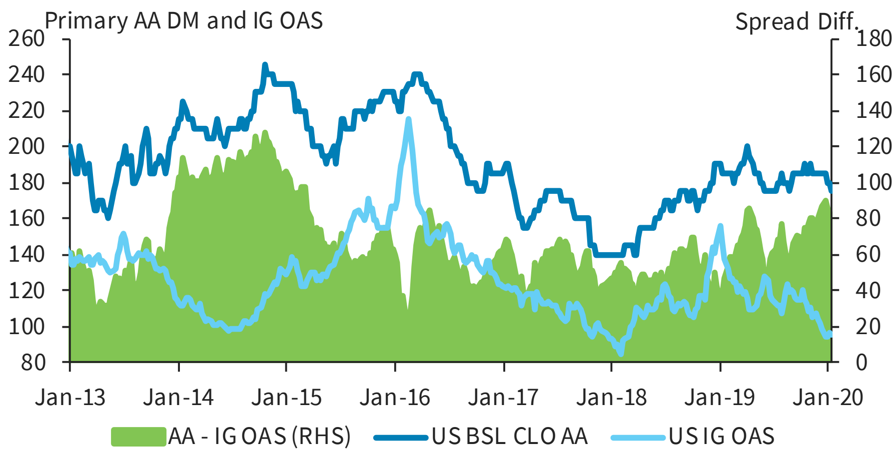


Note: Generic CLO primary spreads. Source for all charts: S&P LCD, Intex, Bloomberg, Barclays Research

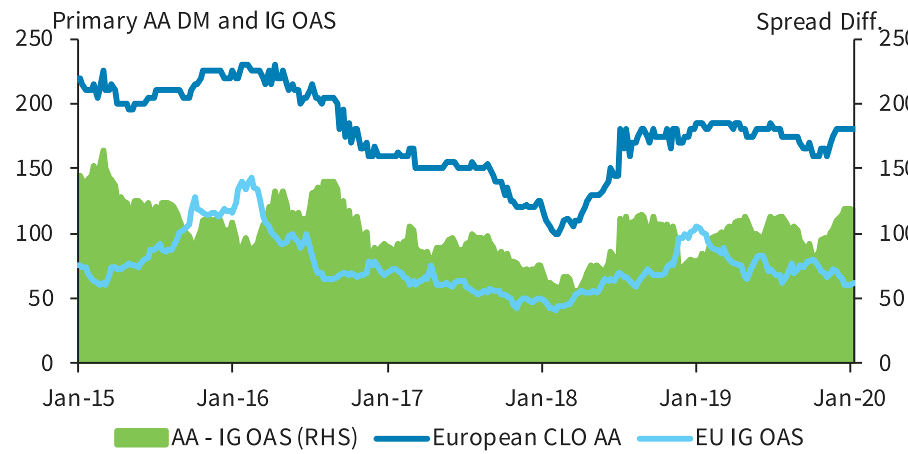
Restricted - External

CLO AA Tranche Relative Value

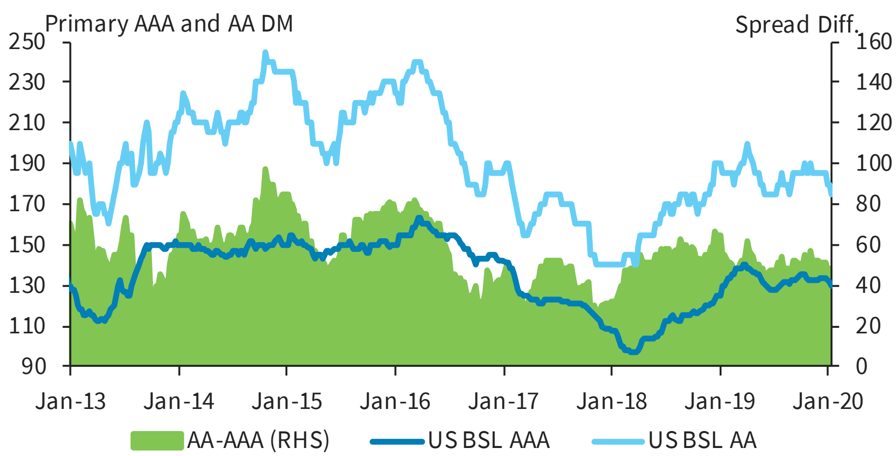
US BSL CLO AA versus IG OAS



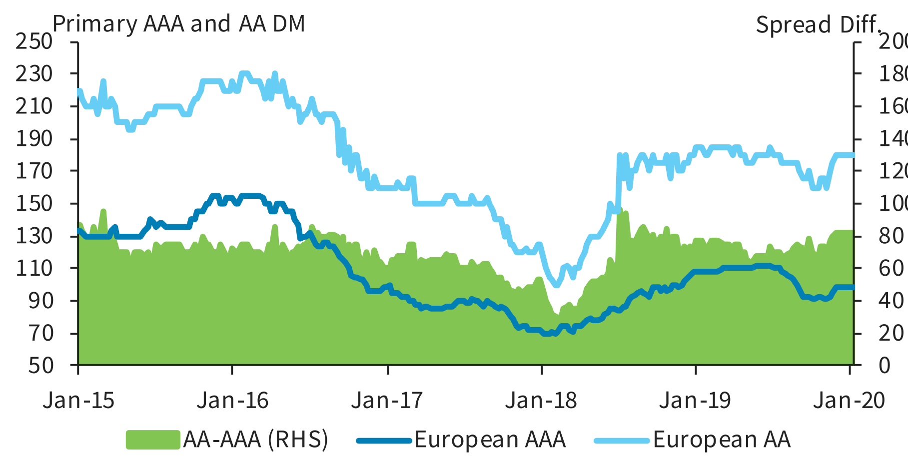
European CLO AA versus IG OAS



US BSL CLO AAA versus AA



European CLO AAA versus AA

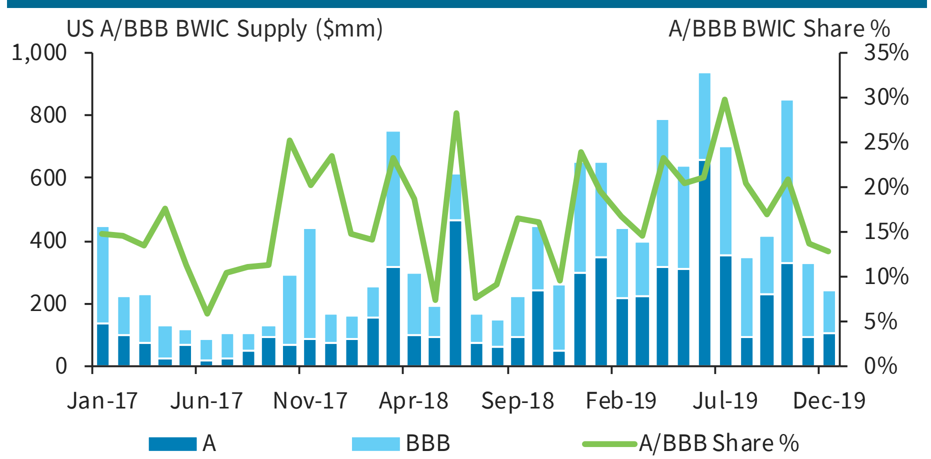


Note: Generic CLO primary spreads. Source for all charts: S&P LCD, Intex, Bloomberg, Barclays Research

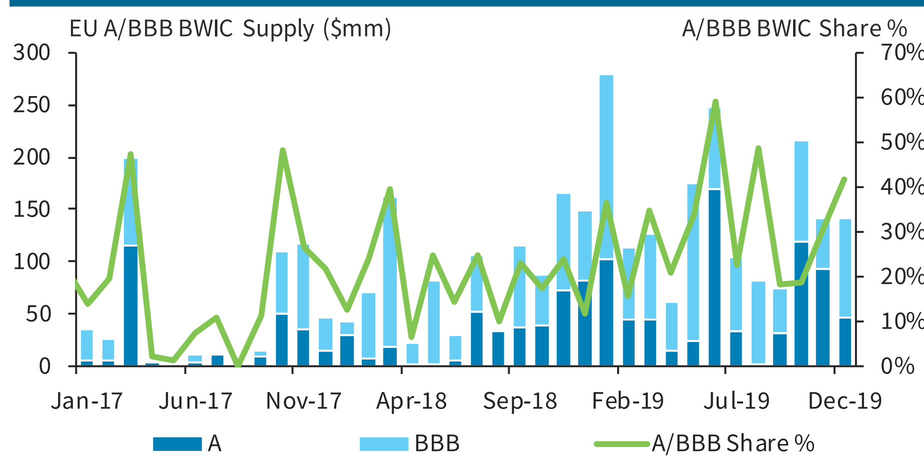
CLO A-BBB Tranche Profile

- Similar to AAA/AA tranches, the risk of principal loss for single-A and BBB tranches is still relatively low due to the high original credit enhancement. However, these tranches are traditionally structured to be PIKable, meaning interest could defer if overcollateralization tests fail
- While banks are traditionally not buyers of A/BBB CLO tranches, asset managers, pensions and credit funds continue to find relative value at this part of the ratings stack
- US insurers are some of the largest investors in this part of this stack, as the spread to NAIC capital charge is attractive for single-A and above tranches. European insurers, however, incur higher capital charges for CLO tranches under Solvency II
- Downgrade risks are present as IG-constrained investors could be required to sell if tranches are downgraded below IG, especially as new CLO BBB tranches are increasingly rated with a ‘BBB-’ rating

US CLO A/BBB BWIC Activity



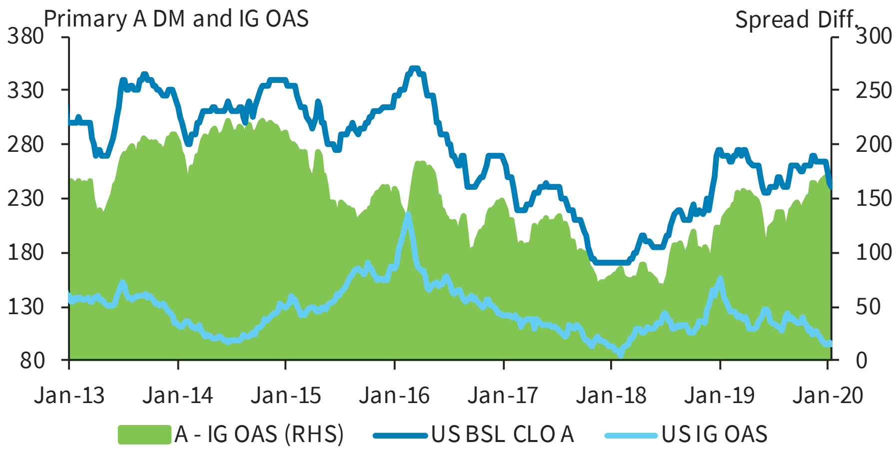
European CLO A/BBB BWIC Activity



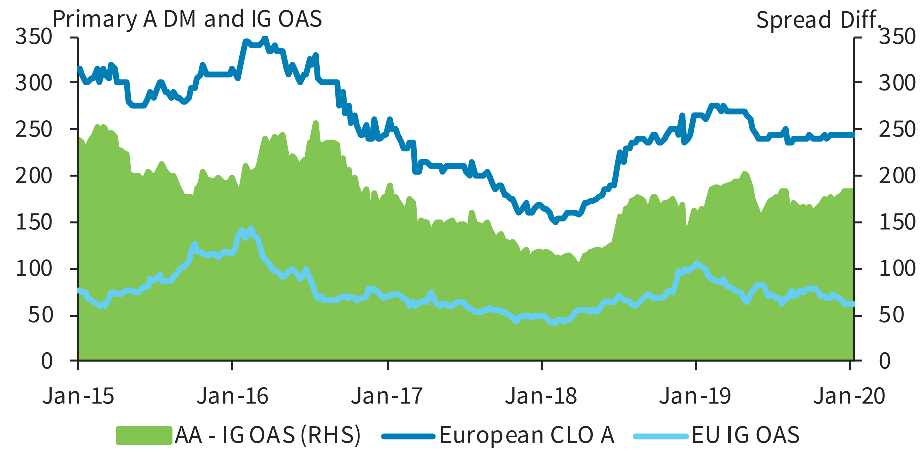
Note: for more detail, see “Tracking Global CLO Ownership”, November 8 2019.
Source for all charts: Kanerai, Intex, BOE, BOJ, FED, FDIC, Lipper, HFR, NAIC, Fitch, Bloomberg, company financials, Barclays Research

CLO A Tranche Relative Value

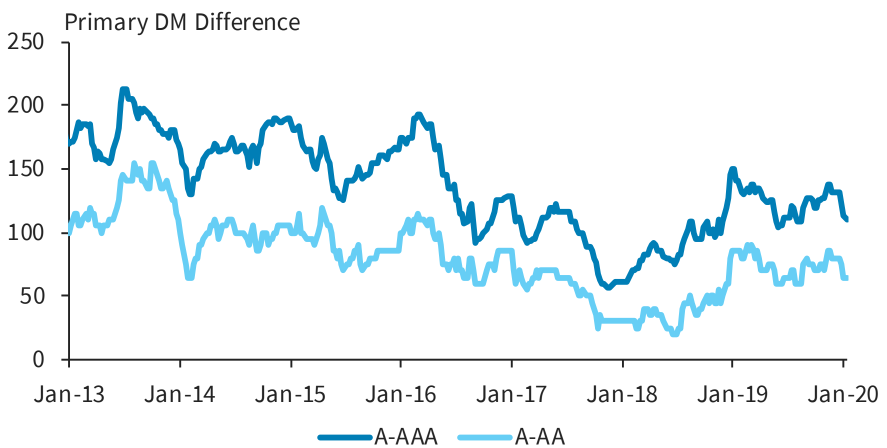
US BSL CLO A versus IG OAS



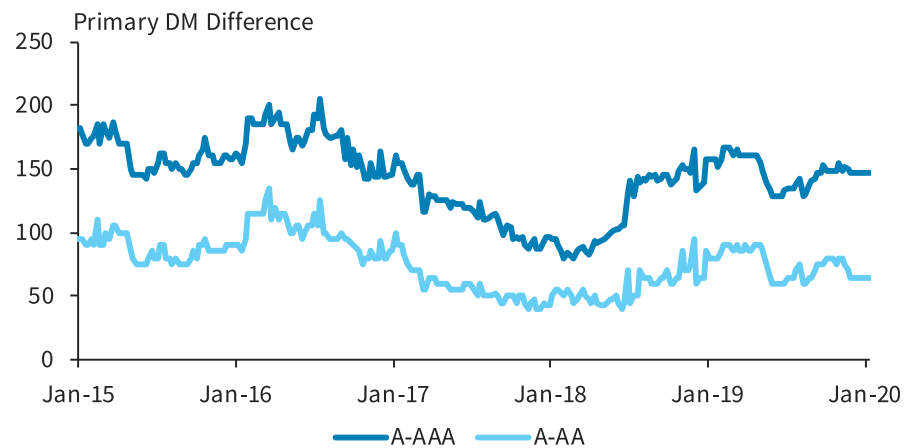
European CLO A versus IG OAS



US BSL CLO A versus AAA/AA



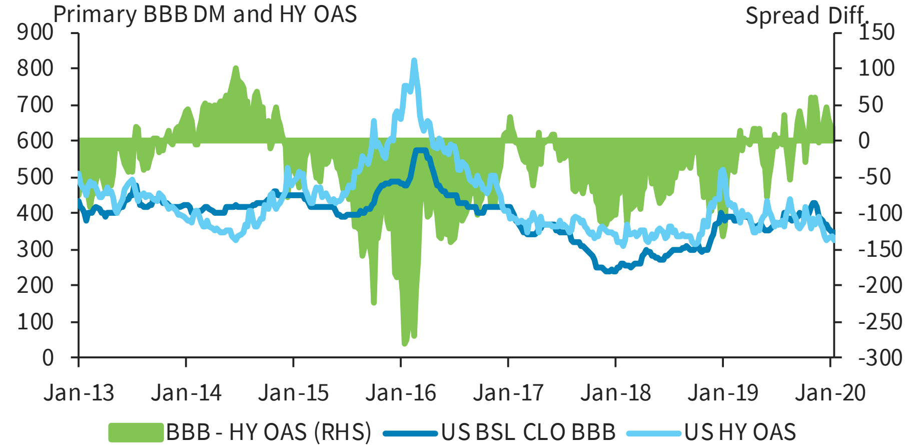
European CLO A versus AAA/AA



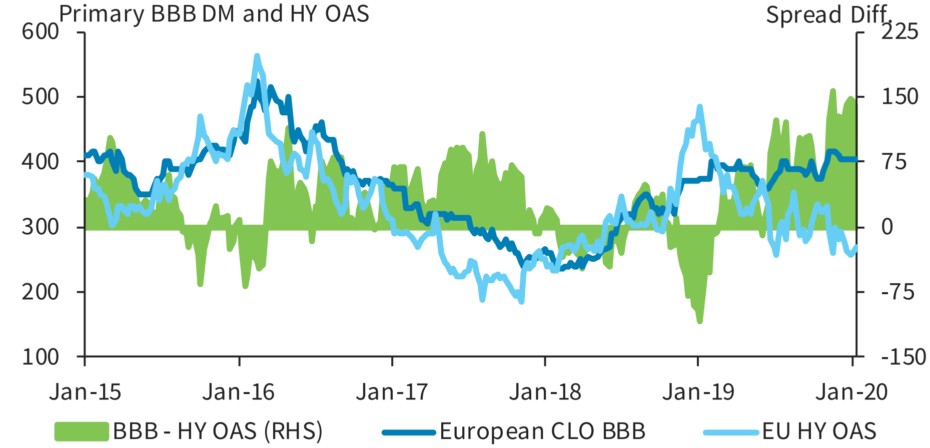
Note: Generic CLO primary spreads. Source for all charts: S&P LCD, Intex, Bloomberg, Barclays Research

CLO BBB Tranche Relative Value

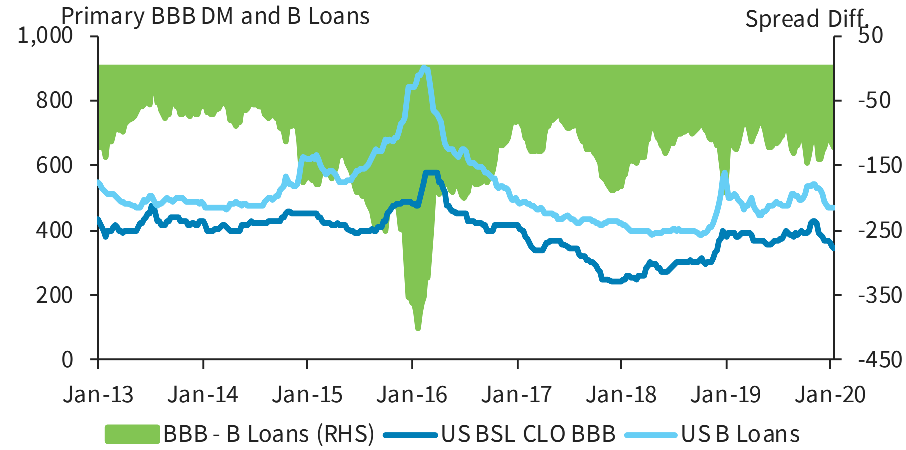
US BSL CLO BBB versus HY OAS



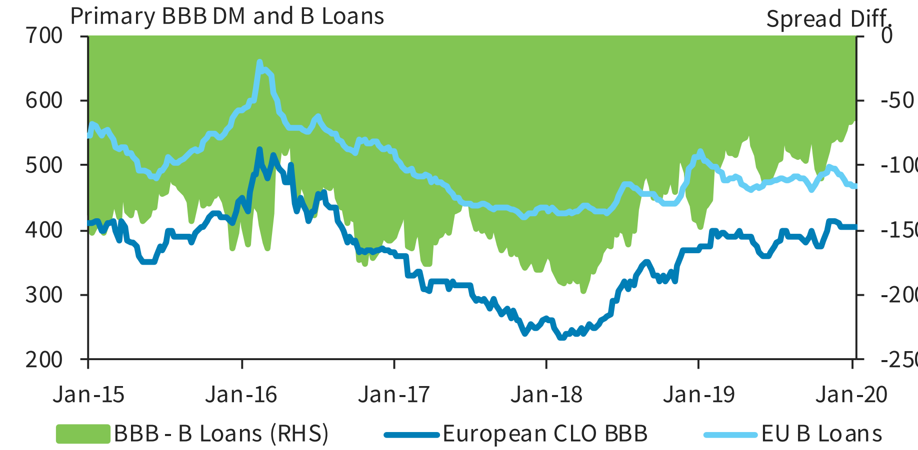
European CLO BBB versus HY OAS



US BSL CLO BBB versus B Loans



European CLO BBB versus B Loans

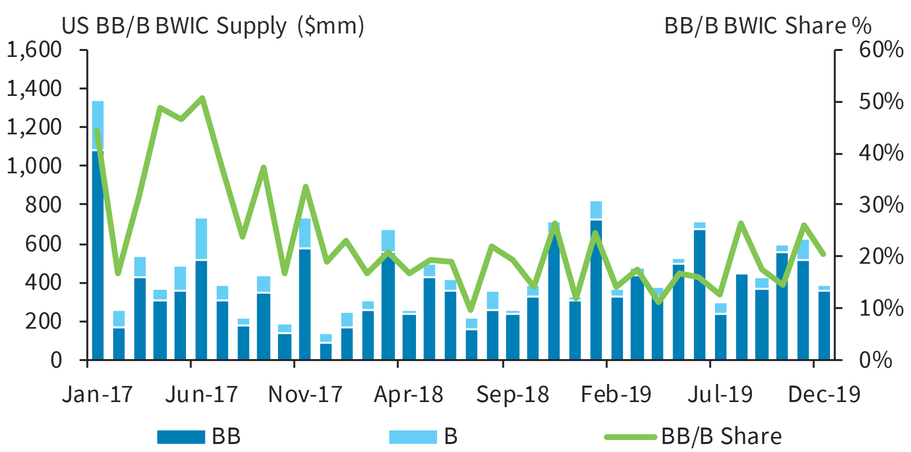


Note: Generic CLO primary spreads. Source for all charts: S&P LCD, Intex, Bloomberg, Barclays Research

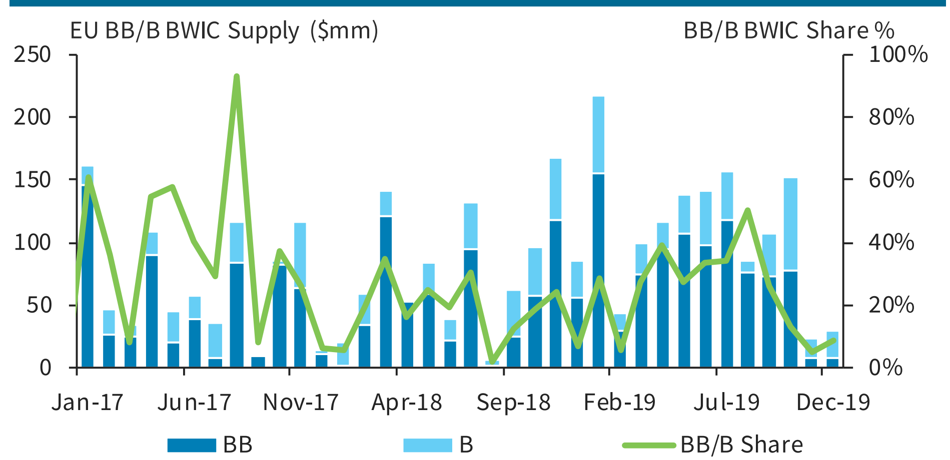
CLO BB-B Tranche Profile

- Aside from CLO equity, junior CLO tranches (BB/B ratings) are the most exposed part of the capital stack to declines in the underlying portfolio as these tranches have the lowest credit enhancement at issuance
- Thus these investors tend to scrutinize collateral portfolio composition more closely, with specific focus on tail risks in the portfolio (e.g. exposure to below $80 assets, percentage of assets rated B3, etc.)
- Post-reinvestment amortization speed is also an important consideration because of its influence on pull-to-par. Junior mezz is typically issued at a far greater discount than more senior tranches, giving it the best convexity profile among CLO liabilities with built-in potential for price appreciation
- However, this benefit comes at a cost of greater sensitivity to changes in assumptions and market conditions, and thus price volatility. As a result, junior mezz tends to require a more tactical investment time horizon, which corresponds fairly well to the investment style of dedicated structured credit investors

US CLO BB/B BWIC Activity



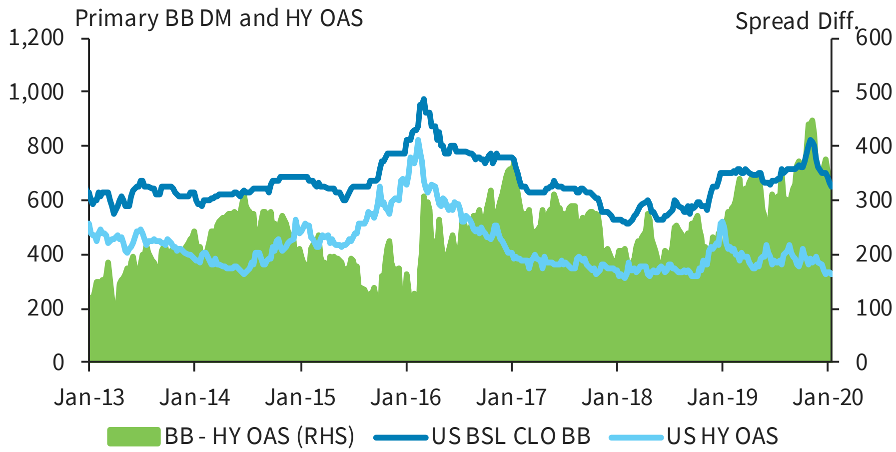
European CLO BB/B BWIC Activity



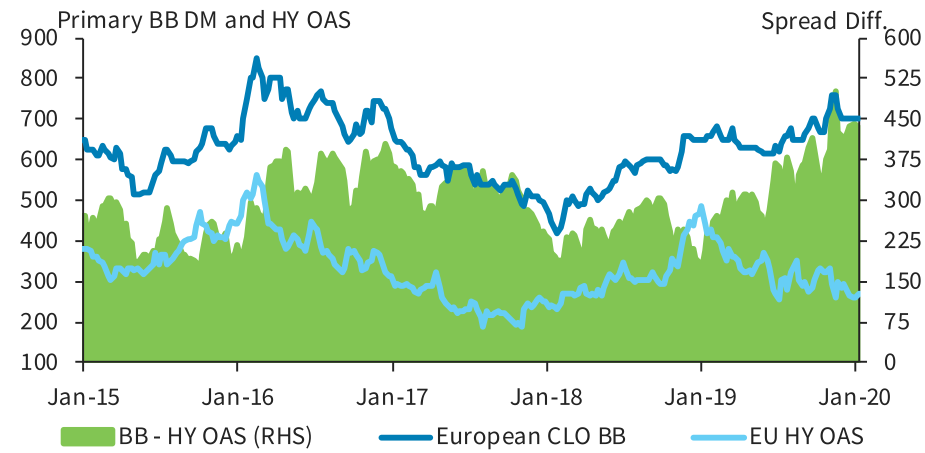
Note: for more detail, see "Tracking Global CLO Ownership", November 8 2019 and "Santa Brings Uneven Rally to CLO Town", January 10 2019.
Source for all charts: Kanerai, Intex, BOE, BOJ, FED, FDIC, Lipper, HFR, NAIC, Fitch, Bloomberg, company financials, Barclays Research

CLO BB Tranche Relative Value

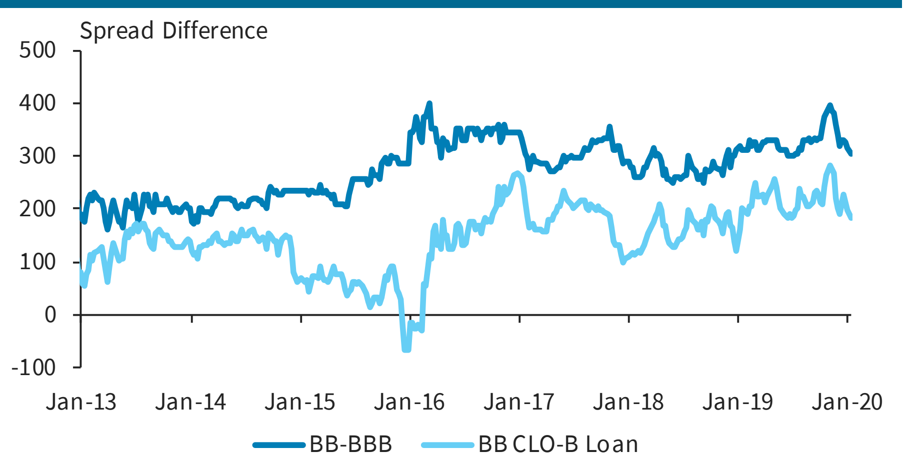
US BSL CLO BB vs HY OAS



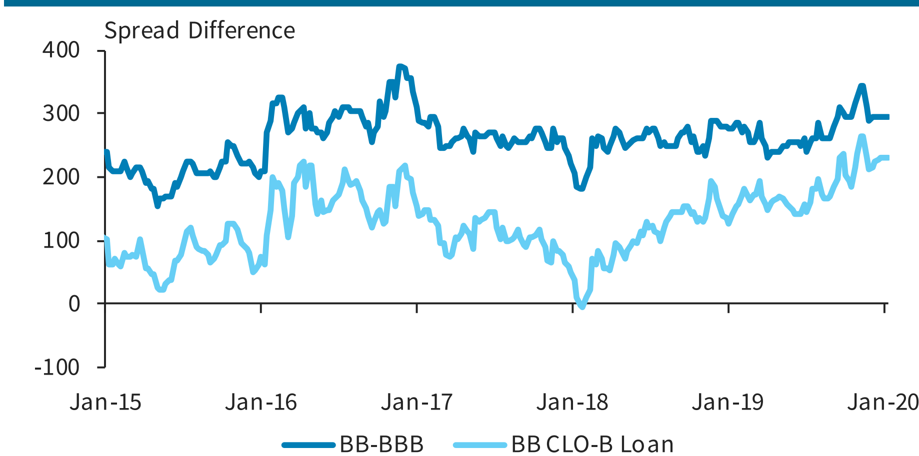
European CLO BB vs HY OAS



US BSL CLO BB vs BBB and B Loans



European CLO BB vs BBB and B Loans

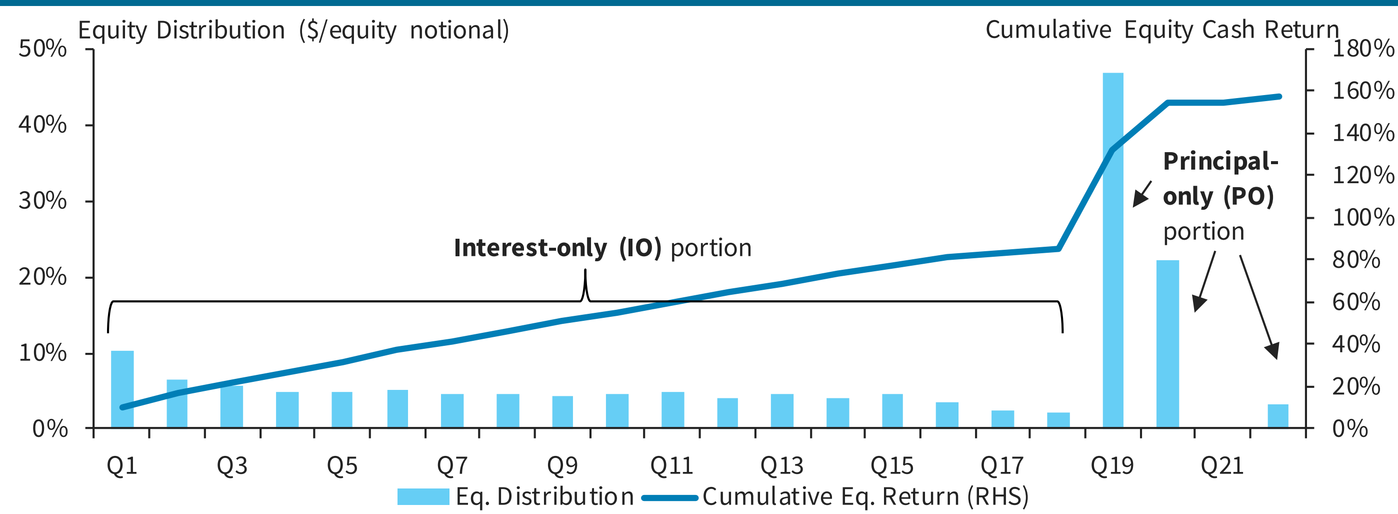


Note: Generic CLO primary spreads. Source for all charts: S&P LCD, Intex, Bloomberg, Barclays Research

CLO Equity Profile

- CLO equity returns can be attractive, as CLO equity is essentially a non-recourse leveraged position on a pool of actively managed loans and bonds. Equity holders are first in line to collect proceeds after debt holders and management fees are paid, and benefit directly from a manager who actively trades the portfolio and build par
- However, this potential upside comes with the risk of holding a first-loss tranche – the potential loss of investment (eg, a negative IRR). Even so, the return profile of CLO equity (front-loaded excess cash flows with a large principal pay-out at deal's end) helps mitigate this risk
- Thus, equity returns can be thought of as two cash flows: the interest-only (IO) stream, and the longer-term principal-only (PO) stream, where equity NAV can be used as a proxy

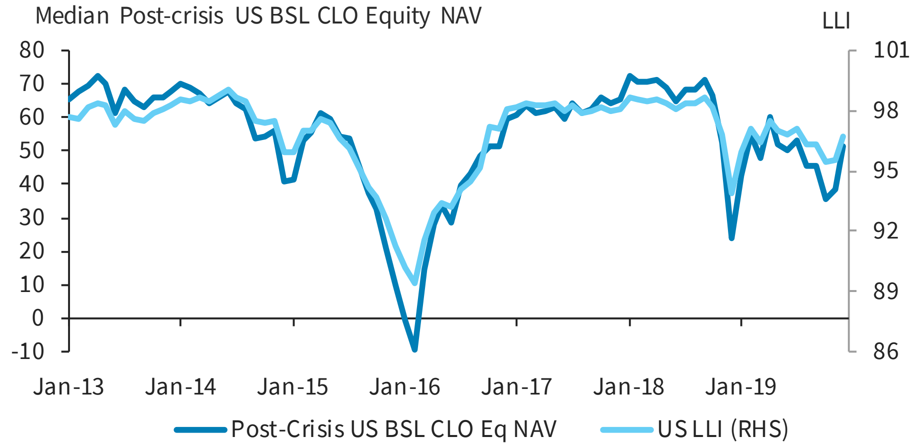
Example CLO Equity Return Profile



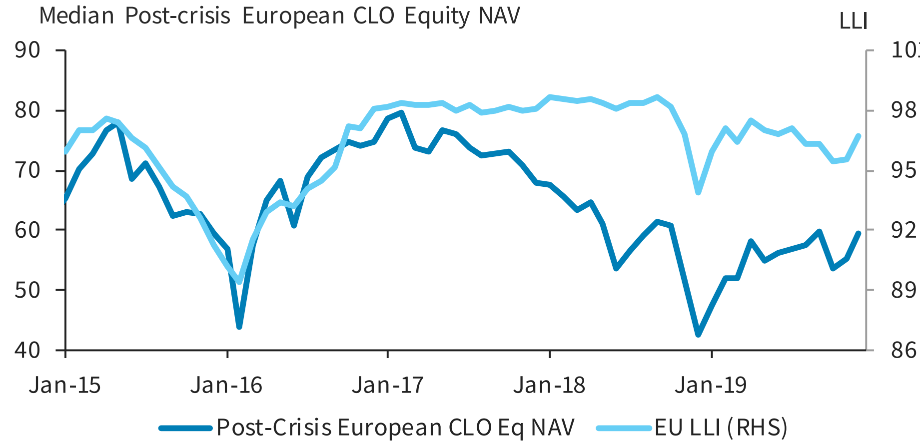
For more detail, see "CLO Equity: The Long and Short of It," April 12, 2019. Source for all charts: Intex, Barclays Research

CLO Equity Profile

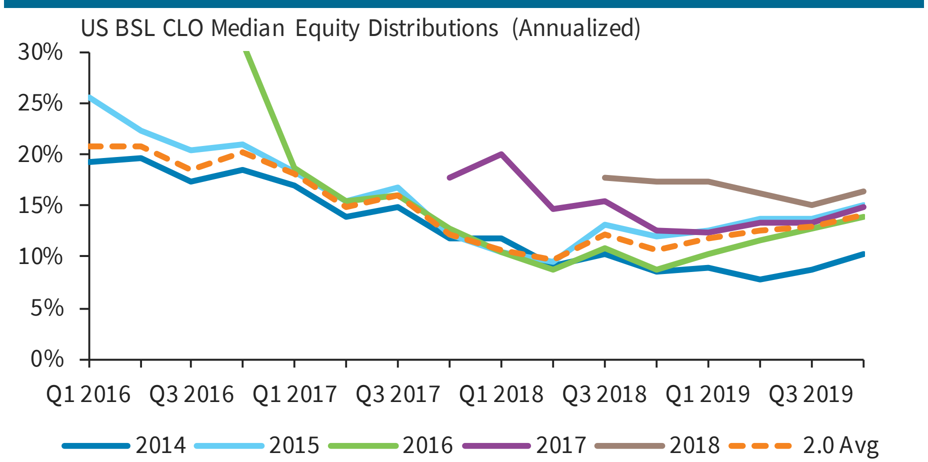
US BSL CLO Equity NAVs vs Loans



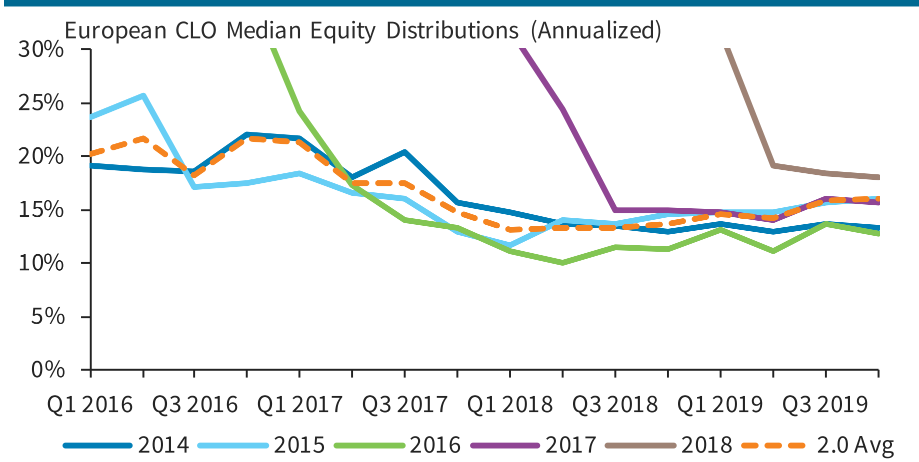
European CLO Equity NAVs vs Loans



US BSL CLO Equity Distributions



European CLO Equity Distributions

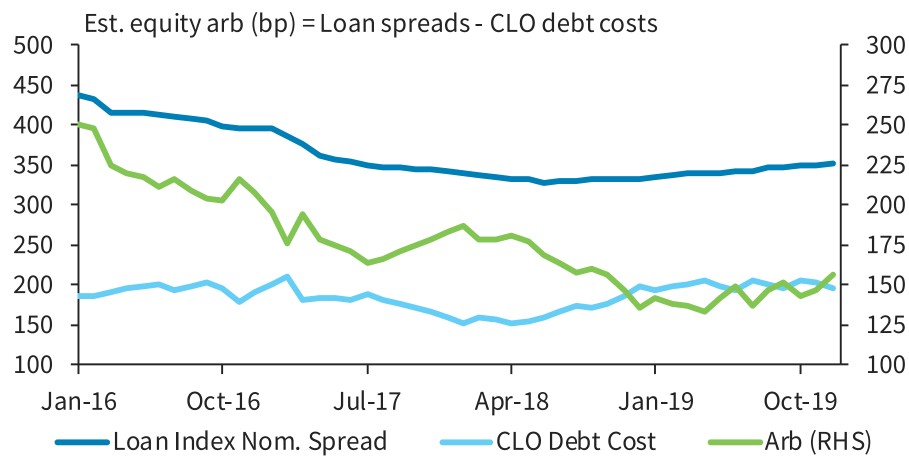


Source for all charts: S&P LCD, Intex, Bloomberg, Barclays Research

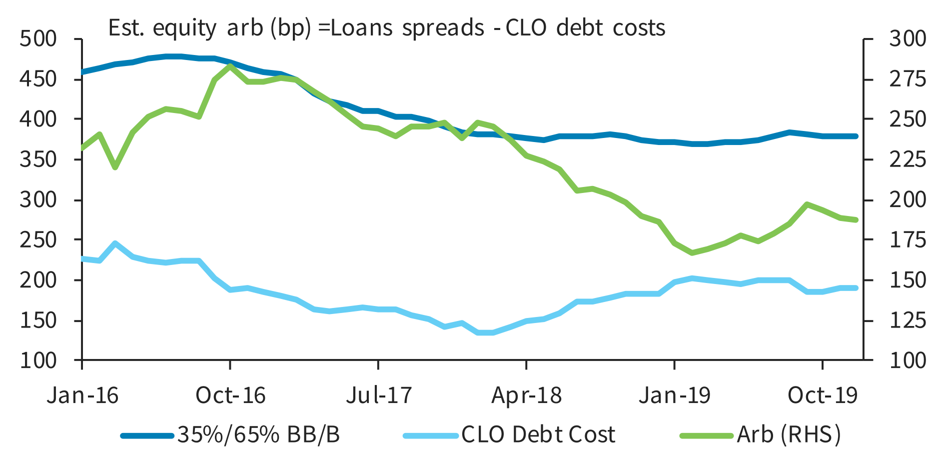
CLO Equity Profile

- CLO equity distributions are guided by the cost of the CLO's liabilities, the portfolio's asset spread, management and other deal fees, as well as the structural leverage. These variable are commonly part of the CLO equity "arb" calculation
- The gap between asset spreads and CLO debt costs has continued to decline, though lower CLO management and arrange fees, and lower than modeled credit losses has helped to keep equity distributions attractive
- The investor base for CLO equity is similar to junior mezz, though risk retention (for European and US MM CLOs) has required CLO managers to hold 5% of the interest in new deals (either through a horizontal or vertical slice)
- Thus, risk retention, and the fact that more CLO managers are retaining equity (or at least a majority), has shifted a large share of CLO equity ownership from credit funds to managers and retention funds

Est. US BSL CLO Equity Arb



Est. European CLO Equity Arb



For more detail, see "Dissecting and Forecasting the CLO Equity Arb," August 16, 2019. Source for all charts: Kanerai, Intex, S&P LCD, Barclays Research

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Risk Retention

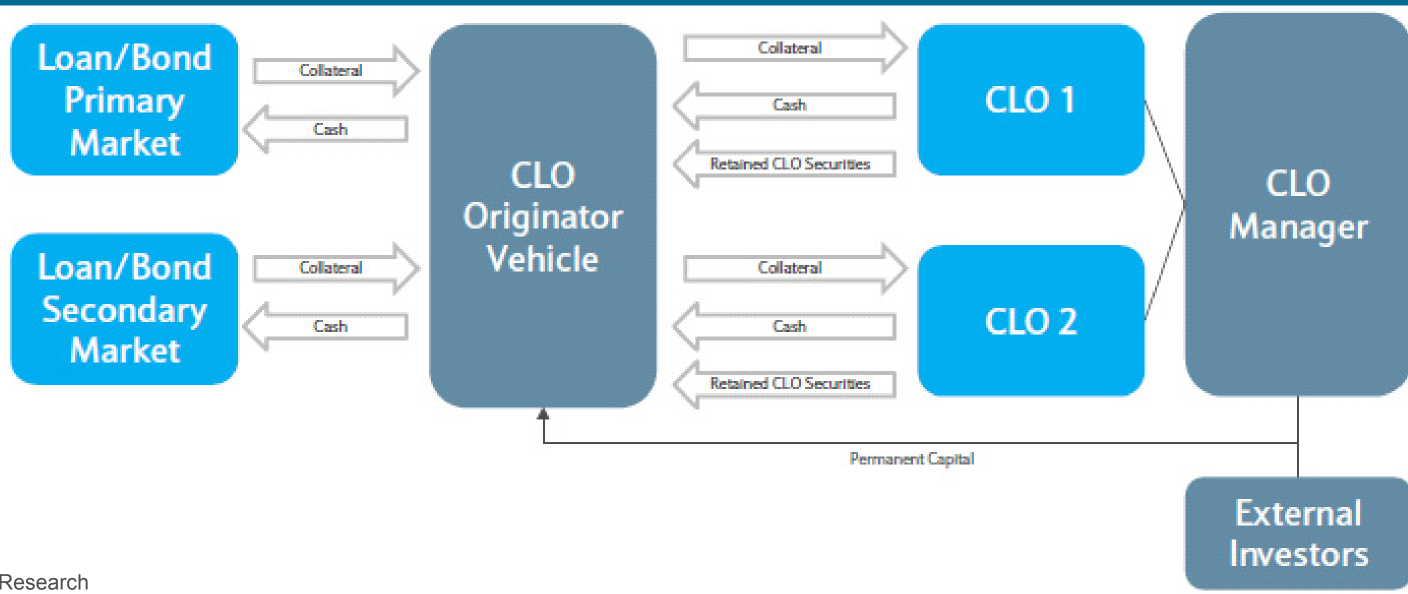
- Risk retention rules aim to align the interests of the original CLO collateral portfolio underwriters with those of CLO end investors. The rules were introduced as a way of reducing the agency problems inherent in the "originate to distribute" model practiced by many securitisation originators prior to the 2008-09 crisis. However, applicability of risk retention requirements are different across the globe
- **US**
  - Originally effective for all US CLOs issued after December 2016, a court case brought by the LSTA reversed the requirement for "open-market" CLOs (a majority of CLOs) to abide by risk retention requirements. However, balance sheet and MM CLOs are still required to retain 5% of the deal as these deals tend to hold a majority of self-originated assets
- **Europe**
  - European financial institutions are only able to invest in new securitisations if the originator/sponsor retains at least 5% of the securitised exposure
  - European regulation places the burden of compliance on the issuers, but also the investors: banks (via CRD IV/CRR), insurers (Solvency 2), alternative investment funds (AIFMD) and mutual funds (UCITS). Non-compliance leads to penalty capital charges
- **Japan**
  - The Japanese Financial Services Agency (FSA) published a risk retention regime for Japanese financial institutions in March 2019. The rule essentially requires Japanese-based buyers to perform an in-depth analysis on the securitization to ensure the collateral was "not inappropriately formed" or be forced to hold increased capital (up to 1250%) against the investment

For more detail, see "CLO Regulatory Roundup," February 22, 2019

Risk Retention

- **The "sponsor" route** requires that the collateral manager provides the retention capital and requires an authorization under MiFID in Europe
- **An "originator" route** is an alternative that allows for external capital to get involved in the retention funding, alleviating the burden on the collateral manager, but maintaining the alignment of the interests between the original CLO collateral portfolio underwriters (the originator) with those of CLO end investors
- An originator is a separately capitalised entity from the CLO manager. It "originates" what will ultimately become CLO collateral by participating in leveraged loan and high yield bond primary syndications, and also by purchasing such assets in the secondary market. After accumulating and holding the assets for some period of time, the originator sells the assets to a newly created CLO in exchange for cash, and then invests in a vertical (pro-rata) or horizontal (equity) strip of the CLO capital stack

CLO Originator Vehicle Model

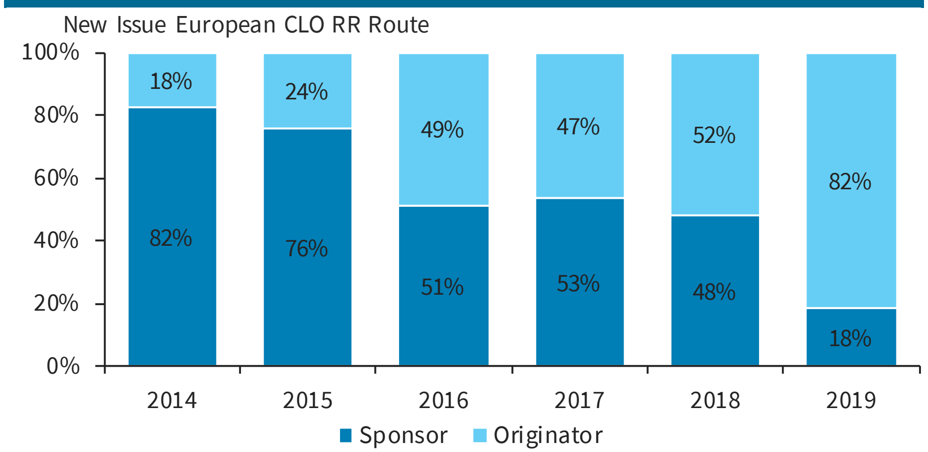


Source for all charts: Barclays Research

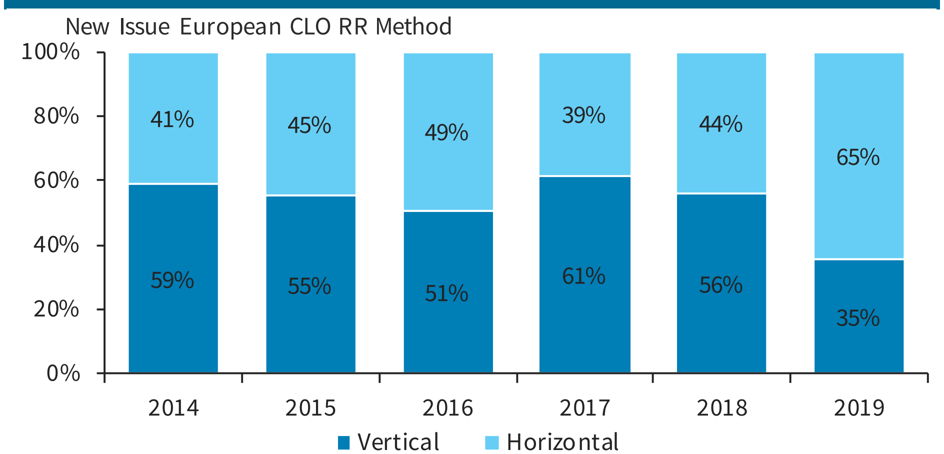
Risk Retention in Europe

- The use of the “originator” route increased after the June 2016 UK referendum, as in contrast to the “sponsor” route, the originator vehicle does not need to be authorised under MiFID, which means that the UK leaving the EU should not affect the risk retention compliance
- In 2019, roughly 82% of European CLOs were issued using the “originator” route, versus just 52% in 2018
- Those European CLO managers that have chosen to continue using the “sponsor” route for risk retention have likely included language in the deal documents that allow for a switch of risk retention methods to ensure compliance in a Brexit scenario

European CLO Risk Retention Route



European CLO Risk Retention Method



For more detail, see “CLO Regulatory Roundup,” February 22, 2019. Source for all charts: S&P LCD, Bloomberg, Barclays Research

Volcker Rule

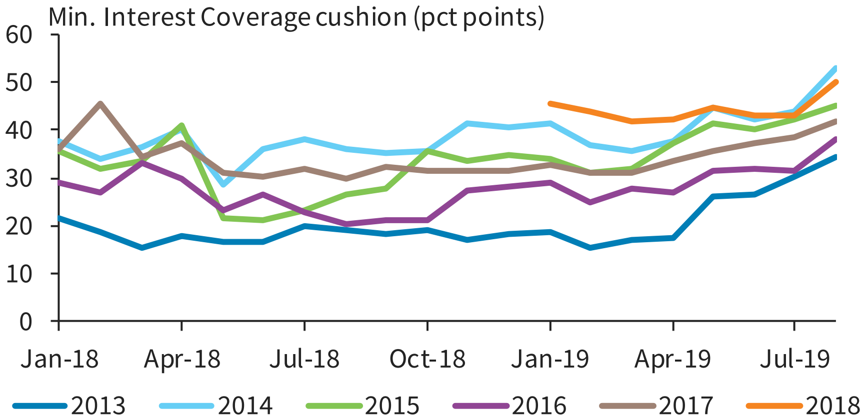
- The Volcker rule prohibits US banks from having an "ownership interest" in "covered funds", the definition of which includes private equity, hedge fund stakes and CLOs that hold bonds (loans exempt)
- Thus, some CLO market participants will refer to the CLO 2.0 market as pre-Volcker deals (bonds allowed) and the CLO 3.0 market as Volcker-compliant deals (no bond holdings allowed)
- Despite a majority of US CLOs choosing not to include bond buckets, as banks are an important source of demand at the AAA level, the European CLO market has continued to incorporate bond buckets across most deals due to the smaller size of the leveraged loan market in Europe versus the US
- Compliance options:
    - **Pure loan securitisation:** "Loan securitisations" are exempt from the definition of covered funds. In order to qualify as a loan securitisation, the assets of the CLO must consist solely of loans. In particular, the definition of "loan" generally excludes securities
    - **Rule 3a-7**: The CLO can be structured in accordance with rule 3a-7 of the US Investment Company Act of 1940 – this is also an explicit exemption, although in practice the associated restrictions on collateral management are open to interpretation
    - **Voting/Non-voting:** Classes of CLO notes relevant to banks are divided into three types: 1) voting notes; 2) non-voting exchangeable notes; and 3) non-voting notes. The lack of voting rights with respect to manager removal avoids creating an "ownership interest" from a legal standpoint
- Post-implementation of the Volcker Rule, European CLO issuance has been dominated by "voting/non-voting" approach
- Federal agencies responsible for amending Volcker are likely to finalize their decision regarding covered fund definitions soon, which could allow US CLOs to hold up to a 10% high yield bond bucket (similar to pre-crisis CLOs)

Restricted - External

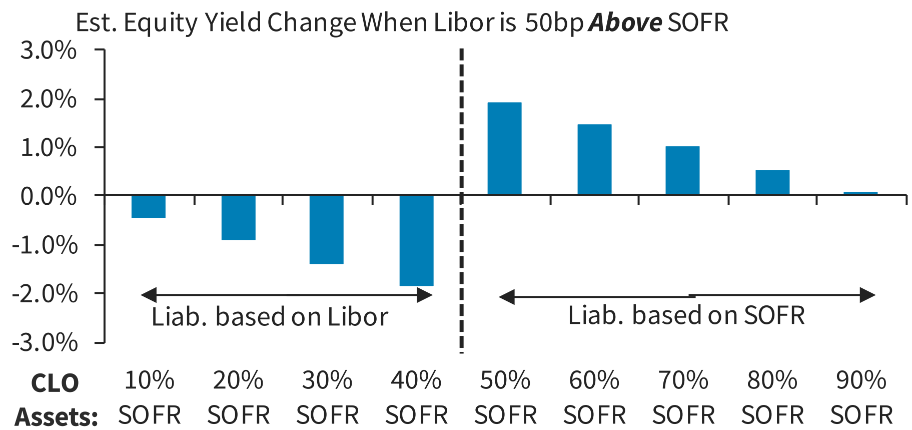
Reference Rate Replacement

- Most US CLOs now have language in the documents to prevent a “fixed rate” scenario when Libor ceases (last quote available), but variation still exists on when to transition to a new rate and what the new rate will be
- Debt investors are unlikely to feel the impact of the transition, while equity investors could bear the brunt of any mismatch in assets and liabilities
- CLOs are unlikely to switch from Libor at materially different times than other floating rate assets
- ARRC language provides more clarity on what happens to the reference rate for CLO liabilities, but a downside scenario could occur where the underlying assets are based on a mix of different reference rates that do not match the ARRC recommendations
- European CLOs will be less impacted by this change due to the minimal number of underlying assets that pay based on US Libor and the relative ease of transition with Euribor

US BSL CLO Interest Coverage is High



Equity More at risk in a Rate Mismatch



For more detail, see “Libor Fallback Language in CLOs,” September 13, 2019. Note: Sample of BB IC test cushions by vintage. Source for all charts: Intex, Barclays Research

Data Disclosures

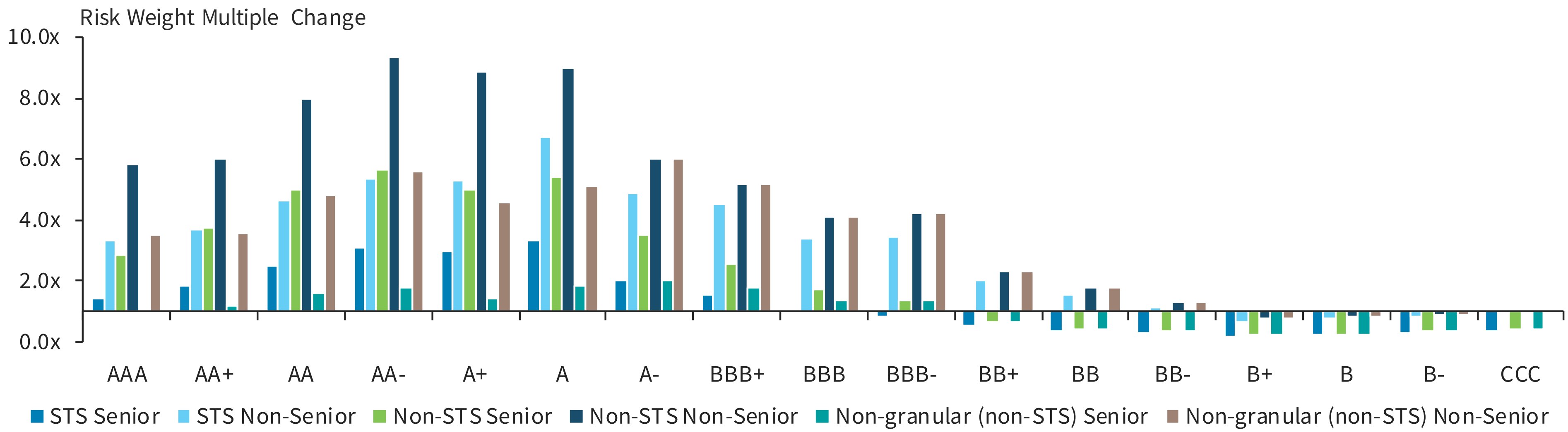
- European Securitization Regulation (EUSR) requires all securitization to adhere to loan-level data templates, among other deal-level documentation that needs to be disclosed to investors
- The ESMA templates that were submitted to the EC slowed European ABS issuance significantly in H1 2019, but have since been watered down, allowing for a number of fields to contain no data
- While the option for "no data" has increased for many fields, the ability to have the additional data readily available and be able to report that to trustees is a work in progress. Additionally, it is currently unclear what constitutes compliance for CLOs, leaving newly priced European CLOs at risk of being non-compliant in the future
- The EC recently published a lightly modified version of the templates that is expected to pass through the European Parliament and European Council in Q1 2020 before being enforced
- However, these reporting templates are enforced from 1 January 2019; hence, all 2019 issuance needs to comply
- Additionally, the recently finalised version from the EC did not add any commentary on the jurisdictional scope of the regulation
- As it stands, it may mean that EU investors are regulated out of non-EU investments, since non-EU issuers are unlikely to adhere to EUSR data disclosures
- There is also still a risk that this extends to funds which are registered as UCITS under EU law but which predominantly operate outside the EU

For more detail, see "Global Securitized Products Outlook 2020," December 6, 2019, "CLO Regulatory Roundup," February 22, 2019, "Navigating the UCITS Uncertainty," January 25, 2019

European Bank Risk Weights

- EUSR also brought along new capital charges for banks that, in general, have resulted in higher capital charges
- The regulation provided for one year of grandfathering for pre-2019 issuance to continue to operate under the older risk weight. This ended on 1 January 2020, after which all securitisation carried the new risk weights
- We expect the higher risk weights to hinder trading desks from playing an active role in lower rated CLO tranches, potentially lowering the opportunity for CLO investors to find cheaper attractive tranches in secondary
- However, senior rated tranches remain attractive for European buyers, especially as the opportunity set of higher-yielding, highly rated paper shrinks in Europe
- Even on a risk-weighted asset (RWA) basis, European CLO AAA tranches offer attractive return on capital ratios for banks compared to other credit and structured products

Capital Multiple (New to Old Risk Weights) Under External Ratings-Based Approach



For more detail, see “Global Securitized Products Outlook 2020,” December 6, 2019. Source for all charts: EU Regulation 2017/2401, CRR, Barclays Research

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CLO vs. CDO

- CDOs are often compared to CLOs, but the differences are vast, from the underlying assets to the structures
- Over the past 10 years, 0% of global CLO AAA tranches took a loss versus 39% for global CDOs (ex-CLOs)
- Lessons from the CDO era:

1 Avoid mark-to-market vehicles	2 Know the underlying assets	3 Minimise correlations	4 Understand the buyer base
High embedded leverage and market-value triggers caused cascading effects as assets quickly fell in value	Holdings of synthetic securities and other securitized products made it difficult to price the pool and judge downside risks	Linking a portfolio to a single factor (i.e. subprime mortgages to housing prices) makes it difficult to hedge performance of the underlying assets	CDOs, SIVs and asset-backed commercial paper created an artificial demand for securitized products (including CLOs)

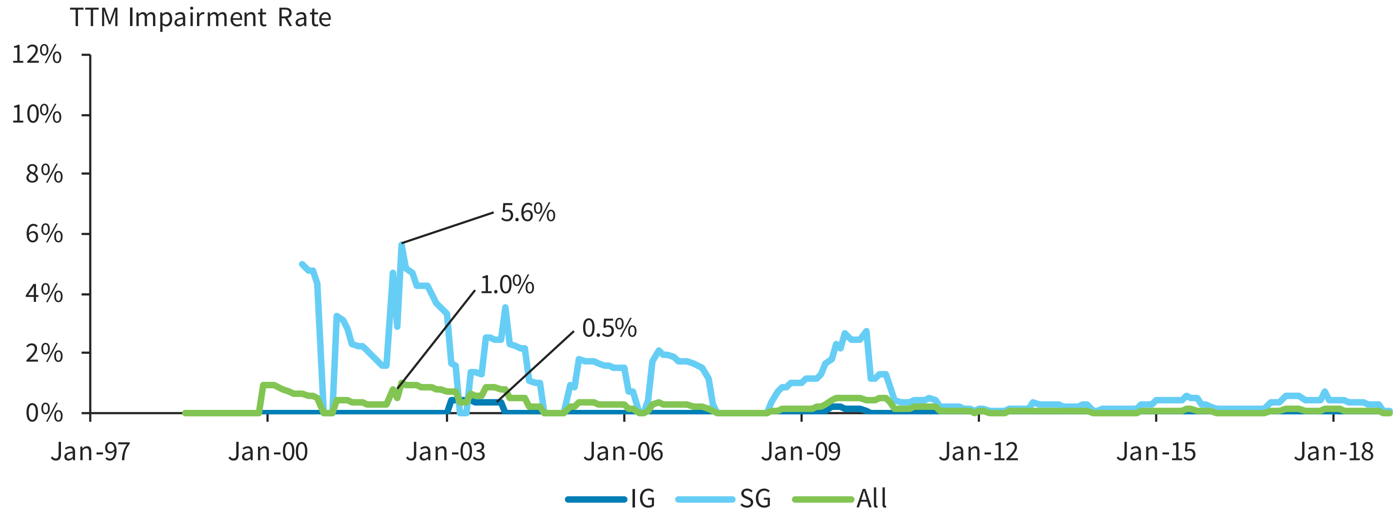
Global CLO Impairment Rates versus Corporates

Orig. Rating	US CLO	Euro CLO	Global CLO	Global CDO (ex-CLO)	Global Corporates
AAA	0.0%	0.0%	0.0%	39.1%	0.1%
AA	0.0%	0.0%	0.0%	48.2%	0.7%
A	0.1%	0.0%	0.1%	53.1%	2.1%
BBB	3.0%	0.0%	2.3%	62.4%	3.4%
BB	5.9%	4.9%	5.5%	60.7%	15.3%

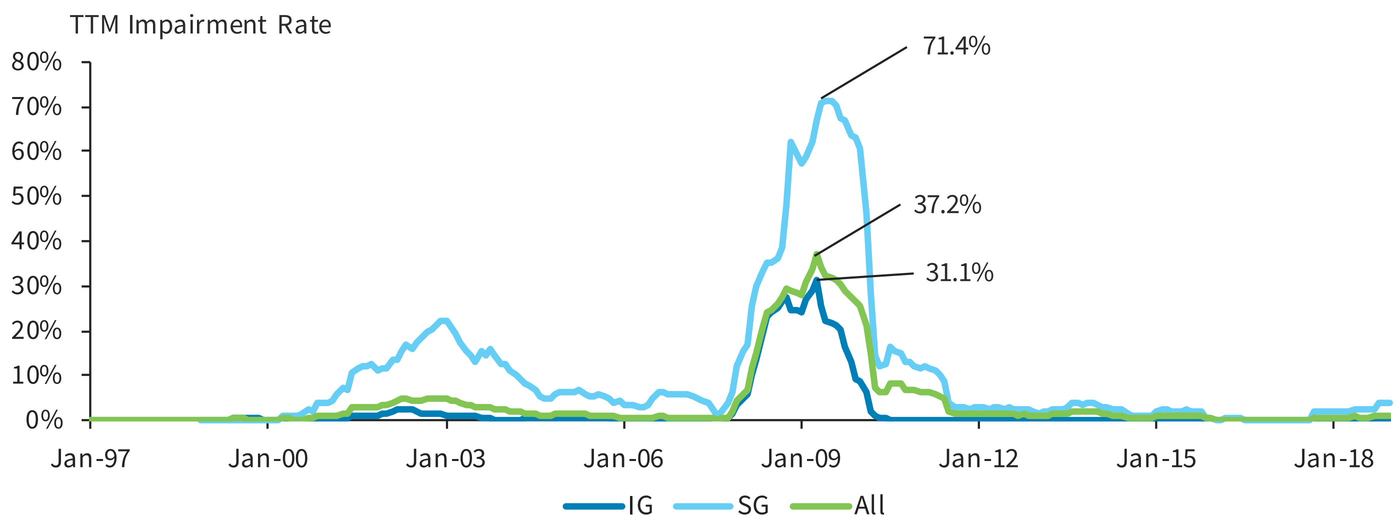
Note: Global corporate default rate data is the 10-year cumulative issuer-weighted global corporate default rate from 1983-2018. CLO impairments by original rating and based on 10-year cumulative impairments over 1993-2018. Impairments are split by principal (outstanding principal write-down or loss greater than 50bp of the tranche original balance or security carrying Ca or C rating, even if not yet experienced an interest shortfall or principal write-down) and interest (outstanding interest shortfall greater than 50bp of original tranche balance).
Source for all charts: Moody’s, Barclays Research

CLO vs. CDO Trailing Impairment Rates

Global CLO Trailing 12 Month Impairment Rate



Global CDO (ex-CLO) Trailing 12 Month Impairment Rate



Note: Maximum historical impairment rate noted. Source for all charts: Moody's, Barclays Research

Pre-Crisis CLO Tranche Defaults (S&P)

- Similar to Moody's impairment rate data, S&P's statistics on CLO tranche defaults is very low
- S&P notes that general credit deterioration led to most of the defaults, with six of the US CLO tranche defaults being caused specifically from market value tests
- The one AA tranche to default in the US was due to the note's interest payments being placed in escrow by the trustee, but the tranche eventually repaid accrued interest and was paid in full
- Defaults were low due to not only high credit enhancement and overcollateralization test protections, but also because of the longer final maturity for CLOs (~12-13 years), allowing more time for asset values to improve

US CLO Tranche Defaults by Orig. Rating

Original Rating	Tranches	Defaults	Default Rate
AAA	1,540	0	0.0%
AA	616	1	0.2%
A	790	5	0.6%
BBB	783	9	1.1%
BB	565	22	3.9%
B	28	3	10.7%
Total	**4,322**	**40**	**0.9%**

EU CLO Tranche Defaults by Orig. Rating

Original Rating	Tranches	Defaults	Default Rate
AAA	472	0	0.0%
AA	225	0	0.0%
A	239	0	0.0%
BBB	290	3	1.0%
BB	205	16	7.8%
B	11	1	9.1%
Total	**1,442**	**20**	**1.4%**

CLO Tranche Defaults by Vintage

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
US CLOs	7	1	4	7	3	2	0	10	1	5
% of Defaults	18%	3%	10%	18%	8%	5%	0%	25%	3%	13%
EU CLOs	0	0	0	0	4	8	3	2	1	0
% of Defaults	0%	0%	0%	0%	20%	40%	15%	10%	5%	0%

Note: Pre-crisis CLO tranches rated by S&P only. US data as of August 12, 2019. European data as of September 4, 2019. European vintage data does not include two combination note defaults.
Source for all charts: S&P, Barclays Research

CLO Pre- versus Post-Crisis

- After the crisis, CLOs became more conservative with enhancement levels and asset limitations
- Based on credit enhancement, what was once rated AA, would be rated around single-A today
- Compared to pre-crisis CLOs (1.0), post-crisis deals (2.0) tend to have:
  - **Less** structural leverage (more credit enhancement)
  - **Shorter** reinvestment periods (less chance for par erosion)
  - **Shorter** non-call periods (can refinance the tranches sooner)
  - **Greater** ability to manage CLO liabilities (deals can refi, reset or re-issue)
  - **More** restrictions on asset holdings (no structured finance assets)
  - **More** focus on minimizing asset and liability maturity mismatch (cannot buy assets maturing after CLO maturity)

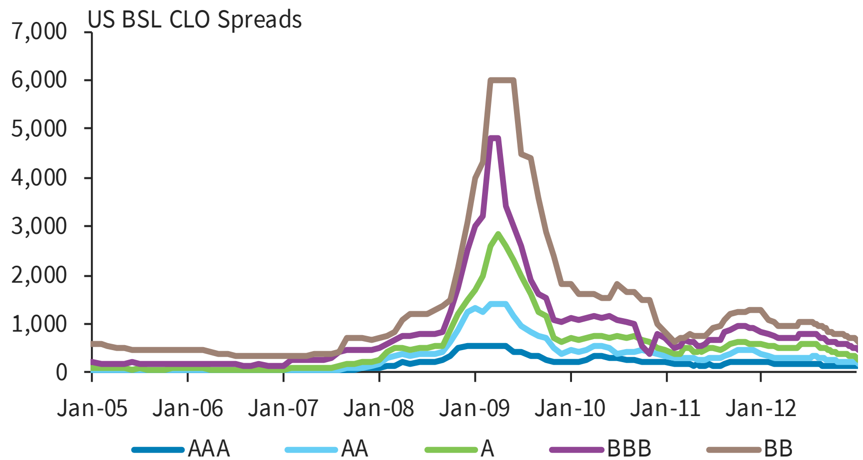
Credit Enhancement Evolution

Original Rating	1.0 US BSL	2.0 US BSL	1.0 Euro	2.0 Euro
AAA	28%	36%	30%	38%
AA	21%	25%	23%	29%
A	15%	20%	17%	22%
BBB	11%	14%	11%	16%
BB	8%	9%	7%	10%

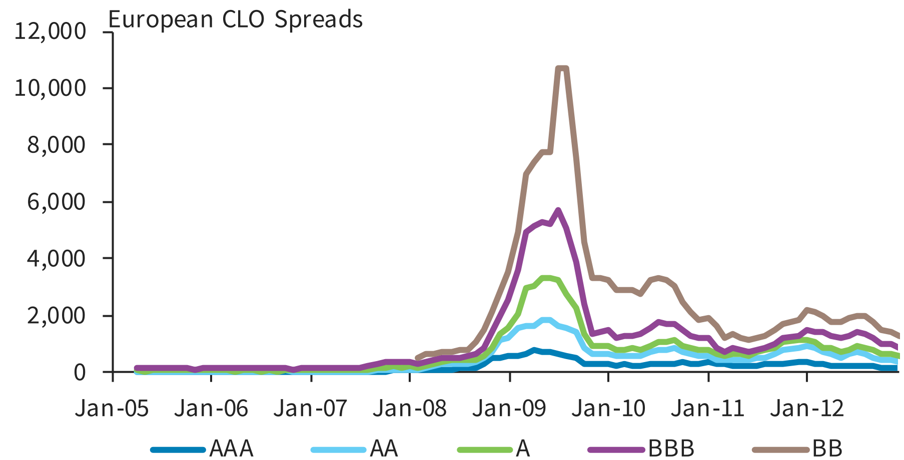
Source for all charts: S&P LCD, Intex, Barclays Research

Pre-Crisis CLO Spread and Price History

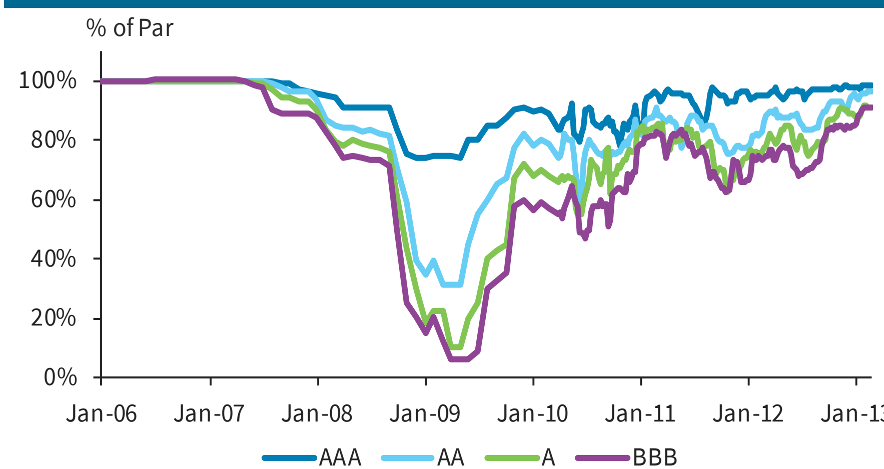
US BSL CLO Spreads



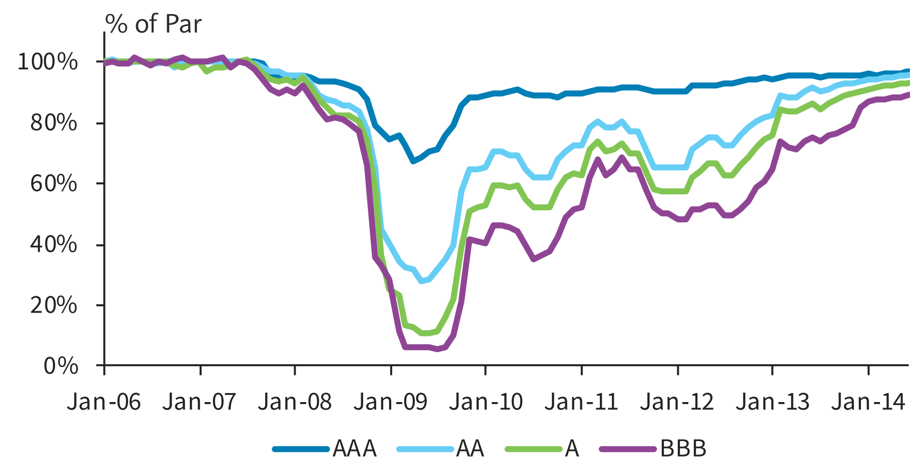
European CLO Spreads



US BSL CLO Prices



European CLO Prices



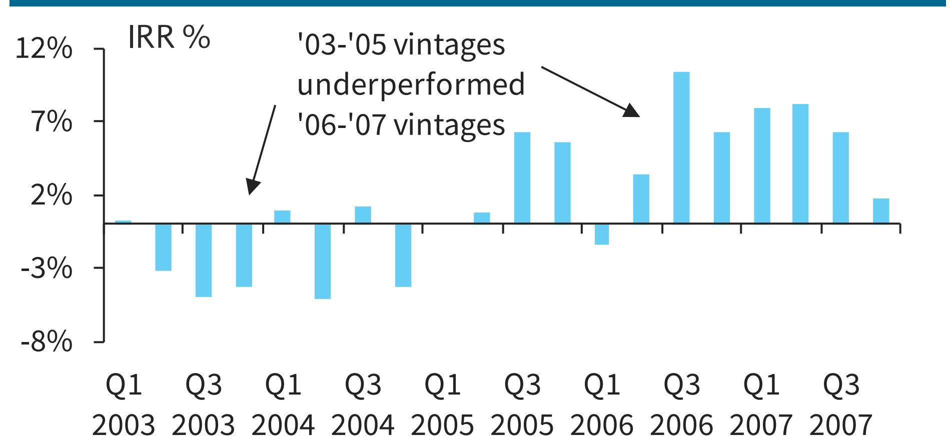
Source for all charts: S&P LCD, Intex, Barclays Research

Pre-Crisis CLO Equity Performance

- Despite pricing just before the crisis, 2006-07 vintage deals had the best performing CLO equity
- These deals were able to lock in relatively cheap cost of liabilities, and mixed with a long reinvestment period (6-7 years), where asset spreads widened and coupons were amended higher (with the covenant fee flowing to equity), and CLOs could also buy discounted CLO mezz tranches, most CLO managers were able to take advantage of a period of historical volatility in the loan market without being forced to sell
- European CLO equity performed relatively worse than US CLO equity due to CCC buckets being slightly higher for longer in Europe, with slightly lower CCC limitations (~5% versus 7.5% today), lower asset recovery rates, as well as a double-dip default cycle in Europe

Pre-crisis US BSL CLO Equity Returns

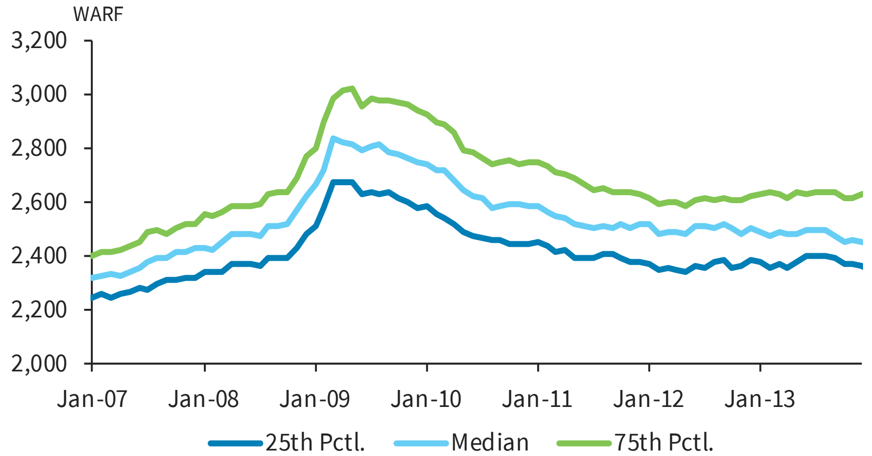
Pre-crisis European CLO Equity Returns



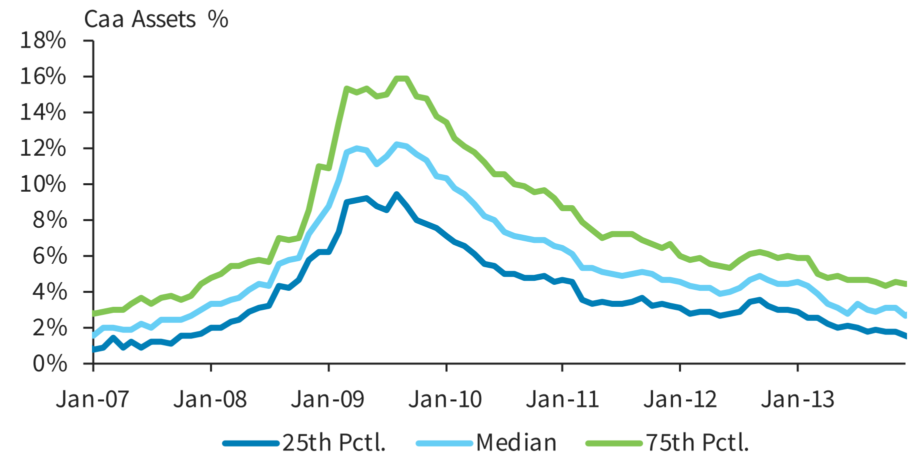
For more detail, see "CLO Equity: The Long and Short of It," April 12, 2019. Note: Data by deal closing dates. Source for all charts: Kanerai, Intex, Barclays Research

Pre-Crisis US BSL CLO Stats

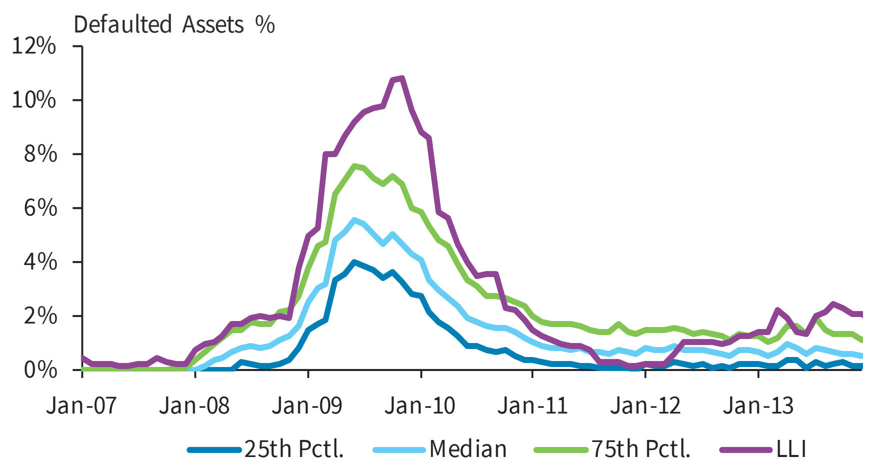
Moody's WARF



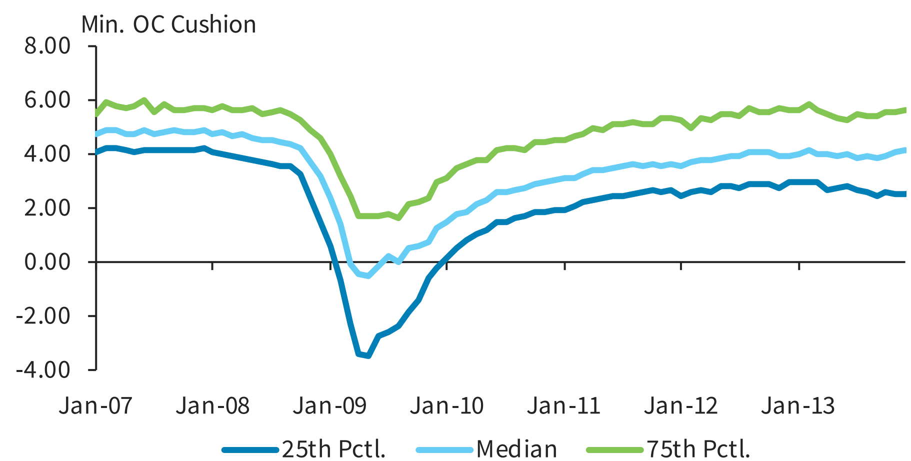
Caa % Bucket



Defaulted Assets



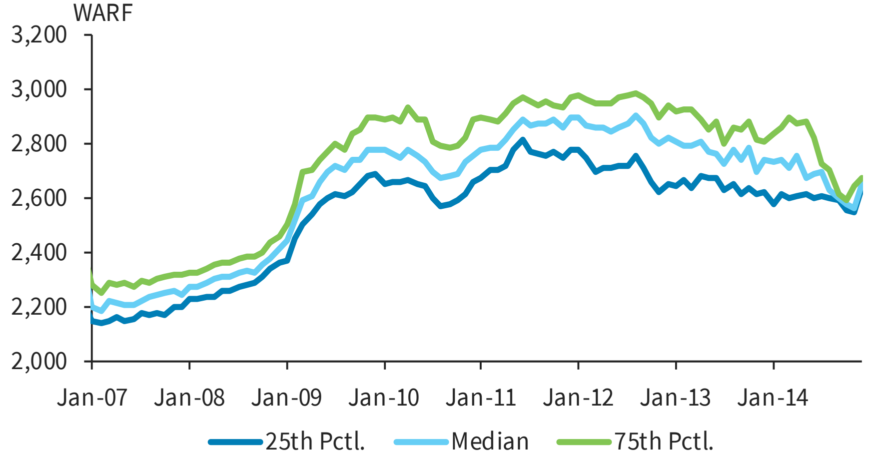
Min. OC Cushion



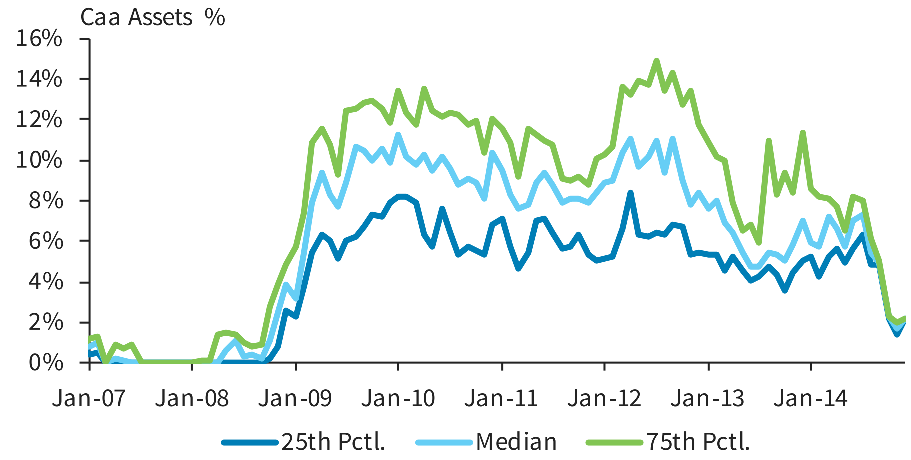
Note: Median of in-reinvestment US BSL CLOs issued between 2003-2008. Source for all charts: Kanerai, Intex, Barclays Research

Pre-Crisis European CLO Stats

Moody's WARF



Caa % Bucket



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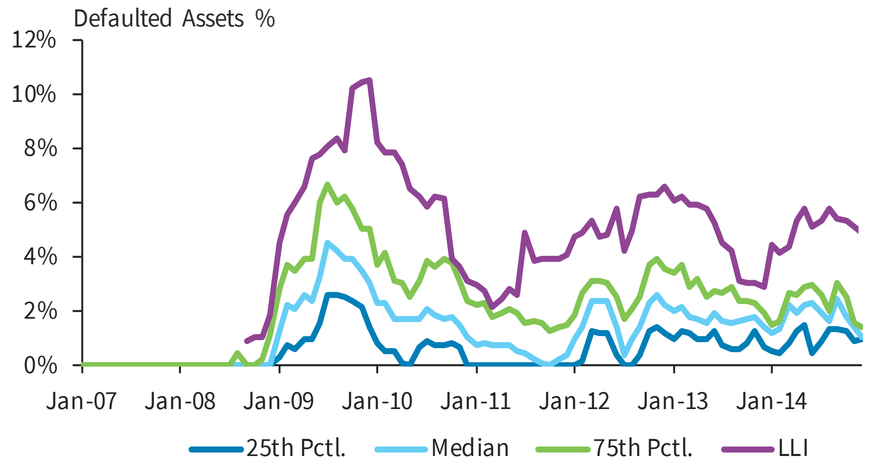

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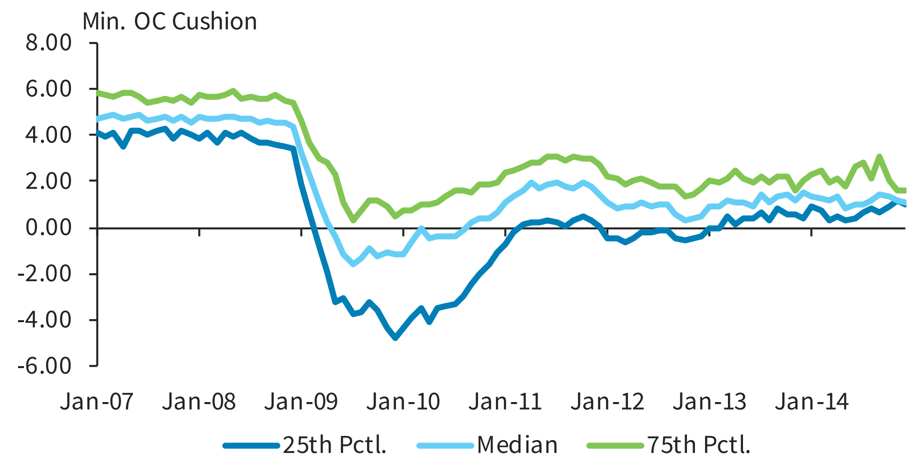

Note: Median of in-reinvestment European CLOs issued between 2003-2008. Source for all charts: Kanerai, Intex, Barclays Research

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