

European CLO Primer

The CLO 2.0 era has arrived in Europe

Update: This version has been updated to reflect the realised performance of a CLO that was redeemed shortly prior to publication, see page 86.

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After five years of dormancy, the European CLO market reopened for new issuance in early 2013. To help reacquaint investors with the features, opportunities, and challenges of CLO investing, we present this consolidated European CLO 2.0 market primer.

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Relative to pre-crisis (1.0) CLOs, the post-crisis (2.0) standard has better structural credit enhancement for most debt holders, similar leverage to equity, and a shorter reinvestment period.

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Driven by rating agency requirements, regulation, investor preferences, and manager style, a long list of rules governs the accumulation and management of CLO collateral. These rules are designed to mitigate the inherent correlation and cyclicalities of corporate credit default risk, which is a key driver of CLO performance.

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For senior tranches, regulated investors such as banks and insurers dominate the buyer base. Mezzanine bonds are held by the same group plus less heavily regulated investors like pension funds, credit hedge funds, and traditional asset managers. Equity tranches are the purview of hedge funds, structured credit specialists, and the CLO manager.

Chapter 4 – Market status 56

The European CLO 2.0 market is evolving: originator vehicles are proliferating and the manager base is becoming more diversified. Pre-crisis (1.0) transactions are amortising rapidly, while new CLO formation has been constrained by loan supply. Annual gross issuance remains far below pre-crisis peaks, but net issuance has just turned positive.

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The performance of pre-crisis (1.0) CLOs has validated that the model works: all senior and most mezzanine tranches have experienced no loss of principal and full coupon payments to date. However, elevated loan default rates in Europe over the past seven years have taken a toll on lower-rated mezzanine and equity performance, and have also contributed to significant volatility in all tranche ratings and secondary trading levels. With loan defaults expected to be lower in future years, the performance outlook for post-crisis (2.0) European CLOs is improved.

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We present a list of common terms and acronyms often encountered in CLO investing.

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We present an assortment of charts and data tables, including a full list of European 2.0 CLOs with liability spreads and publicly disclosed discount margins where applicable.

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Links to original publications:

Note: The five principal chapters comprising this volume are edited versions of documents that were originally published individually. The previously published version of each chapter can be accessed on Barclays Live via the following links:

European CLO Series: Part 1 – Structures

European CLO Series: Part 2 – Collateral

European CLO Series: Part 3 – Investor Base

European CLO Series: Part 4 – State of the Market

European CLO Series: Part 5 – Performance

INTRODUCTION

The CLO 2.0 era has arrived in Europe

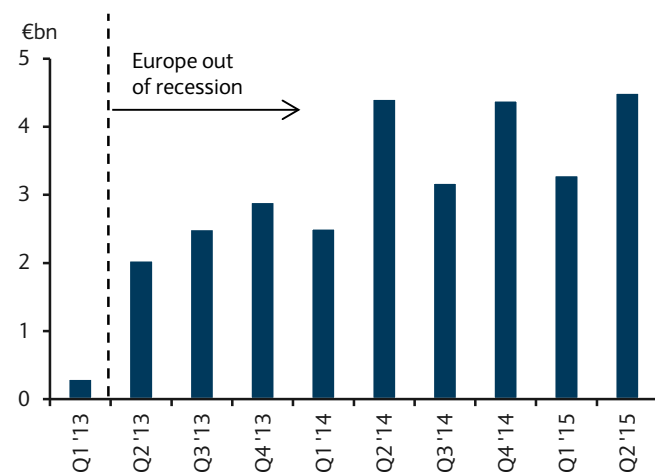
After five years of dormancy, the European CLO market reopened for new issuance in early 2013, coinciding with Europe's emergence from the second leg of its "double dip" recession. Since that time, new issuance has proceeded at a measured but gradually increasing pace, as old participants slowly returned to the market and others joined for the first time. To help reacquaint investors with the features, opportunities, and challenges of CLO investing, we present this consolidated European CLO 2.0 market primer.

Rebirth of the European CLO market

The rebirth of the European CLO market (colloquially Euro CLO 2.0) generally coincides with the continent's emergence from its "double dip" recession in Q2 2013. Technically, the first European 2.0 was created while Europe was still in recession, as Cairn Capital priced Cairn CLO III in mid-February of that year. However, it was during the second quarter of 2013 that new CLO creation returned in earnest, as six deals totalling slightly above €2bn in aggregate par amount were priced (Figure 1). Issuance has accelerated since, reaching a full-year total of €14.5bn in 2014, and €9.8bn YTD through July 2015. With European GDP growth now on a firmer footing (Figure 2) and the ECB's various asset purchase programs helping to alleviate deflation concerns, we expect further growth in Euro CLO 2.0 issuance in the years ahead. Our revised 2015 CLO issuance forecast for Europe is €15-20bn, with still higher amounts expected thereafter.

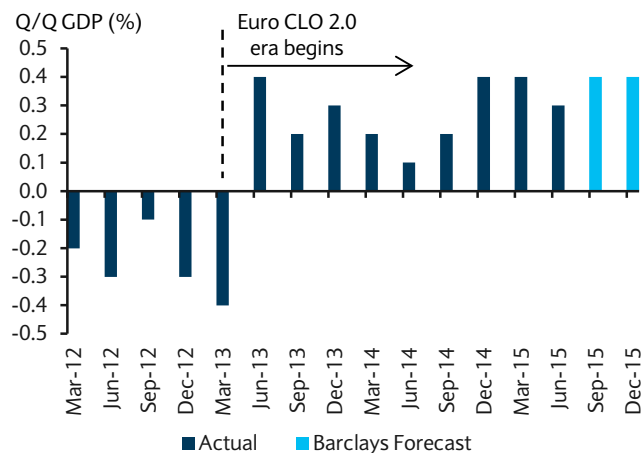
The resurgence and growth of the European CLO 2.0 market has not gone unnoticed by investors across the credit risk spectrum. In some cases, investors remained active in the secondary market in the years following the 2008 financial crisis, but more commonly, they are now re-engaging after a multi-year hiatus. Meanwhile, new investors that previously did not participate in structured products at all have recently become interested in CLOs after the model was validated during the crisis. Relative to their original credit rating, most pre-crisis (1.0) CLO debt tranches have delivered very low observed principal loss rates – lower, in fact, than the long run historical average for similarly rated corporate bonds, and much lower than some other types of securitised products (most US non-agency MBS and European CMBS, for example).¹

FIGURE 1
Euro CLO 2.0 issuance by quarter



Source: Barclays Research

FIGURE 2
Eurozone GDP growth with Barclays 2015 quarterly forecasts



Note: Forecasts as of 14 August 2015.

Source: Bloomberg, Barclays Economics Research

¹ For details regarding annual default rates by rating and securitization type, see S&P's *Global Structured Finance Default Study*.

However, new and old investors alike are aware that the impressive default performance of CLOs during and after the financial crisis was accompanied by significant mark-to-market volatility, driven by a combination of illiquidity, reduced availability of leverage to tranche investors, collateral downgrades driven by a deteriorating economy, and ratings agency methodology changes that resulted in a wave of CLO tranche downgrades as well. As a result of this volatility, some investors have been hesitant to participate in the asset class without a full understanding of the CLO structure and the factors that can affect the economics for debt and equity tranches. While the concept of cash flow securitisation is relatively simple, the details often are not: CLOs come with an assortment of rules, limits, tests, and (for pricing purposes) assumptions that can appear daunting at first glance. This complexity can sometimes reinforce investors' hesitancy to participate, making investor education a key challenge that the European CLO 2.0 market must overcome in order to continue on its current growth trajectory.

To assist in this endeavour, we have assembled this volume which covers all major aspects of the CLO 2.0 market. In the ensuing chapters, the following five topics will be discussed in detail:

- Structures – an overview of the typical 2.0 capital stack, cash flow waterfall, deal lifecycle, and fee structure.
- Collateral – loan availability, issuer diversity and credit risk, portfolio tests, issuance volumes and pricing trends, the growth of cov-lites, and the role of bond buckets.
- Investor base – buyers across the CLO capital stack, and the impact of regulation on the economics of their investments decisions.
- State of the market – trends in issuance and legacy amortisation rates, aggregate reinvestment capacity, risk retention solutions, and manager diversity.
- Performance – ratings and spread history, default rates, equity cash distributions, and secondary liquidity.

CHAPTER 1

Chapter I – Structures

This is an edited version of the [article](#) that was previously published on 27 February 2015.

Over the past two years, a relatively standard transaction structure has emerged, colloquially known as Euro CLO 2.0. Relative to pre-crisis (or “1.0”) CLOs, the 2.0 standard has better structural credit enhancement for most debt holders, with similar leverage to equity holders. The deal’s lifecycle is also shorter, particularly the period of active reinvestment by the collateral manager. Importantly, warehouse facilities have re-emerged, allowing asset accumulation over a multi-month period which allows the manager to maintain selectivity during the initial portfolio ramp. Standard fee structures align manager interests with equity holders, while keeping the majority of their cash flow claims subordinate to debt holders.

In this chapter we will examine the key structural aspects of CLOs, including:

- The basics – what is a CLO?
- The CLO capital stack – typical tranche sizes and overcollateralisation levels by credit rating (including a 2.0 versus 1.0 comparison), along with leverage to equity.
- The lifecycle of a European CLO – market standards for the phases (pre-closing ramp, non-call, reinvestment, and final maturity) making up the finite lifecycle of a CLO.
- The cash flow waterfall – rules governing the sequential distribution of interest and principal payments from the collateral pool.
- Manager fee structure – the typical senior/junior/incentive fees that remunerate CLO managers, and their alignment of interests with debt and equity holders.

What is a Collateralised Loan Obligation, or CLO?

CLOs first came into existence in the early 1990s, when banks began using nascent securitisation techniques to repackage balance sheet loans, freeing up lending capacity. By the late 1990s, dealers and asset managers had gotten involved, and CLOs gained wider acceptance as a means of distributing the comparatively uniform credit risk associated with leveraged corporate borrowers across a wider range of investors. After several years of moderate issuance, CLO creation grew very strongly during the credit boom of the mid-2000s, reaching a peak of nearly €40bn in Europe in 2006 (and nearly \$100bn in the US in 2007). However, CLO creation stopped in the wake of the financial crisis, with no new broadly syndicated deals in the Europe between mid-2008 and early 2013.

The basic organisational structure of a CLO is fairly simple, as represented by Figure 1. An SPV issues a series of notes to investors representing tiered claims on the CLO’s cash flows. The notes are secured by the collateral which will ultimately produce those cash flows. On behalf of the SPV, the collateral manager uses the proceeds from the notes’ issuance to purchase the collateral, which is principally a portfolio of loans made to sub-investment grade corporate borrowers (often referred to as “leveraged loans”). Cash flows from the portfolio are distributed to noteholders in accordance with a strict set of rules (see the ensuing section on cash flow waterfall for further detail regarding this topic).

After the initial selection of collateral, the manager continues to be responsible for managing the portfolio by buying and selling assets. This process is also governed by a strict set of rules, most of which are designed to protect the interests of the noteholders. In

exchange for providing this service, the manager receives fee income, which is typically divided into several streams with varying seniority relative to different classes of noteholders (see the ensuing section on manager fee structures for details). As finite-life vehicles, CLOs begin to naturally wind down after a predetermined date, and eventually are collapsed completely, with all collateral liquidated and all cash flows distributed to noteholders and the manager in accordance with the rules established at the outset (see the ensuing section on the CLO lifecycle for details).

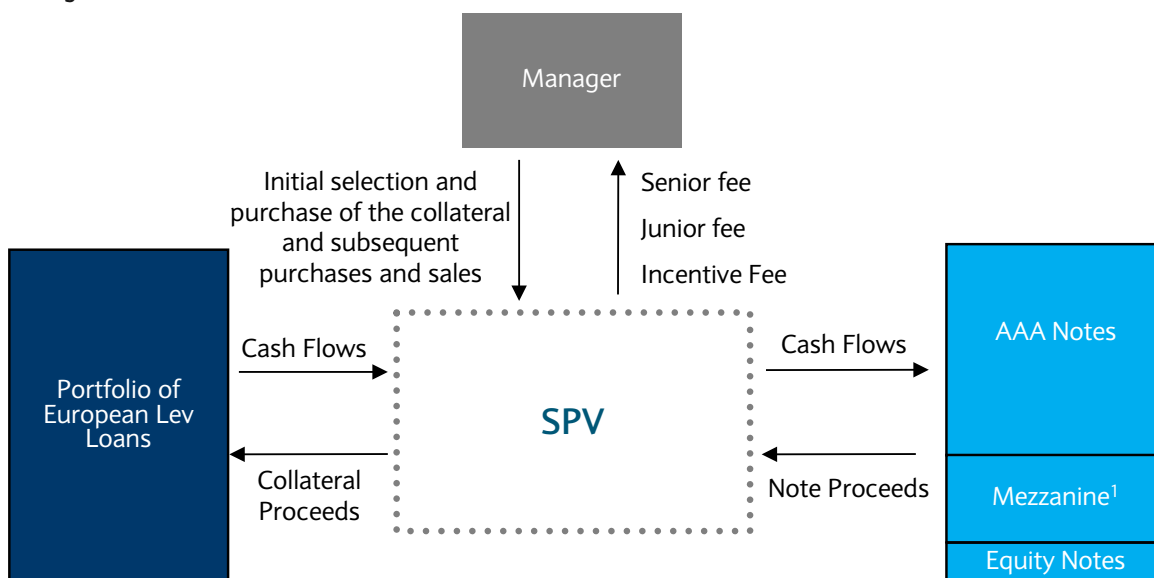
The CLO capital stack

As mentioned in the previous section, CLOs are funded on the liability side by the issuance of credit-tranched, structured bonds, secured by the collateral pool of assets. While the exact specifications of the liability stack can vary from deal to deal, the capitalisation of a CLO always includes one or more tranches of investment-grade debt, and also an equity interest that is subordinate to all debt tranches. Importantly, the relative size of debt and equity tranches in the Euro CLO 2.0 market is different from pre-crisis (1.0) norms, and also slightly different than the current standard for US 2.0s.

Similar to most structured and derivative products during the pre-crisis period, legacy CLOs did not adhere to a consistent standard in terms of overall size and liability structure. The particular characteristics of each deal were determined by a combination of manager track record and reputation, dealer creativity, and investor appetite for specific risk exposures. However, despite the varied nature of pre-crisis deals, one trait shared by nearly all such structures is that they were aggressively leveraged. At the peak of the pre-crisis credit boom, as investors baked in assumptions of a permanent decrease in volatility (the so called “Great Moderation”), European AAA tranches from established managers typically made up nearly 65% of the overall capital stack, mezzanine tranches became very thin, and total leverage to CLO equity holders was often in the 10-11x range.

The ensuing credit crisis and recession altered perspectives in numerous ways, resulting in a much different landscape when issuance resumed in 2013. For a start, investor assumptions regarding default correlation and potential loss severity were reset by the large number of corporate borrower defaults and lower average recoveries realised in 2009. Meanwhile,

FIGURE 1
Functional diagram of a CLO



Note ¹: Mezzanine refers to all notes that are subordinate to the most senior class of notes, but senior to equity (typically AA-B). Source: Barclays Research

rating agencies significantly amended their CLO rating methodology (and did so for other structured products as well), requiring more conservative capital structures to achieve the same assortment of original tranche ratings. The net result was a permanent shift in CLO capital structures, along the lines of what is depicted in Figure 2.

FIGURE 2

Indicative capital structures of pre- and post-crisis CLOs²

	Euro 1.0 (Pre-Crisis)		US 3.0 (2014/15)		Euro 2.0 (2013)		Euro 2.0 (2014/15)	
Tranche Rating	% of Notional	Par O/C Level	% of Notional	Par O/C Level	% of Notional	Par O/C Level	% of Notional	Par O/C Level
AAA	65.0%	135%	61.0%	139%	56.5%	144%	57.5%	143%
AA	9.0%	126%	11.5%	128%	11.5%	132%	11.0%	132%
A	6.0%	120%	6.5%	121%	6.5%	126%	6.0%	126%
BBB	5.0%	115%	5.5%	116%	5.0%	121%	5.0%	121%
BB	4.0%	111%	4.5%	111%	6.5%	114%	6.5%	114%
B	0.0%	111%	1.5%	110%	0.0%	114%	3.0%	111%
Equity	11.0%	N/A	9.5%	N/A	13.0%	N/A	11.0%	N/A

Note: All indicative capital structures are based on market averages for actively managed CLOs with collateral consisting primarily of broadly syndicated loans. Static and middle market CLOs as well as European SME ABS are excluded. Pre-crisis figures are based on averages from 2006 transactions from large, well-established managers. Source: Intex, Barclays Research

Several aspects of the pre- vs. post-crisis and US vs. Europe comparisons are worth highlighting, beginning with Euro 1.0s versus the 2014 standard for 2.0s (the far left and far right pairs of columns in Figure 4 above).

First, the size of a typical European AAA rated tranche has shrunk, from roughly 65% of total notional during the pre-crisis period to less than 60% today. At the bottom end of the capital stack, 2013 vintage European 2.0 equity tranches were larger than their pre-crisis predecessors, making the structure much more conservative. However, more recent 2.0 equity has been roughly equivalent in proportion to pre-crisis deals, meaning that overall leverage to equity holders is now similar to the 1.0 era. The return of equity leverage to pre-crisis levels has been achieved by the introduction of a single-B rated class (i.e., part of the equity has been substituted by a single-B class), which generally did not exist in European CLO 1.0 deals.

In addition to the introduction of single-B tranches, the European 2.0 standard has evolved somewhat since the earliest deals from the 2013 vintage. At the senior part of the capital structure, average AAA tranche thickness has increased slightly, whereas AA and single-A classes have become thinner. However, these changes have been minor, such that par O/C levels for AAA through BB rated tranches have changed only slightly relative to early 2.0 norms.

While AAA rated tranches remain smaller in the standard European CLO 2.0 structure than in pre-crisis deals, most other debt tranches (collectively referred to as mezzanine, with credit ratings ranging from AA to single-B) are now often larger than they were pre-crisis. The combined effect of smaller AAAs, larger mezzanine tranches, and the inclusion of single-B rated tranches is that over-collateralisation levels³ for all debt tranches are greater than they were pre-crisis. This is a direct result of revisions to the CLO tranche rating methodologies used by S&P and Moody's, which require greater credit protection than they did pre-crisis in order to secure the desired credit rating. In essence, CLO noteholders across

² For a comparison between US CLO 1.0 and 2.0, please see *U.S. Credit Focus: CLO Market Mini-Primer*, 28 June 2013

³ Over-collateralisation is the amount by which available collateral exceeds the notional amount of the debt tranche in question along with all debt tranches that are senior to the tranche in question. The O/C levels in Figure 2 are based on notional amounts of the CLO capital stack and are for comparison purposes only. Actual O/C test levels are based on the size of the collateral pool, which may be smaller than the combined par amount of the CLO tranches due to OIDs, fees, and other costs. See the ensuing chapter on CLO Collateral for details.

the risk spectrum currently receive better structural protection against credit losses than they did for pre-crisis CLO notes of the same rating, even though the default performance of pre-crisis CLOs has been very good relative to other similarly rated asset classes.

A comparison with the US CLO 2.0 standard (as represented in Figure 4 by 2014 averages) is also revealing. While they are more conservatively structured than their own pre-crisis deals⁴, US 2.0s have larger AAA tranches, smaller equity tranches, and higher leverage than European 2.0s. While this may be justified by the fact that the US economy is currently growing faster than Europe, arguably providing more support to the corporate borrowers in US collateral pools, it does suggest that US investors and ratings agencies are potentially tolerant of more aggressive structures than the European 2.0 market has been thus far.

The lifecycle of a European CLO

Following the warehousing period that typically precedes the issuance of a CLO, the lifecycle of the securitisation itself consist of several time periods that are governed by different rules related to reinvestment within the collateral portfolio, amortisation of the outstanding liabilities via principal repayments to noteholders, and optional redemption options for the entire structure. Except in the extremely rare case of default, the lifecycle of a CLO can be broken down into four parts:

- ramp-up / initial investment period;
- reinvestment period;
- amortising period; and
- non-call period.

Ramp-up / initial investment

A bank typically provides financing to the collateral manager to purchase loans several months before the issuance of the CLO. However, at the closing date of a CLO transaction, the manager has often not yet acquired the entire portfolio that is to be financed by the CLO. Hence, the *ramp-up / initial investment period* describes the time required to purchase the remainder of the portfolio and typically lasts three to six months from the securitisation's closing date, depending on market conditions and the availability of collateral. The date on which the CLO is fully invested is called the *effective date*.

Reinvestment

In a European CLO 2.0 the *reinvestment period* is usually four years, which is shorter than the five to six years that were common in pre-crisis (1.0) CLOs. During the reinvestment period the collateral manager is allowed to reinvest loan principal repayments (whether scheduled maturities or early prepayments) or sales proceeds into new collateral, subject to certain structural conditions (including interest coverage and over-collateralisation tests) as well as a number of portfolio limitations (permitted asset types, aggregate ratings, issuer diversity, average life, etc).

Most of the tests are usually centered on either maintenance of the portfolio within specified limits, or the “non-worsening” of aggregate portfolio statistics if the limit has already been breached; ie, the test must be satisfied, or maintained/improved if it is not satisfied, before reinvestment of proceeds is permitted. Generally, in addition to reinvestment periods having become shorter, portfolio selection criteria are stricter in European CLO 2.0s than in pre-crisis transactions. See Chapter 2 of this volume for a full description of CLO collateral limits.

⁴ See *U.S. Credit Focus: CLO Market Mini-Primer*, 28 June 2013

Amortisation

After the reinvestment period ends the CLO enters its *amortisation period*, during which most portfolio principal and sales proceeds must be used to redeem the CLO notes sequentially, starting with the most senior (ie, AAA rated) class. The collateral manager is usually still allowed to reinvest unscheduled principal repayments and sales proceeds from credit improved assets⁵; sometimes it is also allowed to reinvest sales proceeds of assets that are likely to deteriorate in credit quality. In most European CLO 2.0 transactions, collateral managers have less flexibility to reinvest than in their pre-crisis (1.0) counterparts. Usually, reinvestment of eligible proceeds during amortisation is subject to the same tests as during the reinvestment period, but some tests become absolute as opposed to a “non-worsening” language. In particular, the weighted average life, average credit rating, and limits on lowly rated assets often have to be met during the amortisation period, or else reinvestment is completely prohibited. Likewise, the newly purchased asset is usually not permitted to have a lower rating or a longer life than the prepaid/sold asset. The reinvestment of sale proceeds generated from assets with deteriorating credit quality is often subject to approval from the controlling class of the CLO (usually the most senior class).

The amortisation period usually has a maximum length of eight-to-ten years, which is similar to pre-crisis deals, and ends with the *final maturity* date of the CLO notes. In practice, most CLOs are called or refinanced well in advance of the end of the reinvestment period, as deleveraging from senior note repayment causes the returns to equity holders to deteriorate (see the ensuing section on post-noncall redemptions and refinancing for details). However, in the unlikely event that a CLO reaches its final maturity date, the securitisation notes become due and payable. Any remaining collateral must be liquidated prior to this date, so that proceeds can be used to repay the outstanding principal amount of any remaining rated notes. At this point, non-payment of principal to any noteholder other than equity would constitute an *event of default* of the CLO, enabling the most senior noteholders to direct the trustee to enforce against the issuer (see the section below on events of default for details).

After the non-call period: redemptions and refinancing

Depending on several factors, the reinvestment period mentioned above can terminate earlier than anticipated. This could be the case in the unlikely event that the CLO issuer defaults (see below). The reinvestment period can also terminate if the collateral manager determines that it cannot reinvest in eligible assets (special redemption), or in case of a tax-related optional CLO redemption. However, the much more likely scenario is that the CLO will be voluntarily called when the economics for equity holders are no longer sufficiently compelling to warrant the ongoing use of their capital.

After the *non-call period*, which often lasts two years from closing of the transaction, the majority of the equity holders can direct the issuer to redeem the notes at any time; this is known as an optional redemption or transaction call. The likelihood of a transaction call after the non-call period depends on the economics of the CLO and the prevalent market conditions. After the non-call period expires, most European CLOs also have a clean-up call option which can be exercised by the manager once the collateral value falls below 15% of the initial principal balance of the CLO. This would typically occur several years into the amortisation phase, when a significant portion of the collateral and the CLO notes have been repaid. The clean-up call is intended to allow the manager to redeem the small remnants of an old transaction when the fee income (which is based on notional amount outstanding) no longer justifies the time expended in managing the deal.

⁵ Credit improved assets are broadly defined as an asset that, in the view of the collateral manager, has significantly improved in credit quality since it was acquired. There can be differences from one CLO to another in the exact definition of credit improved assets, sometimes depending on whether the reinvestment period has expired or not.

Usually, upon optional redemption all CLO classes must be repaid save for the most junior tranche (equity). The collateral manager can fund an optional redemption either by liquidating the securitised portfolio or by the refinancing of the entire capital structure. In many European CLO 2.0 transactions, equity holders also have the right to repay *some* tranches after the non-call period; the repayment can be funded by the issuance of *refinancing notes* (ie; a new note issued by the CLO), in order to achieve lower funding costs without liquidating the collateral. A less common option included in some transactions is a mechanism for the *re-pricing* of existing notes, which enables the CLO to lower its finance cost without going through the redemption and re-issuance process. From an economic standpoint, the outcome of refinancing or re-pricing is largely the same, as it lowers the weighted average cost of debt in the CLOs liability stack, thereby enhancing equity returns. While most European 2.0 transactions have not yet left their non-call periods, the experience of the US market suggests that when call protection has expired on a larger number of deals, refinancing and/or re-pricing transactions will soon follow, provided market conditions are favourable.

FIGURE 3
Lifecycles of selected European CLO 2.0

	TCLO 1	HARV 10	BABSE 2014-2	RYEH 1X A
Closing date	Sep 12	Nov 2014	Nov 2014	Jan 15
Legal final maturity date	Oct 28	Nov 2028	Nov 2027	Oct 28
Ramp-up period	7 months	5 months	6 months	6 months
Reinvestment period	4 years	4 years	4 years	4 years
Amortisation period	10 years	10 years	9 years	9.8y years
Total maximum life	14 years	14 years	13 years	13.8 years
Non-call period	2 years	2 years	2 years	2 years
Refinancing of single tranches allowed?	Yes	Yes	Yes	Yes
Re-pricing option?	No	No	No	No

Source: Offering Circulars, Barclays Research

The very rare fifth phase – Event of Default

Similarly to other securitisation asset classes, actual maturity defaults are very rare in CLOs, in part due to the maturity restrictions for the underlying assets. To our knowledge, thus far only one European CLO 1.0 failed to repay on the final maturity date: Harbourmaster CLO 3 in July 2014 – in that case the collateral was liquidated by the issuer before maturity but proceeds were insufficient to repay all CLO notes in full, inflicting credit losses on junior mezzanine noteholders.

Only in the case of very adverse collateral performance could the CLO-issuing SPV default on its contractual obligations. In most transactions, defined *events of default* include:

- non-payment of interest on the class A (ie, AAA rated) or class B (AA rated) notes;
- non-payment of principal on the maturity date;
- the senior O/C level falls below 102.5% (see the ensuing section on cash flow waterfall for details on O/C test calculations); and
- issuer insolvency.

The issuing SPV for a CLO is typically a bankruptcy-remote vehicle (ie, is not exposed to any other liabilities or claims against the CLO manager, issuer, or arranger), while CLO cash flow waterfalls aim to mitigate the risk of non-payment of interest on senior classes as much as possible (for example, by incorporating “principal proceeds to pay interest” features). As a result, events of default on CLO notes, by construction, are very rare.

However, in the unlikely event of a transaction default, the controlling class (the most senior class of notes still outstanding) can direct the trustee to accelerate the notes. After the notes

have become due and payable, the controlling class can direct the trustee to liquidate the collateral in order to redeem the CLO notes in accordance with the post-acceleration waterfall. The payment order is strictly sequential, such that interest on non-senior notes is only paid after principal of more senior notes is fully redeemed. In the CLO offering circulars we reviewed, this direction has to be given by an extraordinary resolution of the controlling class, necessitating a two-thirds majority vote. In addition, before taking action, the trustee needs to be satisfied that it is indemnified appropriately against claims by other noteholders or the CLO manager.

Cash flow waterfalls

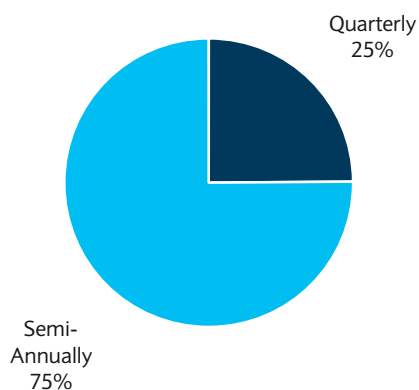
As is the case for many European securitisation transactions, the CLO priority of payments (or “waterfall”) differentiates between cash flows received from interest vs. principal payments from the collateral pool, and can vary over time for an individual CLO depending on the collateral and transaction performance.

Interest payments

European CLOs usually buy floating-rate loans or bonds; fixed rate assets usually make up only a relatively small percentage of the pool. The vast majority of a CLO’s liabilities are floating rate. As interest-rate hedging is uncommon, to mitigate interest rate mismatches CLOs often sell some fixed-rate tranches in an amount of the expected fixed-rate loan holdings. Most of the leveraged loans making up a CLO’s collateral pool will pay interest on a quarterly basis; a limited number of assets might pay monthly, semi-annually or annually. Some loan agreements provide the borrower an option to change its payment frequency from quarterly to semi-annually, for example.

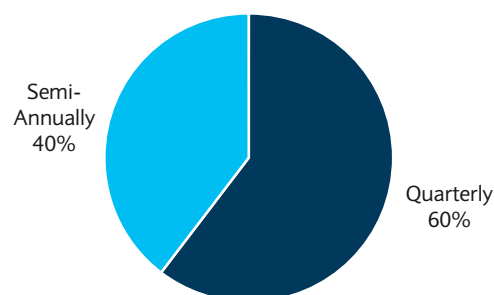
Compared with European CLO 1.0 transactions which pay interest semi-annually in the majority of cases (Figure 4), in post-crisis deals quarterly payment frequency is more common (Figure 5), likely to mitigate basis risk (ie, to match the payment frequency of assets and liabilities) and to increase equity returns by reducing liability costs (3m euribor < 6m euribor). To mitigate the potential for reset risk to arise and for timing mismatches (in particular, cases where a significant portion of collateral pays semi-annually but interest payments must be made to CLO noteholders quarterly), European CLO 2.0 transactions are usually structured with restrictions for adding assets that pay interest less frequently than the liabilities; interest smoothing accounts; triggers that lengthen the payment frequency of the CLO tranches if the proportion of assets with longer reset periods exceeds a certain threshold; and/or a liquidity facility.

FIGURE 4
Pre-crisis (1.0) European CLO interest payment frequency



Source: Barclays Research

FIGURE 5
Post-crisis (2.0) European CLO interest payment frequency

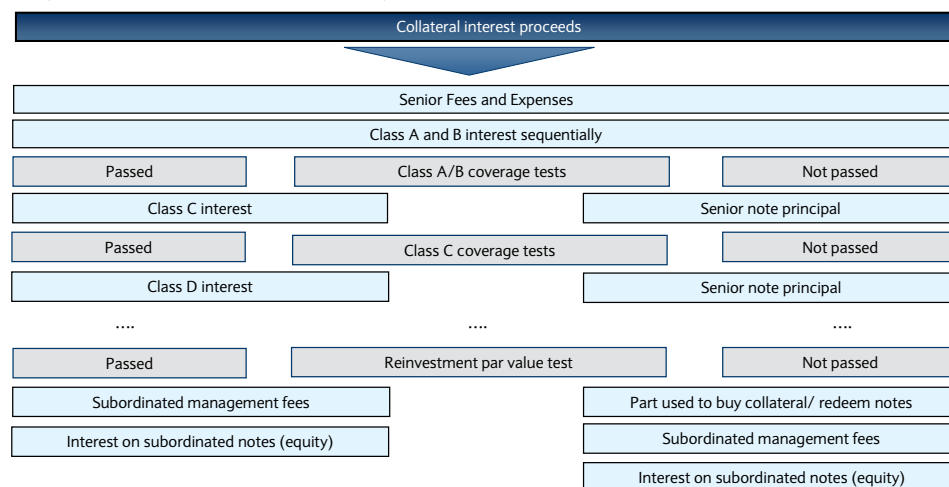


Source: Barclays Research

For the purposes of the CLO waterfall, interest proceeds are broadly defined as interest payments on the securitised assets or from other investments, accrued interest from asset sales, fees and net hedge payments (if any) that were received by the CLO issuer in a given interest period. In some transactions trading gains (excess value from asset sales or redemptions over the purchase price and/or par) are also classified as interest proceeds. If needed, amounts available on interest smoothing accounts and/or liquidity draws can also be classified as interest proceeds.

Principal proceeds can be reclassified as interest proceeds to pay interest on classes that are not subject to interest coverage ratio (ICR) tests (usually the one or two most senior classes) or the controlling class (the most senior class at that point in time). This “principal-to-pay-interest feature” aims to reduce the likelihood of an interest-payment default on the most senior class of the CLO, which is typically defined as an event of default and could result in enforcement against the issuing SPV (see above). Finally, principal proceeds can also be reclassified as interest proceeds if fast amortisation ICR tests (see below) are cured on that interest payment date.

FIGURE 6

Simplified interest waterfall in European CLOs

Source: Offering circulars, Barclays Research

The distribution of interest proceeds to the CLO notes is governed by the interest waterfall whose exact workings depend on the portfolio performance. In most situations, after payment of senior fees and expenses (including senior collateral management fees), repayment of liquidity draws (if any) and net hedging payments, cash is distributed sequentially, starting with the most senior class of notes (Figure 6). After payment of all interest due on all senior and mezzanine has been completed, the residual amount is paid to the subordinated notes (equity). At each point of the waterfall, interest coverage and over-collateralisation tests govern whether interest due on mezzanine or junior notes is diverted to purchase additional assets (to cure the reinvestment par value test) or to amortise the senior notes (to cure the coverage test).

Tests applicable to the interest payment waterfall

The *interest coverage ratio* (ICR) for a given tranche is defined as the interest proceeds received on the issuer’s assets, divided by the interest due on the respective tranche plus the interest due on all notes senior to that class of notes. If for a given class of notes the ICR falls below a certain threshold, the interest that would have been paid to this and other subordinated classes is diverted to redeem the senior notes until the ICR test is passed again.

To determine the *over-collateralisation (O/C) / par value ratio* for each tranche, the value of the collateral is divided by the principal amount outstanding of the respective tranche plus

the outstanding principal amount of all notes senior to that class of notes. For the purpose of this test, the collateral value used in the calculation is dependent on the status of each individual asset in the portfolio, with underperforming assets (defaulted, interest-deferring, lowly rated, etc) being valued at their expected recovery and/or market values. If for a given class of notes the O/C level falls below a certain threshold, the interest that would have been paid to this and other subordinated classes is diverted to redeem the senior notes until the test is passed again.

Over-collateralisation / par coverage test thresholds are usually set somewhat lower than the actual initial over-collateralisation level of the CLO, so that the transaction starts its life with some amount of cushion against test breaches (refer back to Figure 2 above for typical O/C levels in 2.0 structures). As such, it is not surprising that compared with pre-crisis CLOs, the test levels are higher in post-crisis transactions, reflecting the higher initial credit enhancement in 2.0 deals. European CLO 2.0 par coverage test thresholds are also higher than those in US CLO 2.0, reflecting the lower initial leverage for European 2.0s described in the section above on the CLO capital stack.

In addition to the standard approach of redeeming senior notes, some transactions also enable the collateral manager to cure coverage test breaches by making a new equity contribution, the proceeds from which are then used to purchase additional assets, or to sequentially repurchase CLO notes (this is typically referred to as the remedial funding option). Coverage test thresholds from a representative sample of Euro CLO 2.0s appear in Figure 7.

FIGURE 7

Coverage tests of selected European CLO 2.0

	TCLO 1	HARVT 10	BABSE 2014-2	RYEH 1X A
Required O/C classes A/B	136.7%	130.4%	133.89%	132.84%
Required O/C class C	126.0%	121.2%	124.23%	122.87%
Required O/C class D	118.1%	114.1%	117.71%	114.85%
Required O/C class E	108.8%	106.4%	108.89%	107.31%
Required O/C class F	-	103.6%/104.6%*	-	104.49%
Reinvestment par value test	109.3% (class E)	104.1% (class F)	104.94% (class F)	104.49% (class F)
Required ICR classes A/B	125.0%	120.0%	120.0%	120.0%
Required ICR class C	112.0%	115.0%	110.0%	110.0%
Required ICR class D	105.0%	110.0%	105.0%	105.0%
Required ICR class E	102.0%	105.0%	101.0%	101.0%

Note: * during reinvestment period/ after reinvestment period. Source: Offering Circulars, Barclays Research

In many transactions, a second threshold level called the *reinvestment par value test* exists, which is typically set at a slightly higher level than the O/C test for the second most subordinated class of notes (ie, the notes above the equity). During the reinvestment period, a breach of this higher threshold would trigger a diversion of part or all of the interest that would have been paid on the notes and equity towards the purchase of additional assets. The collateral manager may also have the option to redeem notes in sequential order instead of purchasing new collateral.

The net effect is that as collateral performance initially deteriorates, the manager is typically first forced by the reinvestment par value test to divert interest payments away from subordinated classes and towards the purchase of additional collateral. If performance deteriorates further, such that O/C test levels are breached, the manager typically must divert interest away from subordinated noteholders to pay down the most senior class of notes, unless the manager is permitted (and chooses) to make a new equity contribution and purchase additional collateral to cure the test breach.

Principal payments

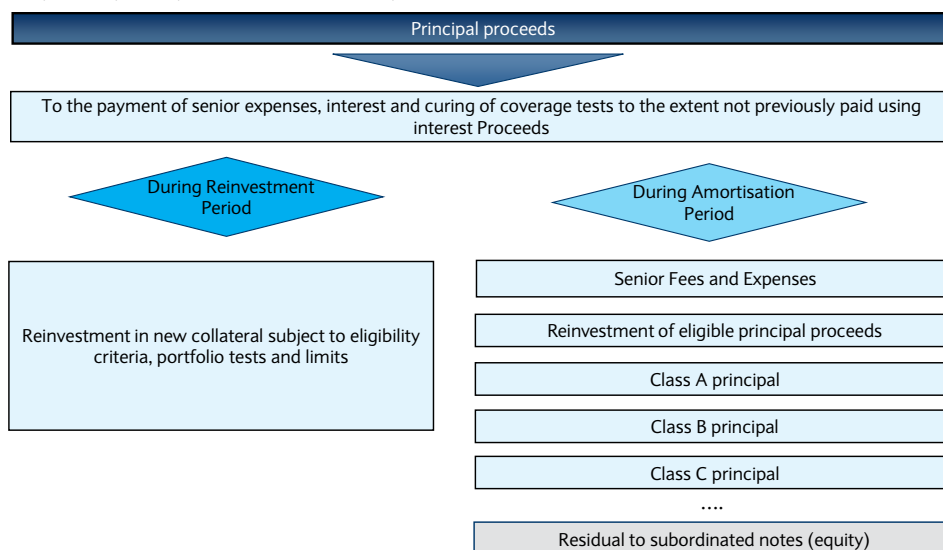
Principal proceeds are broadly defined as scheduled and unscheduled principal redemption of the CLO's assets, asset sale proceeds, and recovery proceeds from a corporate issuer default or restructuring process. In addition, part of the interest proceeds can be reclassified as principal proceeds in case of ICR or O/C trigger breaches (see above). The distribution of principal proceeds depends on where the transaction is in its lifecycle.

As mentioned above, under certain circumstances, principal proceeds can be used to pay note interest when collateral performance is poor. Other than that, during the reinvestment period, principal proceeds can be invested in new CLO collateral, at the discretion of the collateral manager and subject to the portfolio selection criteria.

After the end of the reinvestment period, principal prepayment proceeds and sales proceeds from credit improved assets can usually be used to acquire new collateral, subject to certain criteria. Some transactions also allow the collateral manager to participate in "cash-less roll" amend and extend transactions after the end of reinvestment, subject to maximum maturity and weighted average life (WAL) limitations. However, apart from these limited exceptions, the principal proceeds received outside of the reinvestment period are used to redeem the CLO notes. In accordance with the principal payment waterfall, note redemption using principal proceeds is usually applied sequentially, starting with the most senior class of notes (Figure 8).

FIGURE 8

Simplified principal waterfall in European CLOs



Source: Offering circulars, Barclays Research

Manager fee structure

As depicted in Figure 6 in the previous section, there are placeholders in a CLO's cash flow waterfall for payment of fees to the collateral manager. The most common fee structure separates manager fees into three separate streams: senior, junior, and incentive. A summary of these components is depicted in Figure 11.

FIGURE 11

Representative European CLO 2.0 fee structure

Fee	Amount	Waterfall Position	Tests Passed
Senior	15 bp	Before senior noteholders	None
Junior	35 bp	After mezzanine noteholders, before equity	Senior and junior O/C and ICR tests
Incentive	20% of equity CF	With equity	Sr/Jr OC/ICR, plus equity IRR hurdle

Source: Offering circulars, Barclays Research

Given their difference in scale, variability, and position within the cash flow waterfall, the three components of the fee structure clearly have different purposes, and also affect the alignment of manager incentives with debt and equity noteholders in various ways. The senior portion of the collateral management fee comes at the top of the waterfall, and as such is primarily driven by the need to provide the manager with some fee income under virtually any circumstance so that basic operating expenses do not threaten the viability of the vehicle. No tests are required to be passed in order for this fee to be distributed, although an CLO event of defaults (which can be triggered by a failure to make payments due to senior noteholders, for example) can cause immediate acceleration of final maturity and make all outstanding notes payable in full, effectively ending fee income of all kinds for the manager.

The junior management fee is usually larger in size, but is earned only if all over-collateralisation and interest coverage ratio tests are passed for both senior and mezzanine noteholders. The subordination of this fee stream to all debt tranches is intended to align the manager's interest with noteholders by providing an incentive to manage the portfolio in a way that does not endanger payments on the notes. This fee is senior to any payments to equity holders.

The final component of the manager's fee structure is the most subordinated, the most variable, and potentially the largest, depending on the performance of the collateral portfolio. As such, the incentive fee structure is clearly designed to align the manager's interest with equity holders, as it encourages them to maximise the surplus cash flow generated by the collateral portfolio. In addition to passing senior and junior O/C and ICR tests, the manager must also wait until CLO equity holders have received sufficient cash flows to push the realised equity IRR above a hurdle rate. The hurdle can vary from deal to deal based on the manager's reputation and track record, and also fluctuates across time as market conditions ebb and flow. The European CLO 2.0 incentive fee hurdles have typically fallen within the 10-15% range.

CHAPTER 2

European CLO series: part II – collateral

This is an edited version of the article that was previously published in the *European Securitised Products Monthly*, 31 March 2015.

The performance of CLO debt and equity tranches is ultimately a function of the cash flows generated by the underlying collateral portfolio. Driven by a combination of rating agency requirements, regulation, investor preferences, and manager style, a long and detailed set of rules governs the accumulation and maintenance of this collateral pool. The portfolio's foundation is made up of broadly syndicated loan tranches from sub-investment grade borrowers (known as institutional leveraged loans), augmented in smaller amounts by other corporate credit assets with similar risk profiles. The inherent correlation and cyclicity of corporate credit default risk is a key driver of CLO performance; the rules governing collateral portfolios are designed to mitigate these risks, and compensate investors appropriately for bearing them.

As we described in Chapter 1 of this volume (Structures), there are a number of contractual rules, rating agency requirements, and market conventions that influence the arrangement of the liability side of a CLO's balance sheet (ie, the debt and equity securities bought by CLO investors). If anything, there are an even greater number of rules, requirements and conventions governing the asset side of the CLO ledger. In this chapter, we take a closer look at CLO collateral, including:

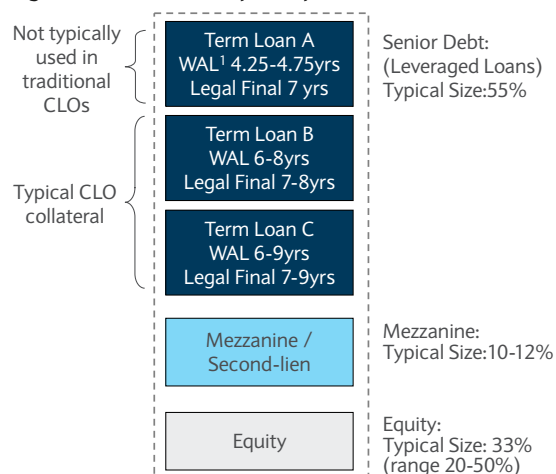
- Where CLO collateral comes from – who issues it, for what reasons and in what forms.
- Recent and expected future trends in collateral availability.
- The tests and limits governing the CLO manager's ability to buy and sell assets across the CLO lifecycle.
- The time-varying nature of corporate credit risk, and the role that collateral limits play in mitigating those risks for CLO investors.

The foundation: first-lien institutional leveraged loans

While European CLO 2.0 collateral pools can contain a number of different types of securities, the vast majority in most cases will be comprised of institutional leveraged loan tranches. These loans are often used to finance the senior parts of the capital structure for LBO credits (see Figure 1 for a stylised LBO capital structure). They may also be issued in support of M&A transactions, or as part of a refinancing/recapitalization of other sub-investment grade corporate borrowers. The leveraged loans used in CLOs typically have most or all of the following features:

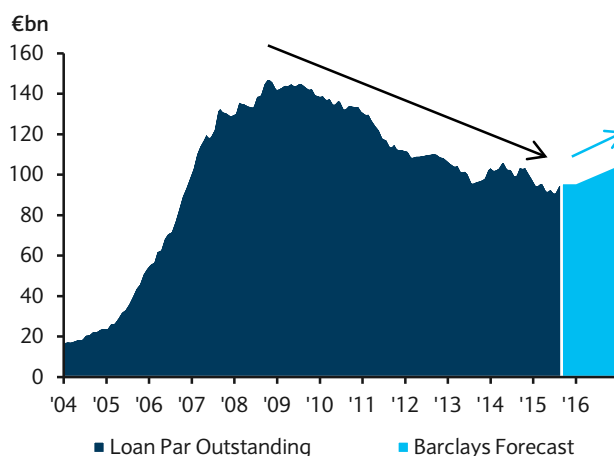
- A first-lien senior secured claim on the issuer's assets in the event of a bankruptcy or restructuring, resulting in high expected recoveries under most market conditions.
- A floating rate coupon, making the asset relatively insensitive to interest rates moves.
- Incurrence covenants that limit the borrower's ability to add leverage, dispose of assets without paying down debt, redirect operating cash flows away from creditors, or accept additional liens on the assets securing the loan.
- Maintenance covenants, including tests for leverage (Debt/EBITDA) and interest coverage (EBITDA / cash interest). These tests can provide an early warning of potential financial distress and safeguard lender interests by providing control options when limits are breached, including the extraction of incremental coupon income, other issuer

FIGURE 1

Leveraged loan issuer sample capital structure

Source: Barclays Research

FIGURE 2

European leveraged loan index size (par outstanding)

Source: S&P LCD

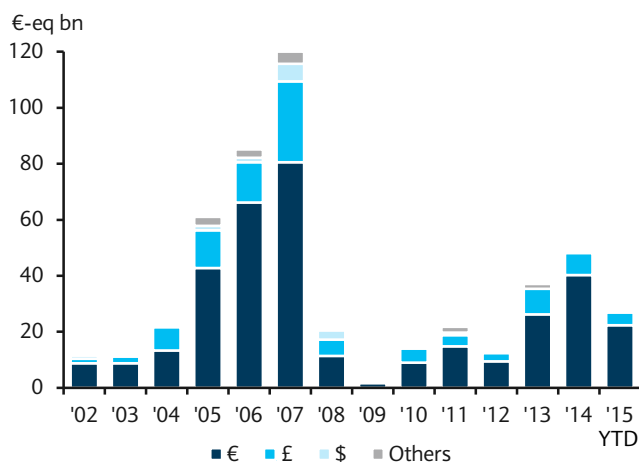
concessions, or (in the extreme) acceleration of a restructuring to maximize recovery. Some loans, known as cov-lites, do not include these maintenance covenants (see the subsequent section called “The debate over covenant-light loans” for further details).

Institutional loan market size

The aggregate size of the index-eligible European institutional leveraged loan market is approximately €100bn, although off-index loans (chiefly from smaller issuers) add another €20-30bn to the total opportunity set for CLO managers. By way of comparison, the European HY bond market (excluding bank capital and other sub-investment grade financial securities) is approximately 2.5x the size at €250bn by par amount, while the US institutional leveraged loan market is more than 7x the size at nearly €800bn outstanding. The comparatively smaller size of the European loan market is a recent phenomenon, as par outstanding shrank in Europe for five consecutive years following the 2008 financial crisis before finally stabilising in 2014 (Figure 2). Several large legacy repayments in early 2015 (especially Boots) caused the market to shrink temporarily once again.

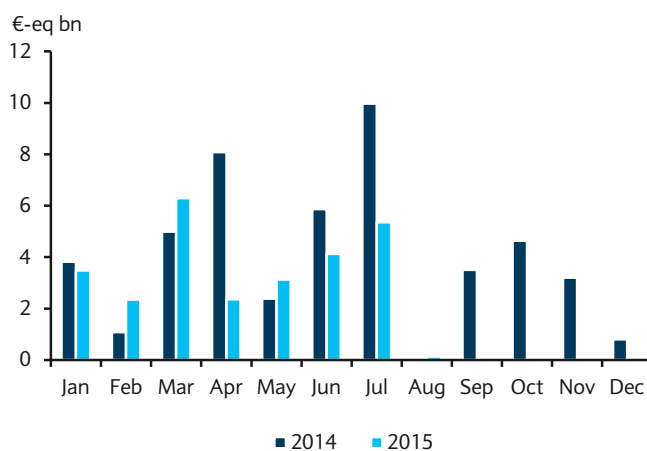
The multi-year decline in par is primarily attributable to a lack of demand for loans during this period, as pre-crisis CLOs began to amortise, new CLO creation was delayed, and banks

FIGURE 3

Annual issuance of European institutional leveraged loans

Source: S&P LCD, Barclays Research

FIGURE 4

2014/15 European loan issuance by month

Source: Barclays Research

began to de-risk their balance sheets. The slower pace of the decline in loan par outstanding since late 2013 is directly attributable to the resumption of CLO creation in Europe. As demand has slowly returned for European leveraged loans, issuance has generally followed suit. Excluding repricings and non-institutional tranches (ie, revolvers and TLAs), loan issuance was up nearly 200% y/y in 2013 (the first year of the CLO 2.0 market in Europe), and another 31% in 2014 to a post-crisis record of €48.4bn-equivalent across all European currencies (Figure 3). Coming into 2015, it appeared that a CLO-driven return to loan market growth was at hand.

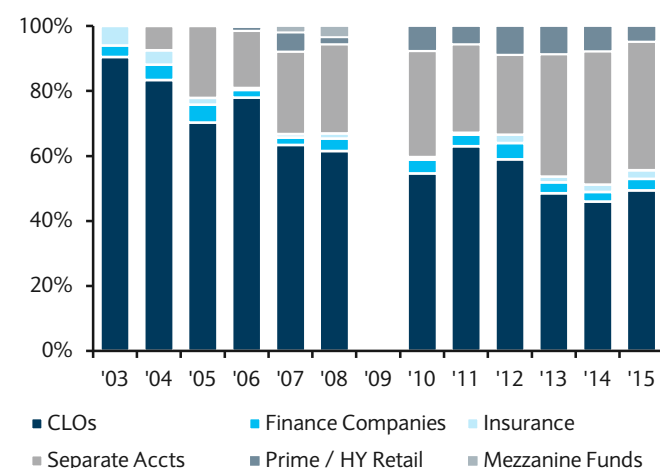
However, 2015 issuance has been somewhat disappointing, with just €27bn priced through the end of August, a y/y drop of nearly 25% (Figure 4). As we noted in *The delayed supply response*, several factors have hindered loan supply growth, including competition from the HY bond market, increased enforcement of US leveraged lending guidance, and generally weak growth and inflation trends. While leveraged lending guidance is here to stay, we expect less competition from the HY bond market in the future, and a gradual improvement in European macro conditions. As such, although the YTD results have been disappointing, we continue to believe that an inflection point is near at hand, with European loan market growth soon to follow.

Competition from other investors

As the trends in par outstanding clearly demonstrated, CLOs are the single largest and most important part of the buyer base for European institutional leveraged loan tranches. However, CLO managers do face competition from other investors. Banks still account for a significant portion of the buyer base for European leveraged loans, including institutional tranches. In the 12 months preceding publication of this volume, bank purchases of institutional tranches have increased significantly, as the Q4 14 completion of the ECB's asset quality review (AQR) and stress test have given banks greater certainty regarding their capital positions, while low all-in yields on a variety of assets (driven by QE) have increased banks' appetite for riskier lending to increase net interest margin.

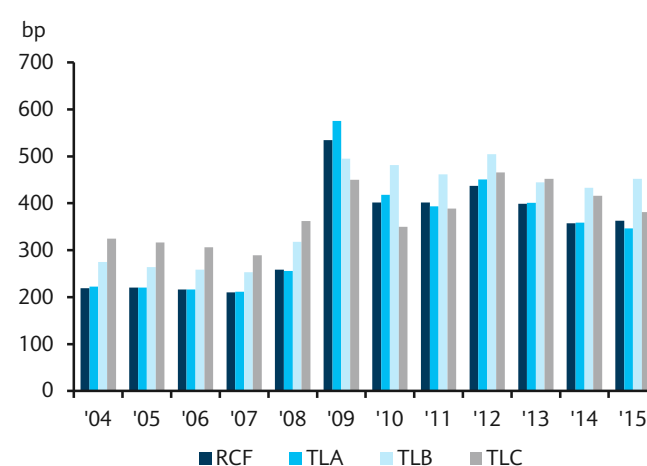
Beyond the demand from banks, CLOs also face competition from various other types of institutional investors (Figure 5). In particular, a significant portion of the institutional loan market in Europe is held in separately managed accounts. Fortunately for CLO managers, the one major buyer type that is largely absent from the European market is the retail channel, which in the US is made up of mutual funds and ETFs. The lack of UCITS eligibility for leveraged loans makes cross-border marketing of retail loan funds nearly impossible in Europe, limiting the appeal of such products for asset managers. This is in stark contrast to the US, where large post-crisis

FIGURE 5
European institutional leveraged loan primary market share



Source: S&P LCD

FIGURE 6
Average new issue coupon spreads for European leveraged loans



Source: S&P LCD, Barclays Research

growth in the retail channel has made the leveraged loan asset class more sensitive to fund flows, increasing secondary price volatility.

Loan pricing conventions & the importance of OIDs

As mentioned above, institutional leveraged loans are usually a floating rate instrument with a nominal coupon spread above a benchmark rate. In Europe, this is typically 3m or 6m Euribor, depending on the loan's coupon payment frequency. While this may seem relatively straightforward, actual credit spreads as calculated by market participants (commonly called "discount margins") are actually derived from a combination of three separate factors, all of which are part of the negotiated pricing process between issuers and investors during loan syndication. The three factors are:

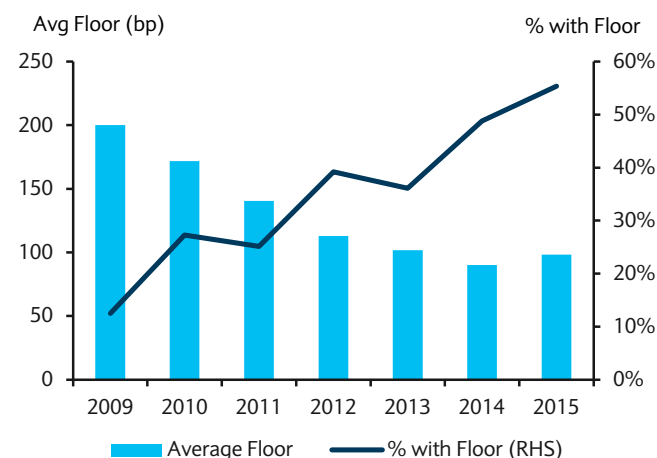
- Nominal coupon spread – represents a credit spread above the benchmark rate;
- Euribor floor – if present, represents the minimum value for the benchmark rate;
- Original issue discount (OID) – represents the actual price paid (as a % of par) by an investor to purchase a loan in the primary market.

Early in 2015, pricing trends across all of these factors remained relatively favourable for CLO economics, but. Average TLB coupon spreads in the primary market hovered around 450bp, an increase relative to the 2014 full year average (Figure 6). Meanwhile, more than half of the institutional tranches that have come to market in 2015 have included Euribor floors, and these floors appear to have troughed at around 100bp after falling for five consecutive years (Figure 7). Given the ECB's recent launch of QE, it seems likely that Euribor will remain extremely low for the next several years at least, meaning that these floors have a substantial effect on loan coupons, which will benefit CLO equity holders as long as European short rates remain low.

However, conditions began to tighten in Q2/Q3 of 2015, as robust demand for loans was met with insufficient supply. After ticking wider in late 2014, OIDs have narrowed in 2015, and as of mid-year were close to post-crisis tights (Figure 8). OIDs are a critical factor in efficient collateral accumulation, for two reasons. First, given the lack of call protection inherent in the loan product, being able to buy below par provides the investor with an opportunity to capture at least some upside in the event that market conditions or the issuer's credit quality improves. Second, and perhaps even more importantly, systematically harvesting OIDs in the primary market allows a CLO manager to build the par value in their portfolio (by "buying a dollar for 99 cents"), which in turn increases headroom relative to the O/C tests governing the cash flow waterfall.

FIGURE 7

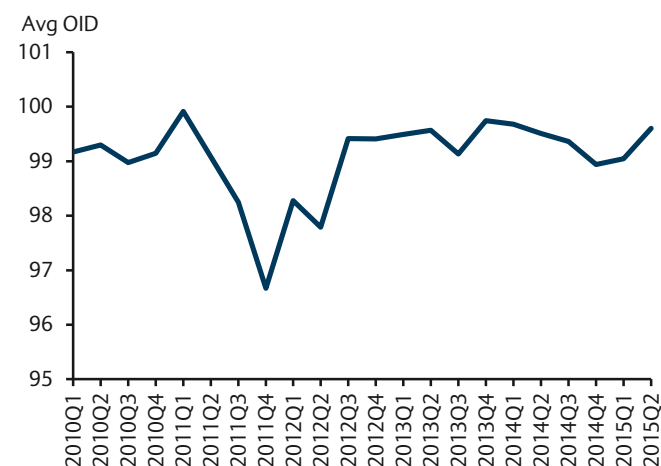
% of new issue loans with Euribor floors and average floor level by vintage year



Source: S&P LCD, Barclays Research

FIGURE 8

Average new issue OID by quarter



Source: S&P LCD, Barclays Research

The role of collateral warehouses

The importance of capturing OIDs in the primary market is the biggest reason that most CLOs now use a warehouse to accumulate assets before pricing their liabilities. Discounted assets are periodically available in the secondary market as well, but less reliably so for healthy credits. By providing the CLO manager with a longer time window to buy new issue (and perhaps capture a macro-driven dip in the secondary market as well), a warehouse can reduce the portion of the collateral pool that must be bought in the secondary market at par or higher. This is especially important given the relatively long lead time needed to launch, market, and price a CLO, and the inconsistent primary volumes in leveraged finance. A manager attempting to launch a CLO without a warehouse runs the risk of primary deal flow being light during the “print and sprint” ramp-up phase, which could make asset accumulation difficult and costly by forcing more secondary purchases regardless of market conditions.

Committed warehouse financing is often one of the very first contractual aspects in a CLO's lifecycle, completed well in advance of the debt and equity tranches being marketed to investors. While exact terms and conditions vary by provider, most warehouses will typically have the following features:

- Total size (referred to as the Maximum Warehouse Amount) of at least 50% of the intended CLO notional amount prior to CLO pricing, expanding to 100% of CLO size between pricing and closing.
- Maximum reinvestment period of 12 months, after which (if still in use) an amortisation period begins. In practice, most CLOs price within six months of launching the warehouse under normal market conditions, such that the warehouse never reaches its amortisation phase.
- Senior lenders who provide a funding commitment for a significant majority (c.75%) of the pre-pricing warehouse amount, and (in most cases) all of the remainder when the warehouse expands between pricing and closing. Senior lenders are only subject to losses on the collateral after all subordinated lender contributions are utilised. The CLO's arranging bank is often a participant in the senior lender group.
- Subordinated lenders who provide a funding commitment equal to the remainder (c.25%) of the pre-pricing warehouse amount, and are subject to first losses on the collateral up to the entire amount of their investment. The collateral manager is usually required to provide an amount of the subordinated loan representing at least 5% of the Maximum Warehouse Amount, as warehouses are generally considered by arrangers to be securitisations, and thus subject to European risk retention requirements.
- Portfolio profile tests that are similar to CLOs, including limits on unsecured collateral, obligor concentration, high yield bonds, fixed rate securities, and CCC rated assets, among others.
- A simplified cash flow waterfall to ensure that senior lenders are repaid before subordinated lenders with proceeds from the eventual CLO transaction. This process involves the issuance of CLO securities, transfer of collateral from the warehouse to the CLO itself, repayment of warehouse lenders with available proceeds, and ultimately the termination of the warehouse.
- A senior Mark-to-Market (MtM) ratio test, which is calculated as the ratio of market value of the portfolio to the amount of senior funding outstanding, with a minimum threshold typically set at 120%. Failure to pass this test triggers a Drawstop Event, which prevents the collateral manager from drawing down any additional senior or subordinated funding, prevents reinvestment of any principal proceeds from collateral repayment by the issuer, and causes the amortization period to start.

- Clearly defined Events of Default, which give senior lenders the option to declare an Early Redemption and receive full repayment of their loan amounts.

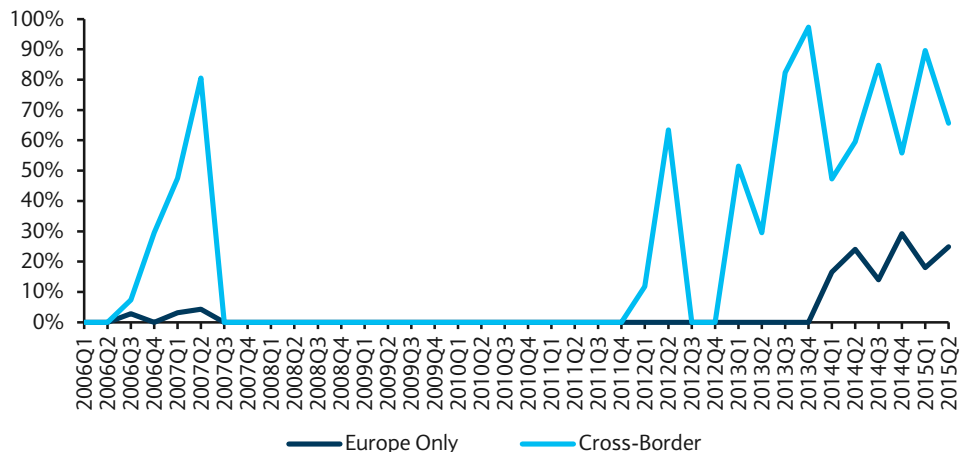
The debate over covenant-light loans

Perhaps the most contentious topic with respect to loan collateral is the rising incidence of covenant-light (or “cov-lite”) loans in Europe. Originally a US market phenomenon, cov-lite issuance was initially spread to Europe via cross-border syndications, the vast majority of which have been cov-lite over the past two years. Europe-only cov-lite deals finally began to appear in 2014, but remain the exception rather than the rule at approximately 20% market share (Figure 9). Nevertheless, the increasing prevalence of cross-border issuance has pushed cov-lite’s overall share up to the 35-40% range over the past year, a large enough amount to bring differences of opinion to the surface.

Part of the challenge associated with the cov-lite phenomenon is the lack of a precise definition for what actually constitutes a cov-lite loan. All leveraged loans, whether fully covenanted or cov-lite, typically have the incurrence covenants described earlier. Traditionally, cov-lite has meant that the loan lacks maintenance covenants for leverage (debt/EBITDA) and interest coverage (EBITDA / cash interest). However, debate has arisen as to whether a first lien institutional tranche which lacks these covenants is truly cov-lite if the issuer’s pari passu revolver has them. While seemingly an esoteric point, the difference matters where cov-lite bucket limits are concerned. A manager who is restricted by a small cov-lite bucket is likely to define cov-lite based on all of the issuer’s pari passu debt tranches, including the revolver, whereas a manager with a large cov-lite bucket may be required to abide by a more tranche-specific definition.

FIGURE 9

Share of leveraged loan syndications done cov-lite: cross-border versus Europe-only



Source: S&P LCD, Barclays Research

A second point of contention is the potential impact of maintenance covenants on default and recovery rates. Given the very low incidence of pre-crisis cov-lites in Europe (peak share was 10% of total issuance in 2007), the best available evidence comes from the US market. Moody’s has published two reports on the subject using US data. The first, published in mid-2011, suggested cov-lite loan issuers were less likely to default than fully covenanted loan issuers, while eventual recoveries given default were similar⁶. However, in a follow-up report published in mid-2014, Moody’s found that given enough time, cov-lite issuers experienced default rates that were in line with the broader sub-investment grade corporate

⁶ See *Covenant-Lite Defaults and Recoveries: Seeing Where it Hurts*, Moody’s Investor Service, 7 June 2011.

universe, while recoveries remained similar⁷. Moody's also warned that repeat defaulters could cause realised recoveries to deteriorate going forward, as distressed exchanges had in some cases eroded the debt cushion underneath the cov-lite first lien layer.

A final point often made by CLO investors is that any historical study of US cov-lite credit losses may not be representative of future results, because cov-lite has gone from being an exception that was only available to better quality issuers to a veritable market standard for US loan issuers. Some have argued that if enough historical evidence builds, rating agencies could modify their methodologies by lowering the recovery assumption for cov-lites across the board. If this were to occur during a period of market stress, it could potentially have adverse consequences for CLO tranche ratings and secondary trading levels. It is for this reason that even default-remote AAA investors express concerns regarding the cov-lite trend in Europe.

European CLO managers counter these concerns by pointing out that cov-lites do remain the exception rather than the rule in Europe. As a result there is still a selection bias in play, as it is typically the larger, better quality, geographically diversified issuers that are able to place cov-lite deals. Managers argue that having overly tight cov-lite buckets restricts their ability to invest in these better quality credits, potentially forcing them away from their investment discipline and into credits they would prefer not to own on strictly fundamental grounds.

Other collateral options

While first lien institutional leveraged loans make up the bulk of European CLO 2.0 collateral, the manager is often able to further diversify the portfolio by adding alternatives, up to strictly prescribed limits described in the subsequent section called "collateral portfolio criteria." The choices made by the manager from these alternatives are influenced by market conditions, rating agencies, investment style preferences and, more recently, regulation.

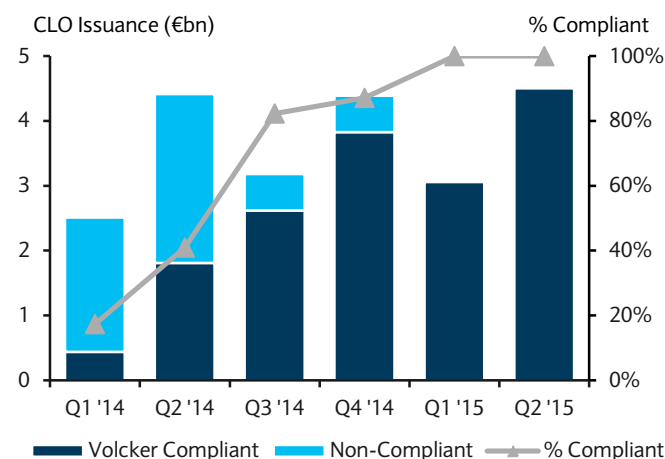
Regulatory consideration – the US Volcker Rule

The key regulatory concern affecting collateral choices for CLOs is the Volcker Rule, also known as the prop trading ban enacted as part of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. Although Dodd-Frank was signed into law nearly five years ago as of this publication, many of the individual rules and regulations only became binding after the details were finalised some time later. One such example is the Volcker Rule, which was not finalised until December 2013, with compliance for new deals finally becoming mandatory in July 2015.

While there are carve-outs for market making and a recently clarified exemption for banks residing Solely Outside the US (SOTUS), in broad strokes, the Volcker rule prohibits US banks from having an ownership interest in what it calls "covered funds," the definition of which includes CLOs (as well as private equity and hedge fund stakes, among others). US banks are an important source of demand for the European CLO market, particularly for AAA tranches. In addition, some non-bank investors fear that non-compliant CLOs could become less liquid in the secondary market, due to the smaller base of eligible investors if US banks are excluded. As a result, the European market has quickly moved to make Volcker-compliance the standard (Figure 10).

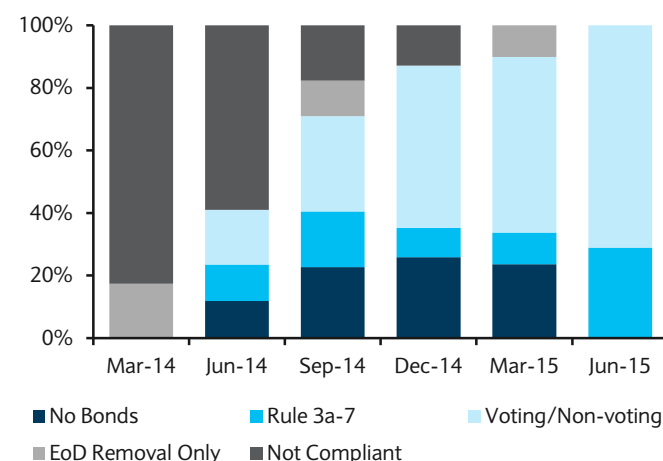
⁷ See *Covenant-Lite Defaults and Recoveries: Time is Catching Up with Covenant-Lite*, Moody's Investor Service, 24 June 2014.

FIGURE 10

% of European CLO 2.0s that are Volcker compliant

Source: S&P LCD, Barclays Research

FIGURE 11

European CLO 2.0 method of Volcker compliance

Source: S&P LCD, Barclays Research

However, the European market has been somewhat slower to adopt a standard method by which Volcker-compliance is achieved. Currently there are three options:

- Eliminate all non-loan securities from the collateral pool – this would make the CLO a loan-only structure, removing it from the definition of “covered fund” under the Volcker Rule.
- Structure the CLO 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.
- Modify the CLO documentation so that a portion of the AAA tranches are non-voting with respect to manager removal rights – market participants are increasingly comfortable that this arrangement avoids the definition of “ownership interests” for AAA noteholders, but this view has not been explicitly validated by regulators.

As Figure 11 shows, the European CLO 2.0 market has increasingly migrated towards the non-voting documentation option, although this is not yet a universal standard. As a result, most European managers currently retain the ability to invest in non-loan collateral, including any/all of the alternatives described in the following sections. However, this flexibility could be subject to change in the future, should regulators render an adverse ruling with respect to the non-voting option or tighten trading restrictions for 3a-7 deals.

High yield bonds – FRNs and fixed rate secured/unsecured notes

Unlike the US, where the breadth and depth of the institutional loan market is such that bond buckets can easily be jettisoned, high yield bond issuers are an important source of diversification for European CLO managers (approximately 15% of European CLO collateral is in bond form, see the subsequent section called “collateral portfolios in practice” for details). Indeed, many secured bond issuers during the post-crisis period were former loan market credits that found much greater demand from bond investors when it came time to refinance amidst weak demand for loans. We estimate that par outstanding for first lien senior secured HY bonds from European issuers (including fixed and floating rate) now totals approximately €100bn, putting it close to the institutional loan market in total size. Of that total, roughly €20bn is in FRNs, with the remainder being fixed rate.

As floating rate obligations, euro-denominated FRNs are a fairly natural fit for CLO portfolios, as they do not require any interest rate or currency hedging. With a few exceptions, most FRNs offer the advantage of having some call protection, most commonly

a one-year noncall period followed by a first call price that is one or two points above par. While this may seem paltry compared to a 2-3y noncall period and higher first call price for fixed rate bonds, it is significantly better than the near total lack of call protection in loans, which at best may have a 101 soft call for 6-12 months. FRNs also have other advantages associated with being a bond, such as being freely transferable (rather than being subject to white lists or borrower approval) and settling in a few business days (as opposed to weeks for loans). As such, FRNs are theoretically easier for a CLO manager to trade, although their poor secondary liquidity tends to offset these advantages. Like most bonds, FRNs also lack the maintenance covenants that have historically been present in leveraged loans.

Relative to FRNs, fixed rate secured bonds offer incrementally better call protection, in the form of longer noncall periods and a higher first call price (usually par plus half of coupon). Secondary liquidity is often significantly better, as the large buyer base of dedicated high yield bond investors tends to trade actively. The potential for issuer diversification is also improved, as many issuers with secured bonds do not have any floating rate debt in their capital structure. However, as fixed rate assets, secured high yield bonds are more susceptible to interest rate risk, and as such, must typically be rate-hedged unless the CLO has fixed rate liabilities (in which case the fixed rate collateral bucket will be sized accordingly to match).

A final option for CLOs with bond buckets is the senior unsecured HY bond market. With more than €150bn in par outstanding (excluding financials), this market segment offers the greatest degree of issuer diversification away from the first lien leveraged loans that make up the core of CLO portfolios. However, as unsecured obligations, the expected recoveries for unsecured HY bonds are much lower (c.40% based on historical averages) than for 1st lien secured debt (typically assumed to be 70%, although higher empirically). Therefore, unsecured bond holdings are often subject to tight limits in portfolio profile tests, and also cause collateral quality tests to weaken due to the lower recovery assumption. For this reason, unsecured bonds make up a very small fraction of European CLO collateral portfolios.

Figure 12 summarizes the key characteristics of first lien leveraged loans and the various forms of HY bonds that can be utilised as alternatives in European CLO 2.0 collateral pools.

FIGURE 12

Typical features of European leveraged loans, FRNs, and HY fixed rate bonds

	First Lien Leveraged Loans	Senior Secured HY FRN	Senior Secured HY Fixed Rate Bond	Unsecured HY Fixed Rate Bond
Coupon:	Floating	Floating	Fixed	Fixed
Maturity:	5-7 years	5-7 years	5-10 years	7-10 years
Non-Call Period:	Can have 6-12m soft call.	Typically 1 year	Typically 2-5 years	Typically 3-5 years
Prepayment:	Usually @ 101 during soft call period, at par any time thereafter	101 or 102 after noncall	Par + partial coupon after noncall, can have makewhole before	Par + partial coupon after noncall, can have makewhole before
Financial Covenants	Maintenance & incurrence (Cov-Lite: Incurrence only)	Incurrence only	Incurrence only	Incurrence only
Security:	Secured by assets of the Issuer	Secured by assets of the Issuer	Secured by assets of the Issuer	Unsecured
Historical Recovery Rates:	82% (Moody's) / 73% (S&P)	No historical data – expected to be in line with Leverage Loans	No historical data – expected to be in line with Leverage Loans	40% (Moody's) / 43% (S&P)
Rating:	> €200mn: Publicly rated < €200mn: Private/shadow rating	Publicly rated	Publicly rated	Publicly rated
Documentation:	Bespoke – based around LMA terms	Fairly standardised	Fairly standardised	Fairly standardised
Transferability / Settlement:	“White List” or borrower consent / Certificate based transfer	Freely transferable / Clearing Systems	Freely transferable / Clearing Systems	Freely transferable / Clearing Systems
Disclosure:	Private – to lenders only	Mostly public	Mostly public	Mostly public

Source: Barclays Research

Other eligible alternatives

Beyond regular institutional leveraged loans and high yield bonds, European CLO 2.0s often contain small amounts of other types of corporate credit risk. Typically, these assets will have similar credit risk profiles to the sub-investment grade loan or bond issuers that make up the bulk of a CLOs portfolio, while still offering further issuer diversification in some cases.

- Revolving credit facilities or delayed draw obligations – some CLOs that hold larger amounts of these assets will feature a variable funding note (VFN) in their liability stack, in order to better match the accordion-like nature of undrawn facilities which do not contribute substantial spread to the portfolio.
- Second liens – although second lien issuance has not accelerated in Europe the way it has in the US, managers will sometimes prefer a second lien position in a credit they like than a more senior position in a credit they don't. Similar to unsecured bonds, second liens are usually subject to tight portfolio profile limits and have an adverse effect on average recovery rating, potentially weakening collateral quality test values as well. For these reasons, they are invariably a fairly small fraction of collateral pools, despite their ample spread.
- Bridge loans – like most loan investors, CLO managers may occasionally find themselves in a position to extend short-term financing to a credit that they already know, allowing them to pick up spread without doing a substantial amount of new credit work.
- Corporate rescue / DIP loans – the nature of sub-investment grade investing is such that eventually challenges will arise for some issuers, providing CLO managers with an opportunity (and sometimes an incentive) to extend rescue financing.
- Foreign currency loans – subject to tight limits and the requirement that the asset is currency hedged, CLOs are often permitted to invest in a small amount of non-native collateral. In practice, however, hedging costs for leveraged loans tend to be high, limiting the utilisation of this option.

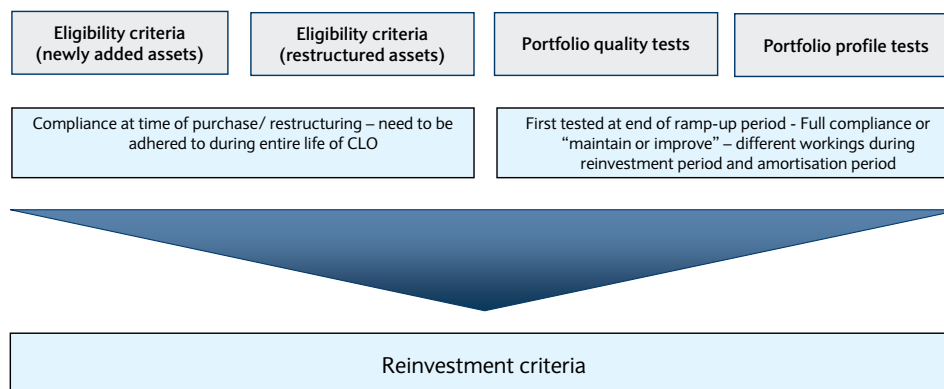
Collateral portfolio criteria

A typical CLO does not securitise a static loan portfolio; rather, the collateral portfolio is actively managed and subject to changes over time due to the reinvestment of principal or asset sale proceeds during the reinvestment and amortisation periods.

To ensure that the collateral portfolio stays within certain parameters, the CLO transaction contains a hierarchy of rules and tests. During the typical lifecycle of a CLO the relevance and workings of the specific rules change. As depicted in Figure 13, the different rules and tests that govern the CLO can be split into four groups:

- **Eligibility criteria** are defined at the asset level. The CLO assets need to satisfy the eligibility criteria at the time they are added to the portfolio. At any time during the life of the CLO the collateral manager can only add assets that meet the eligibility criteria.
- **Collateral quality and portfolio profile tests** consider the portfolio stratifications and are first tested at the end of the ramp-up (initial investment) period.
- Ultimately the collateral quality and portfolio profile test find their way into the **reinvestment criteria**. The exact application of the reinvestment criteria depends on whether the CLO is still in its reinvestment period or in its amortisation period.

FIGURE 13

Collateral portfolio criteria in European CLO

Source: Barclays Research

Eligibility criteria – at the time of asset purchase

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 manager is also free to buy bonds. When comparing the eligibility criteria of European CLO 2.0 with 1.0, some asset types that were generally eligible in pre-crisis deals are typically not allowed to be added to CLO 2.0 transactions; for example, synthetic or structured finance assets are now usually ineligible. Although the finer points of eligibility criteria can differ from deal to deal, the core principals of European CLO 2.0 asset eligibility are fairly standard. The common features are:

- *Asset type*: eligible types usually include secured loans, secured notes, unsecured loans, mezzanine loans, second lien loans, and high yield bonds. Convertible loans, leases, equity and project finance loans are usually ineligible; defaulted assets or credit risk/ credit impaired obligations⁸ are usually not eligible. Typically the assets need to have a minimum rating of CCC/Caa.
- *Borrower domicile*: for example, the underlying borrower needs to be domiciled in a non-emerging market country.
- *Denomination of the asset*: usually, the assets must be in the same currency as the CLO obligations and the asset must not be convertible into or payable in any other currency. Other non-emerging market currencies are often allowed if the CLO issuer enters into appropriate hedging agreements.
- *Interest and principal payments*: for example, eligible assets must make interest payments at least semi-annually. The asset's maturity date must be prior to the CLO final maturity. Interest-only strips are usually not eligible.
- *Structural criteria*: for example, when acquiring the asset the CLO issuer must not be subject to withholding tax or stamp duty, must not be required to be registered as an investment company, and must not be deemed a primary loan originator. The CLO must also be able to subsequently sell, novate or assign the asset. In most cases, the

⁸ Usually defined as assets which, in the collateral manager's opinion, have a significant risk of deterioration in credit quality or price. Defaulted assets are usually not part of the credit risk obligations/ credit impaired obligations. At transaction level, there can be differences in the exact definition; the definition sometimes also depends on whether the reinvestment period has expired or not, and whether the CLO is in a restricted trading period.

purchased loan or bond also needs to fulfil certain criteria in relation to minimum approval rates in case of restructurings.

As mentioned above, eligibility criteria have to be met at the time when an asset is added to the portfolio. 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 sale proceeds can be reinvested into new assets, subject to the reinvestment criteria.

Eligibility criteria – when assets change

After an asset is added to the collateral portfolio, its status can change – for example when the borrower is in financial difficulties or when the borrower negotiates a debt extension with its lenders. In a CLO transaction, there are certain rules in place that determine how the collateral manager can act in such situations. Hence, there is a set of eligibility criteria that need to be met when an asset changes after it has been purchased.

Restructured assets

Restructured assets have to meet a subset of the eligibility criteria on their respective restructuring date. For example the minimum credit quality criteria are usually not relevant for restructured assets; however, sometimes an additional criterion is that rating agencies have to assign a rating to the restructured asset. A special case is an asset restructuring which involves the redemption of the asset and the redemption is funded by a new obligation to the same borrower (roll-over). Those are treated as new assets and need to comply with all eligibility criteria at the date of restructuring.

Loan extensions

When eligible loans are extended during the reinvestment period, in some European CLO 2.0s the collateral manager has to consider some additional restrictions when deciding whether or not to agree to an extension. These restrictions differ from transaction to transaction; typical features include:

- The new maturity date of the asset is not allowed to be later than the final maturity of the CLO notes (which is a standard eligibility criterion, see above).
- Following the extension, the portfolio WAL tests must be satisfied (see below).
- In some cases there is a restriction that after the reinvestment period the asset maturity is not allowed to be later than 18 months before the CLO's final maturity.

In some European jurisdictions, a loan investor can be involuntarily extended into a more distant maturity despite voting against the proposed extension amendment (sponsors have on occasion utilised a scheme of arrangement to effect this outcome). Strictly speaking, a loan that is extended beyond the note maturity date is not in compliance with the eligibility criteria at the time of loan restructuring (see above). In European CLO 2.0 transactions that specifically govern cases of loan extensions, the collateral manager usually would not have to sell the asset immediately. Instead the manager is obliged to sell the asset at some point before the CLO's final maturity and sale proceeds can be reinvested subject to the transaction's reinvestment criteria (see below).

After the reinvestment period, in European CLO 2.0 collateral managers usually face stricter extension criteria than during the reinvestment period. For example, an additional restriction could be that all assets that were extended after the reinvestment period are not allowed to contribute more than a certain threshold to the portfolio. Or, extensions after the reinvestment period could be not allowed at all if a restructured loan counts as a substitute asset which needs to have the same or shorter maturity than the replaced asset (see reinvestment criteria below). The stricter extension criteria after the reinvestment period are a change from most European CLO 1.0s which generally allow asset extensions also after the reinvestment period.

Collateral quality tests

Eligibility criteria are designed to prevent the collateral manager from purchasing (or retaining) individual assets that are inappropriate for the CLO structure. However, as single-asset tests, they do not safeguard CLO investors from the risks associated with concentrated or excessively risky portfolios. This is where collateral quality and portfolio limit tests become important, as they refer to aggregate portfolio metrics that govern the manager's freedom to accumulate credit risk.

The collateral quality tests refer to the average portfolio quality. During the initial investment period (which usually lasts for roughly six months after the launch of the CLO) the portfolio does not have to comply with the collateral quality tests. However, on the last day of the initial investment period (the CLO's effective date) the tests have to be met. If they are not met on that day this *could* result in early redemption of the notes. Hence, during the initial investment period the collateral manager works towards complying with the collateral quality tests on the effective date.

After the effective date, if the portfolio is not in compliance with the tests before a new asset is purchased, assets can still be added. But the addition is not allowed to worsen the previous non-compliance (ie, the test value is either improved or maintained).

Collateral quality tests usually refer to average rating agency default risk and loss given default risk indications, as well as minimum portfolio yield, maturity and diversity requirements:

- The average portfolio default risk is not allowed to exceed a certain level, which is measured by the respective rating agencies' weighted average rating factor (WARF⁹, see Figure 14) or by S&P's CDO monitor, for example;
- The average portfolio recovery rate is not allowed to be lower than a certain level which is measured by the respective rating agencies' average recovery rate test (WARR¹⁰);
- The average floating rate spread (for floating rate assets) and fixed coupons (for fixed rate assets) are not allowed to be lower than a certain level;
- The portfolio diversity is not allowed to be below a certain level, measured for example by Moody's diversity score (DS¹¹);
- The weighted average life (WAL) of the portfolio is not allowed to exceed a certain level. The maximum allowed weighted average life of the portfolio decreases over time, considering the time left to CLO final maturity. In many European CLO 2.0 the portfolio's weighted average life is not allowed to exceed the numbers of years until CLO maturity minus five (ie, on average the portfolio needs to be repaid five years before the CLO's final maturity).

⁹ In the case of Fitch and Moody's, each rating level is assigned a numerical factor which relates the rating's default probability to a certain base default probability. For example, Fitch assigns a factor of 32.2 to a single B asset; Moody's assigns a factor of 2,720 to a B2 rated asset. The lower the rating the higher is the factor.

¹⁰ Depending on the asset type, Moody's assigns expected recovery rates to the securitised assets. Fitch assigns expected recovery rates to the assets based on its recovery ratings, S&P's recovery ratings or based on jurisdiction and asset type. S&P derives expected recovery rates from its recovery ratings, its recovery ratings of other debt instruments issued by the obligor or from the obligor's jurisdiction. In the case of S&P, asset recovery rates differ for each class of the CLO (lower for higher rated notes).

¹¹ Moody's diversity score is a measure that estimates the diversity in a portfolio, taking into account issuer and industry correlation. Technically, the diversity score measures the number of uncorrelated assets that would have the same default distribution as the actual portfolio of diversified assets. Diversity scores range from 1 to 175 and a higher score reflects a more diverse portfolio in terms of issuer and industry concentration.

FIGURE 14

Selected Fitch and Moody's rating factors

Fitch rating	Fitch rating factor	Moody's rating	Moody's rating factor
AAA	0.2	Aaa	1
AA	0.6	Aa2	20
A	1.6	A2	120
BBB	4.5	Baa2	360
BB	17.4	Ba2	1,350
B	32.2	B2	2,720
CCC	62.8	Caa2	6,500
CC or lower	100	Ca or lower	10,000

Source: Fitch Ratings, Moody's, offering circulars

Importantly, most often the portfolio has to meet a three-way combination of the criteria. For example, in the case of Fitch at a given portfolio spread, the lower the WARF (ie, lower average default risk), the lower the WARR can be. In relation to Moody's, the minimum WARR is usually constant. But at a given portfolio spread level, the higher the DS (greater diversity), the higher the WARF can be (ie, higher average default risk). For Fitch and Moody's, eligible combinations of the three respective factors can be looked up in grids that are shown in a CLO's offering circular (for illustration, see Figures 15 and 16). In the case of S&P, the compliant combinations are derived from the rating agency's CDO monitor.

FIGURE 15

Illustration Fitch's minimum WARR for different WARF/WA spread combinations

Fitch WARF					
WA spread	28	31	34	37	42
3.5%	64.3%	68.3%	73.2%	78.0%	87.1%
4.0%	56.2%	60.0%	64.2%	69.7%	82.0%
4.5%	48.9%	54.0%	58.9%	63.9%	77.2%
5.0%	46.0%	51.0%	55.8%	61.8%	72.0%

Source: Fitch Ratings, offering circulars

FIGURE 16

Illustrative Moody's maximum WARF for different DS/ WA spread combinations

Moody's DS					
WA spread	23	29	33	39	43
3.5%	2,441	2,542	2,591	2,641	2,674
4.0%	2,668	2,838	2,925	3,019	3,080
4.5%	2,845	3,024	3,111	3,218	3,289
5.0%	3,036	3,210	3,297	3,403	3,473

Source: Moody's Investors Service, offering circulars

In Figure 17 we show the combination of WARF, WARR and spread, and the combination of WARF, DS and spread that Fitch and Moody's, respectively, used to model several European 2.0 transactions (as disclosed in pre-sale reports); ie, the position in the grid used by the agencies to rate the CLOs. In most cases, these numbers differ from the test and actual values that are used after the effective date. After the effective date, not only actual values of WARF, WARR, etc, change, but also the collateral quality test values; ie, on each interest payment date (IPD) a different position in the grid can be used.

FIGURE 17

Collateral quality tests* of selected European CLO 2.0

	TCLO 1	HARV 10	BABSE 2014-2	RYEH 1X
Maximum WAL	8 years	8 years	8 years	8 years
Minimum average floating spread	3.8%	3.8%	4.2%	3.8%
Minimum average fixed coupon	N/A	6.0%	6.0%	5.7%
Fitch maximum WARF	35.0	33.5	35.5	35.0
Fitch minimum WARR	68.0%	68.0%	66.0%	69.5%
Moody's minimum diversity score	33	Not applicable	35	36
Moody's maximum WARF	2,820	Not applicable	2,875	2,800
Moody's minimum WARR	43.5%	Not applicable	39.8%	42.0%

Note: * values used by rating agencies when assigning the initial ratings. Source: Rating Agencies' New Issue Reports, Offering circulars, Barclays Research

As can be seen in Figure 17, the collateral quality levels used by the rating agencies do not differ significantly in the four CLO transactions we show. The average rating of the portfolio used by the rating agencies is in the mid to low single-B range (as implied by the maximum WARF) and the diversity score Moody's used is usually in the mid-30s. Noteworthy are the differences in Fitch's and Moody's WARR. Fitch's assumed WARR is higher, reflecting different rating approaches rather than an actual expectation of higher collateral quality, in our view.

For a sample of 33 European CLO 2.0s that are fully ramped and in their reinvestment periods, we analysed their current collateral quality test values and thresholds (Figure 18). Generally, the collateral portfolios' diversity is larger than initially assumed by the rating agencies, and the WARF is somewhat lower (ie, average credit rating is better than what was originally assumed). There are, however, marked differences in current WARF, WARR, DS, weighted average spread and the distance to the respective test level. The collateral quality test criterion with the lowest variability between transactions is the portfolios' weighted average life.

FIGURE 18

Collateral quality test values of selected European CLO 2.0

	Test levels			Actual values		
	Average	Minimum	Maximum	Average	Minimum	Maximum
Weighted average asset spread	4.1%	2.7%	4.4%	4.5%	4.1%	5.1%
Weighted average life	6.7yrs	5.2yrs	7.5yrs	5.3yrs	4.7yrs	5.9yrs
Moody's DS (if rated by Moody's)	37	32	40	41	34	49
Moody's WARF (if rated by Moody's)	3,128	2,810	3,900	2,738	2,513	2,871
Moody's WARR (if rated by Moody's)	40.6%	37.9%	44.3%	47.0%	41.8%	56.7%
Fitch WARF (if rated by Fitch)	34.4	32.0	37.0	33.4	31.8	35.2
Fitch WARR (if rated by Fitch)	67.0%	58.0%	70.6%	68.6%	62.2%	72.8%
S&P WARR (if rated by S&P)	35.2%	30.0%	38.0%	36.7%	30.6%	39.2%

Source: Intex, Barclays Research

Portfolio profile tests

Portfolio profile tests describe the acceptable aggregate portfolio characteristics and are intended to augment eligibility criteria and collateral quality tests. By their nature, eligibility criteria are asset-specific and binary, explicitly disallowing asset types deemed to be unacceptable for CLOs (for example, synthetic and or structured finance assets). For ineligible assets, no portfolio profile test is needed (the maximum allowed exposure is by definition zero). For eligible asset types, whose inclusion in CLO portfolios is generally accepted by the market, portfolio profile tests define the minimum and/or maximum

exposures permitted. In this way, these tests act as parameters governing the CLO manager's investment style.

Like the collateral quality tests, the portfolio profile test limits must initially be met on the CLO's effective date. If not, this *could* result in early redemption of the notes. Hence, during the initial investment period, the collateral manager must also work towards complying with the portfolio profile tests on the effective date.

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. Other typical portfolio profile tests in European CLO 2.0 include:

- The minimum amount of secured senior obligations;
- The maximum amount of unsecured senior obligations, second lien loans, mezzanine obligations and high yield bonds;
- Maximum obligor concentrations, maximum industry concentration, the maximum amount of loans of borrowers that are domiciled in countries with a low sovereign rating;
- The maximum amount of hedged assets that are not denominated in the CLO currency, and sometimes the maximum amount of un-hedged assets that are not denominated in the CLO currency;
- The minimum and maximum amount of fixed rate assets;
- The maximum amount of revolving or delayed drawdown obligations;
- The maximum amount of CCC/Caa rated assets;
- The maximum amount of bridge loans, corporate rescue loans, PIK securities, current-pay obligations, cov-lite loans, loan participations, etc.
- The maximum amount of loans to borrowers with low total indebtedness;
- For loan participations, the selling institution's credit rating determines the maximum exposure the CLO is allowed to have to its counterpart in the loan participation.

FIGURE 19

Selected portfolio profile tests/ percentage limitations of selected European CLO 2.0

	TCLO 1	HARV 10	BABSE 2014-2	RYEH 1X
Minimum of senior secured obligations	90%	90%	90%	90%
Maximum of senior secured notes	0%/30%***	0%*	50%	N/A
Maximum unsecured, second lien, mezzanine loans	10%	10%		10%
Maximum high yield bonds	0%/10%***	0%*	10%	
Maximum borrower concentration (all obligations)	5.0%	3.0%	4.5%	3.0%
Maximum borrower concentration secured obligations	3.0%	2.5%	2.5%	3.0%
Maximum top-three borrower concentration secured obligations	N/A	N/A	3.0%	N/A
Maximum borrower concentration non-secured obligations	2.0%	1.5%	1.5%	1.5%
Maximum non-euro collateral (if hedged)	30%	30%	10%	30%
Maximum current-pay obligations	5%	2.5%	5%	5%
Maximum discount obligations	10%	N/A	N/A	N/A
Maximum revolving/ delayed drawdown obligations	5%	5%	10%	5%
Maximum CCC/Caa-rated obligations	7.5%	7.5%	7.5%	7.5%
Maximum cov-lite obligations	20%	30%	20%	20%
Maximum bridge loans	2.5%	2.5%	5%	3%

	TCLO 1	HARV 10	BABSE 2014-2	RYEH 1X
Maximum corporate rescue loans	5%	5%	5%	5%
Maximum PIK securities	5%	0%**	5%	5%
Maximum participations	10%	5%	5%	5%
Minimum fixed rate obligations	0%**	0%	7.5%	0%
Maximum fixed rate obligations (unhedged)	0%**	5%	20%	10%
Maximum assets paying less frequently than semi-annually	5%	5%	N/A	0%**
Maximum industry concentration (Moody's)	N/A	N/A	10%	N/A
Maximum industry concentration (Fitch)	20%	15%	N/A	17.5%
Maximum industry concentration (S&P)	N/A	10%	N/A	N/A
Maximum exposure to borrowers incorporated in countries rated below A- (Fitch)	10%	10%	10%	N/A
Maximum exposure to borrowers incorporated in countries with currency ceiling below AAA (Fitch)	N/A	N/A	N/A	10%
Maximum exposure to borrowers incorporated in countries rated below A- (S&P)	N/A	10%	N/A	N/A
Maximum exposure to borrowers incorporated in countries with local currency country risk ceiling below Aa3 (Moody's)	10%	N/A	10%	10%
Maximum exposure to borrowers incorporated in countries rated below A3 (Moody's)	N/A	N/A	5%	N/A
Maximum exposure to borrowers incorporated in countries rated below Baa3 (Moody's)	N/A	N/A	0%	N/A
Maximum exposure to obligors in a single eligible country	30%	N/A	N/A	N/A
Maximum exposure to obligor in top-four eligible countries	80%	N/A	N/A	N/A

Note: * loan-only CLO, bonds are not eligible, ** not eligible, *** higher percentage once permitted securities condition satisfied. Source: Rating Agencies' New Issue Reports, Offering circulars, Barclays Research

As can be seen in Figure 19, the portfolio test levels are similar in terms of criteria that are tested, but the covenanted levels are far from being standardised in all aspects. Broadly speaking, there are some portfolio profile limits that have become de facto market standards for nearly all European CLO 2.0s, and others where the market allows greater flexibility to accommodate the investment styles of various CLO managers. Market standards include:

- Secured senior obligations must represent at least 80-95% of the collateral pool;
- CCC/Caa rated assets are not allowed to contribute more than 7.5% (there are some exceptions, however);
- Exposure to issuers domiciled in lower rated sovereigns is not allowed to exceed 10%.

The differences in eligibility criteria and portfolio profile tests combined can usually be due to one of the following reasons:

- **Regulation:** for example, the ineligibility of bonds is one option to make the CLO Volcker rule compliant;
- **Rating agency requirements:** different rating agencies have different rating methodologies and requirements. In addition, restrictions for certain assets can be introduced to mitigate adverse effects of other assets;
- **CLO capital structure:** for example, if some of the CLO's liabilities are fixed rate tranches, the collateral manager is usually obliged to keep a certain portion of fixed rate assets to mitigate interest rate risk. Similarly, the CLO interest payment frequency to its noteholders can influence limitations on the assets' interest payment frequency to mitigate cash flow and basis risk.

- **CLO manager strategy.** Different collateral managers have different strategies for how best to achieve compliance with the portfolio quality tests while maximising portfolio cash flows and returns. In particular, investors are likely to accommodate CLO managers with strong track records by allowing portfolio quality limits that facilitate the managers' investment style.

Using our sample of 33 fully ramped European CLO 2.0s, we analysed the respective senior secured, Caa1/CCC+ and cov-lite buckets and test values (Figure 20). While the definition of cov-lite can differ from transaction to transaction, the actual min and max values clearly show that there are significant differences in portfolio construction across European CLO 2.0 transactions.

FIGURE 20

Selected portfolio limit tests of selected European CLO 2.0

	Test levels			Actual values		
	Average	Minimum	Maximum	Average	Minimum	Maximum
Senior secured assets	89.0%	80.0%	95.0%	95.6%	78.1%	100.0%
Caa1 or lower (if Moody's rated)	7.4%	5.0%	7.5%	2.0%	0.0%	5.3%
CCC+ or lower (if Fitch/S&P rated)	7.7%	5.0%	15.0%	1.9%	0.0%	12.5%
Cov-lite assets (if reported)	21.9%	20.0%	35.0%	6.7%	0.0%	19.9%

Source: Intex, Barclays Research

Reinvestment criteria

To review, eligibility criteria are designed to keep inappropriate assets out of collateral portfolios, collateral quality tests prevent the accumulation of excessive, undiversified credit risk, and portfolio profile tests provide boundaries that govern the CLO manager's investment style. The reinvestment criteria describe the conditions that need to be met for the collateral manager to reinvest asset amortisation or asset sale proceeds. During the initial investment (ramp-up) period the reinvestment criteria do not have to be met (except the compliance of assets with the eligibility criteria).

During the reinvestment period, the reinvestment criteria are enforced for all collateral purchases. After the end of the reinvestment period, a different (and more stringent) set of reinvestment criteria are applied.

During the reinvestment period (after the effective date)

During the reinvestment period, which usually lasts four years for European CLO 2.0, the collateral manager is allowed to reinvest loan principal repayments (whether scheduled maturities or early prepayments) or sales proceeds into new collateral. Typical reinvestment criteria include:

- No CLO event of default is outstanding and the purchased asset satisfies the eligibility criteria.
- Following the asset purchase the interest coverage and over-collateralisation tests need to be satisfied; if the tests were not satisfied before purchase, the interest coverage / OC level must not worsen after purchase. However, no reinvestment of defaulted or restructured asset recovery proceeds is permitted if these tests are not satisfied prior to purchase.
- Following the asset purchase, the portfolio profile and the collateral quality tests need to be satisfied; if the tests were not satisfied before purchase, the respective levels must be maintained or improved by the purchase.

- Several conditions in relation to the principal balance of the purchased assets, the total portfolio principal amount and adjusted portfolio principal amount of the portfolio after the asset purchase have to be met.

During the amortisation period (after the end of the reinvestment period)

After the reinvestment period (ie, during the amortisation period) most portfolio principal and asset sale proceeds must be used to redeem the CLO notes. However, the collateral manager is still allowed to reinvest (substitute) unscheduled principal repayments and sales proceeds from credit risk/impaired or credit improved assets¹². The reinvestment criteria during the amortisation period are tighter than those during the reinvestment period and typically include all of the criteria detailed above, as well as the following:

- The principal balance of the purchased assets equals or exceeds the principal balance of the repaid or sold asset (to maintain or increase the par value of the collateral portfolio).
- A restricted trading period is not in effect (see below).
- The weighted average life test was satisfied on the last business day of the reinvestment period and the stated maturity of the purchased asset is the same or earlier than the repaid or sold asset.
- The interest coverage and par value tests are satisfied after the substitution and the rating agencies' WARF and WAL tests are satisfied after substitution. Hence, the WAL and WARF tests are effectively carved out from the "maintain or improve" option, in cases where the relevant collateral quality test is not met before substitution.
- After the substitution, the percentage of CCC/Caa rated assets does not exceed a certain threshold. This threshold is usually set at 7.5%; hence, the CCC/Caa test is effectively carved out from the "maintain or improve" option, in cases where the relevant portfolio profile test is not met before substitution.

The last condition means that after the reinvestment period, in situations in which the collateral portfolio experienced heavy downgrades, the collateral manager is prohibited to substitute loan collateral.

Restricted trading conditions

Restricted trading periods typically occur when the ratings on the CLO notes are either withdrawn or downgraded by a certain number of notches. In these cases, however, the controlling class (usually the holders of the most senior class of notes) of the CLO can determine that no restricted trading period occurred. In some European CLO 2.0 transactions, compliance with each of the par value and collateral quality tests supersedes the adverse rating events (ie, a rating withdrawal or downgrade does not automatically result in a restricted trading period).

Collateral portfolios in practice

A typical European CLO transaction is the securitisation of an actively managed loan portfolio, in which a manager buys and sells assets subject to certain restrictions as described above. These collateral portfolio tests define the boundaries of the portfolio management exercise; the actual pool of assets underlying the CLO will usually remain well within these boundaries. To provide investors with a real world perspective regarding CLO collateral portfolios, it makes sense to examine what is actually securitised at a given point in time.

¹² Credit improved assets are broadly defined as assets that, in the view of the collateral manager, have significantly improved in credit quality after they were acquired. At transaction level, there can be differences in the exact definition; the definition sometimes also depends on whether the reinvestment period has expired or not, and whether the CLO is in a restricted trading period.

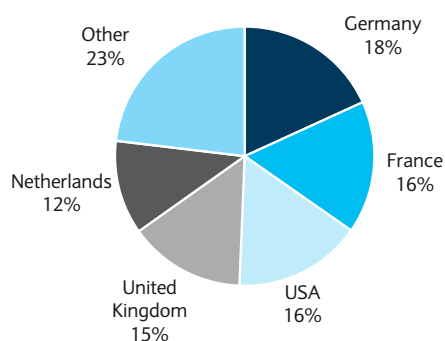
Current European CLO 2.0 portfolios

Based on a sample of 52 European CLO 2.0s, representing approximately 80% of the 2.0 market at the time of publication, we can make some statements about how the collateral portfolio criteria are applied in practice:

- The 52 CLOs are invested in 8,579 line items (assets) with a €20bn aggregate notional; the average collateral balance per transaction is €375mn and the average notional amount of each asset is €2.3mn.
- Several assets can belong to the same obligor; in total we count 450 distinct obligors in these 52 CLO transactions, with €43.6mn average exposure (ranging from €100k to €350mn). We note that our sample does not include any European CLO 1.0 transactions and also excludes a small number of European CLO 2.0 deals, so the total number of distinct obligors held in European CLOs could exceed 500.
- The top five countries (Germany, France, US, UK and Netherlands) contribute three quarters of the aggregate collateral, but no individual country represents even 20% of the total (Figure 21). The predominant industries are healthcare/education, media and electronics (Figure 22), but with the highest share being just 14%, it is fair to say that industry concentration is relatively low at the aggregate level (individual CLOs may have more concentrated industry exposure).
- 85% of the collateral is in loan format (Figure 23), and cov-lite assets (in all various forms, some of which do not fall under the respective transaction-level definition of covenant-light) contribute approximately a quarter to the aggregate portfolio (75% of the US-domiciled assets and 15% of the non-US assets). Reflecting that the earliest European CLO 2.0 vintage is 2013 and relatively young, it is not surprising that nearly all assets are currently classified as performing (Figure 24).

FIGURE 21

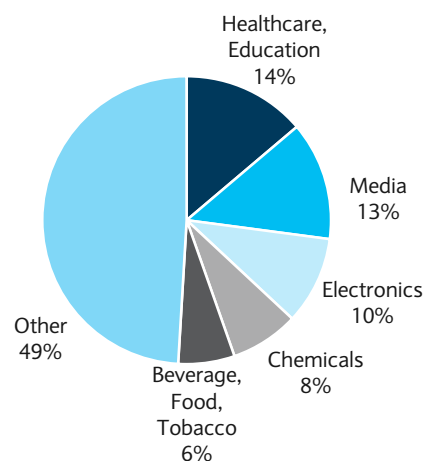
Analysed collateral portfolios by country



Source: Investor reports, Barclays Research

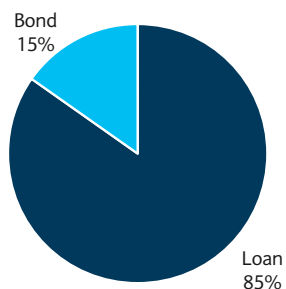
FIGURE 22

Analysed collateral portfolios by industry



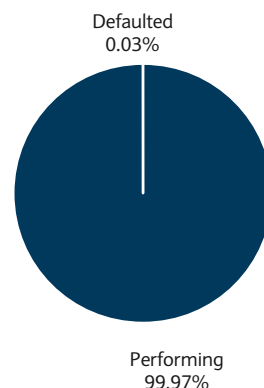
Source: Investor reports, Barclays Research

FIGURE 23
Analysed collateral portfolios by asset type (loan/bond)



Source: Investor reports, Barclays Research

FIGURE 24
Analysed collateral portfolios by asset performance status



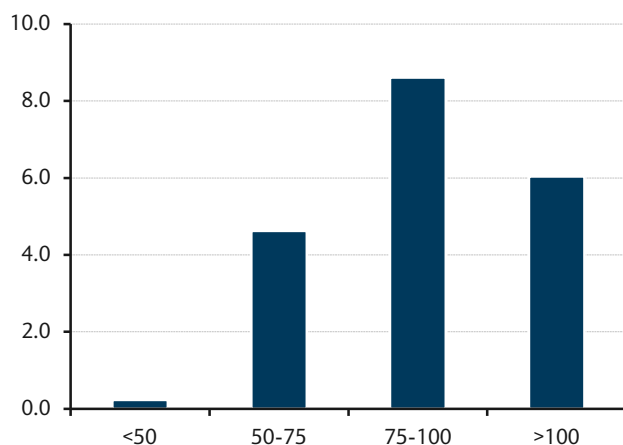
Source: Investor reports, Barclays Research

- On average the 52 transactions are invested in 165 line items that reference the debt of, on average, 85 obligors (Figure 25). We adjusted for borrower concentration by calculating the adjusted Herfindahl-Hirschmann Index (HHI)¹³: the average HHI per CLO is 69, ranging from 41 to 100 (Figure 26). Unsurprisingly, CLO transactions still in their initial investment (ramp-up) period have a lower obligor count and HHI. The 35 transactions we analysed that are past their effective date have an average HHI of 73 (ranging from 52 to 100).

Obligor overlap

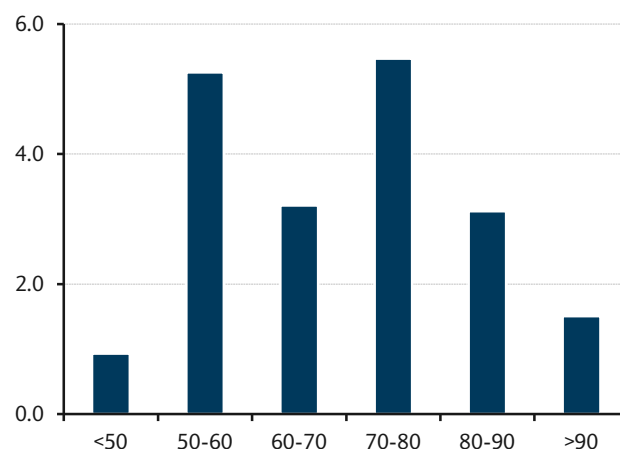
Investors that are involved in more than one CLO transaction, in particular at the more junior parts of the capital structure (mezzanine and equity), need to consider potential obligor overlaps. In Figure 27 we show the ten largest obligors across the 52 collateral portfolios we analysed. Exposure to these large obligors is very common among the 52 CLO transactions in our sample.

FIGURE 25
Analysed collateral portfolios – obligor count (€bn)



Source: Investor reports, Barclays Research

FIGURE 26
Analysed collateral portfolios – adjusted HHI (€bn)



Source: Investor reports, Barclays Research

¹³ The adjusted HHI is the reciprocal of the sum of the squared percentage contribution of each obligor in the portfolio. For a given portfolio with varying obligor contribution, it expresses the equivalent number of equally contributing obligors in the collateral portfolio.

FIGURE 27

Analysed collateral portfolios – largest obligor groups

Obligor group	Exposure	%	# of CLOs
Numericable Group	€350mn	1.8%	48
Ziggo	€315mn	1.6%	45
Eircom Group	€310mn	1.6%	42
Jacobs Douwe Egberts	€300mn	1.5%	42
Telenet	€280mn	1.4%	44
UPC Broadband	€250mn	1.3%	40
TDF	€250mn	1.3%	36
Dell	€245mn	1.2%	35
Wind	€240mn	1.2%	38
Iglo Foods	€230mn	1.2%	46
Total	€2.7bn	14.1%	

Source: Investor reports, Barclays Research

Anything but constant: Defaults, recoveries, and repayments

The sheer size of this chapter is evidence of the scope and complexity of the rule set for CLO collateral pools. An investor who has read this far could be forgiven for wondering whether all of this complexity is really justified, or if CLO investors wouldn't be better off if the manager (who presumably has a good reputation in the marketplace, an observable track record, and a nontrivial amount of capital at risk) was allowed to exercise his or her own discretion with respect to collateral selection. However, the key point to bear in mind is that the rules and requirements regarding CLO collateral are a key safeguard against the correlated, cyclical nature of corporate credit risk.

Simply put, these rules are necessary in order to reliably transform cash flows from leveraged corporate borrowers into credit-tranched distributions to CLO noteholders, as the ensuing data on defaults, recoveries, and repayments will clearly show.

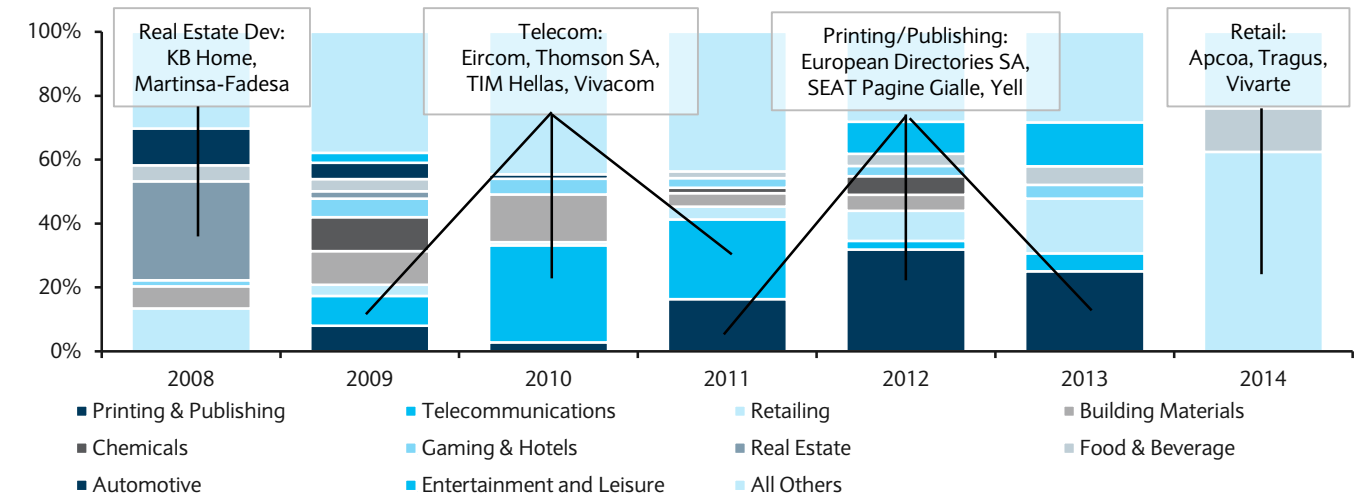
Leveraged borrower defaults are highly correlated

CLO tranches are often priced by market participants based on Intex cash flow models. A key input to this process is a default rate assumption. While the tools used by professional CLO investors are sophisticated enough to allow a multitude of default scenarios, the most common method used is a Constant Default Rate assumption, or CDR. Market convention typically centres around an assumption of 2%. While this is lower than the long-run average for speculative grade debt (Moody's 95-year US corporate bond default history pegs the average for B rated issuers at 3.4% annually), investors are typically willing to assume that a CLO manager will be able to avoid some defaults through credit selection, thus justifying the lower assumption.

However, European leveraged loan default rates (like any corporate credit defaults) are in no way constant over time. Rather, they are extremely cyclical, typically rising to double-digit rates during recessions and often falling to miniscule levels in times of sustained economic expansion. Moreover, defaults typically exhibit high levels of industry concentration (Figure 28), owing to a combination of shared issuer exposure to a common macroeconomic driver and the tendency of investors to over-saturate a growing sector with demand (leveraged credits in the US energy sector are currently experiencing the effects of both dynamics). Over a 6-8 year life of a CLO, the difference in cash flow impact between a constant 2% default assumption and realised swings from sub-1% to 10+% can be dramatic, even if the average rate for the period ends up being the same. This correlation in corporate default risk is the primary reason that multiple layers of collateral tests (eligibility, quality, profile, and reinvestment) must be satisfied at all times.

FIGURE 28

European sub-investment grade defaults by industry



Source: S&P LCD, Barclays Research

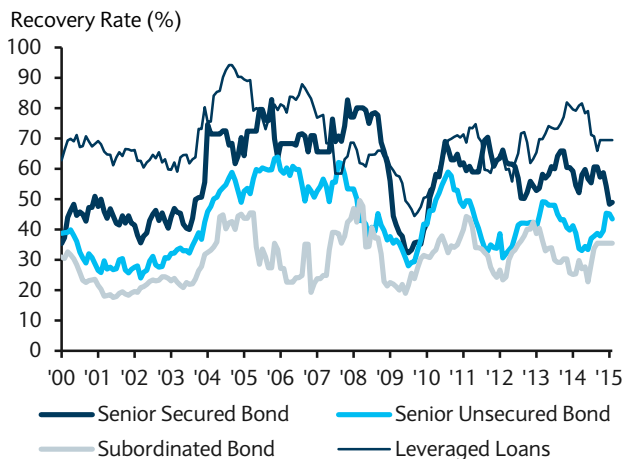
Recoveries aren't constant either

CLO investors must also enter recovery assumptions into their cash flow models, typically in the form of a constant value for each asset type (loan, bond, etc.). As noted above in the section on collateral quality tests, rating agencies also use recovery rate assumptions that are not time-varying in their methodologies (some more transparently than others). But much like default rates, recovery rates aren't stable across time either (Figure 29). In fact, recoveries typically get worse when default rates go higher, magnifying the risk of loss for credit investors during periods of economic stress.

Recovery rates are also susceptible to changes in primary market dynamics, and it can take years before the ultimate consequences of issuance trends are realized, making the ultimate outcome difficult to model. One current example is the aforementioned cov-lite loan question; it remains open to debate as to whether recent vintage cov-lite loans will eventually realise market average recoveries, or something lower. Another example is

FIGURE 29

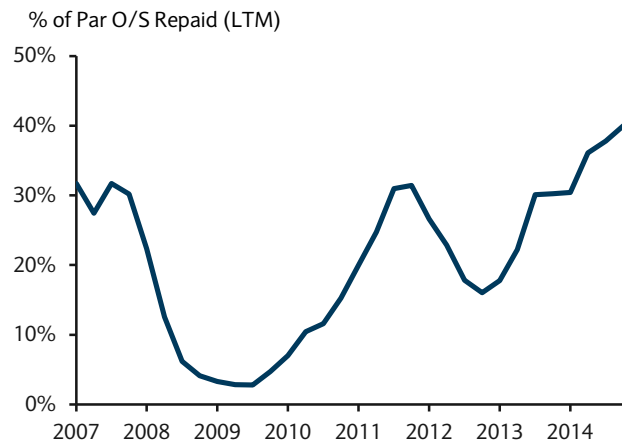
Historical recovery rates for leveraged loans and high yield bonds



Note: US loan market data are used in this chart. Recovery rate time series data are not publicly available for the European leveraged loan market, but are believed to be broadly similar. Source: Moody's Investor Service

FIGURE 30

European leveraged loan repayment rates



Note: Excludes repricing transactions. Source: S&P LCD

secured bonds, which can make up a nontrivial portion of collateral in European CLOs that choose the voting/non-voting or Rule 3a-7 solutions to Volcker compliance. As S&P recently noted, many issuers in the 2013/14 vintages have “all secured” bond capital structures with a super-senior RCF¹⁴. Given the likelihood that management will draw down the revolver in the event of financial stress, secured bondholders could find themselves effectively subordinated in a default or restructuring, with adverse effects on realised recoveries. All of these uncertainties reinforce the need for the stringent portfolio limits and rigorous quality tests that CLOs possess.

Repayments are the most pro-cyclical assumption of all

A final input that is often modelled as a constant in CLO pricing is principal repayments. Specifically, CLOs are often assumed to have a Constant Prepayment Rate (CPR) of 20% annually, on top of any principal that matures (which is assumed to be repaid on the maturity date). In practice, sub-investment grade borrowers virtually always refinance their debt significantly in advance of maturity, to avoid a potential liquidity crisis in the event the market is effectively shut at the maturity date. As a result, actual leveraged loan repayment rates average closer to 35% annually.

But as was the case with default and recovery rates, the cyclical variability in repayments is dramatic (Figure 30). Loan prepayments skyrocket in strong markets as issuers take advantage of the product’s complete lack of call protection to refinance and lower their interest costs. Conversely, repayments can fall to nearly zero in difficult market conditions, as issuers seek to conserve cash and avoid locking in wider coupon spreads.

This combination of default rate, recovery rate, and repayment rate cyclicity in a corporate credit asset class with virtually no call protection can magnify the sensitivity of CLO collateral pools to general market conditions. In strong markets, defaults will be low, recoveries high, and repayments brisk, allowing CLO managers to redeploy capital and capture OIDs in what is likely to be a robust primary market (if still in reinvestment), or facilitating the return of capital to CLO investors (if the reinvestment period has expired). Conversely, during periods of market stress and recession, defaults will rise, recoveries will fall, and repayments will slow down considerably, linking investors to the collective fate of the issuers in the collateral pool. At these moments, the resilience of the CLO model is tested.

Fortunately, when difficult market conditions arise, CLO collateral pools benefit from having already been tested many times over. It is worth noting that during and after the 2008 financial crisis, no senior CLO tranche in the US or Europe ever experienced a credit loss. More importantly, credit losses across most rated debt tranches have been much lower than for many other securitised products, and often lower than the long run averages for comparably rated corporate bonds. The rules, tests, and limitations regarding collateral selection described in this document are a key reason for the European CLO market’s resilient performance track record.

¹⁴ See *Leveraged Finance: As the European Market Heats Up, Recovery Prospects for Senior Secured Bondholders Cool*, S&P RatingsDirect, 18 June 2014.

CHAPTER 3

European CLO series: Part III – investor base

This is an edited version of the article that was previously published in the *European Securitised Products Monthly*, 30 April 2015.

CLO investors vary significantly across the ratings spectrum. For senior tranches, heavily regulated investors such as banks and insurers dominate the buyer base. Mezzanine tranches are held by the same group plus a combination of less heavily regulated investors including pension funds, general credit hedge funds, other funds specialising in structured credit, and more traditional asset managers. Equity tranches are generally the purview of hedge funds, structured credit specialists, and the CLO manager itself. As a result of the difference in investor type across the spectrum, the valuation of higher rated tranches is more sensitive to changes in regulation, whereas the bottom of the capital stack responds more quickly to broader market conditions and relative value versus the US. Upcoming changes in regulation are likely to cause some banks and insurers to reduce their holdings of mezzanine tranches, creating a hole in the buyer base that less heavily regulated pension funds and other asset managers could potentially fill.

The term “CLO investor” itself is somewhat of a misnomer, as CLO investors tend to specialise in whichever part of the capital structure offers the risk/reward profile that best matches their investment objectives and regulatory limitations. As such, we break this chapter down into two sections, detailing:

- 1) the current CLO 2.0 buyer base across various tranche types, including senior, mezzanine, and equity; and
- 2) the impact of upcoming changes in regulations on risk weighting and capital charges for bank and insurance buyers.

Buyer base breakdown

While the line between some buyer types is admittedly a bit blurry, for the purpose of this analysis we have grouped CLO investors into seven categories:

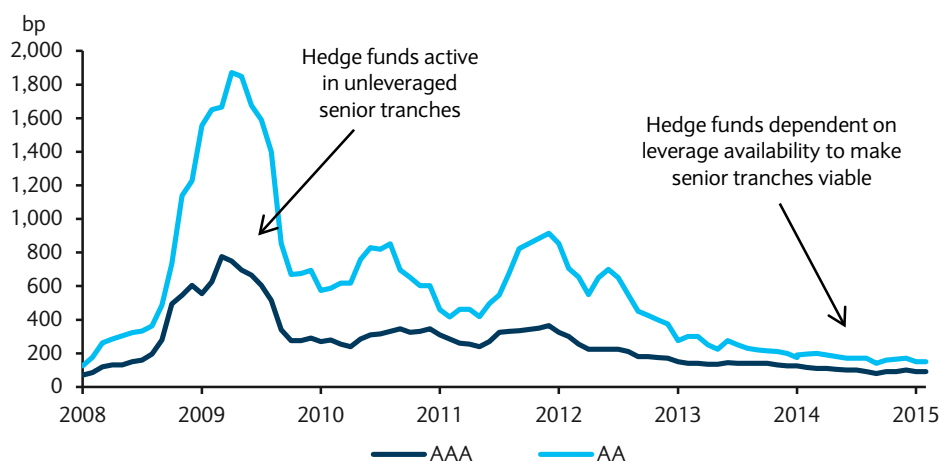
- 1) Banks;
- 2) Insurers;
- 3) Pension funds;
- 4) Traditional fixed income asset managers (including IG/income funds);
- 5) Hedge funds (including those not dedicated to structured credit);
- 6) Structured credit specialists (including PE offshoots and other institutional mandates); and
- 7) CLO managers (including their subsidiaries and originator vehicles).

AAAs

AAA rated tranches account for nearly 60% of the capital stack for a typical European CLO 2.0. By definition, this means that the AAA investor base is larger in size than all other tranches combined. On the surface, finding this much demand for safe, low-yielding assets may appear challenging. Fortunately, the characteristics of AAA tranches make them well suited for banks and insurers. The common thread linking these buyers together is that they are subject to regulations which significantly influence the economics of AAA rated assets,

FIGURE 1

European CLO secondary trading spreads



Source: Barclays Research

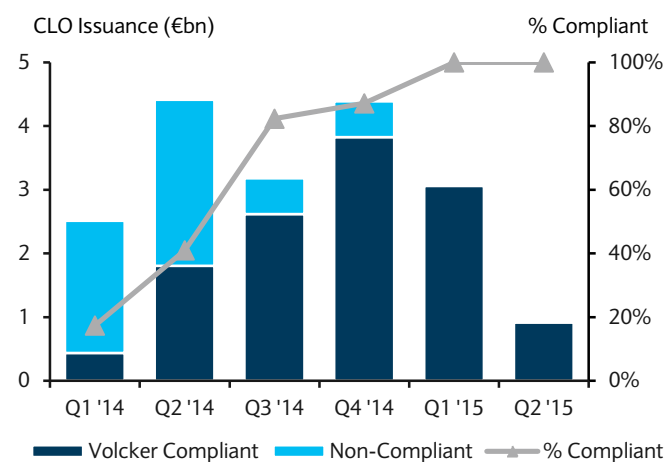
making them viable investment opportunities despite their low yield, at least under the current regulatory environment.

CLO investors whose holdings are less heavily regulated also participate in AAAs. Pension funds are not currently subject to the same regulatory oversight as insurers, but do hold a meaningful amount of AAA tranches. Traditional asset managers (including IG/income funds) tend to prefer the higher yields available further down the ratings spectrum, but are also buyers of AAAs for their products with more conservative return objectives. Meanwhile, leverage for AAA purchases is not yet universally available in Europe, making it difficult for AAA tranches to reach the total return targets of hedge funds or other alternative asset managers. Hedge funds were more active in senior tranches in the immediate aftermath of the 2008 financial crisis when spreads were much wider (Figure 1), but the multi-year rally back to more normal spread levels has resulted in a retreat of “fast money” from the top of the CLO capital stack.

With default risk for AAAs extremely remote, AAA buyers do not tend to focus on the details of a CLO’s actual collateral portfolio (although banks may utilise the information for risk weighting purposes, depending on their regulatory regime). Instead, factors such as manager reputation and track record, documentation strength (particularly around post-reinvestment limitations), and expectations of secondary liquidity can play a key role in AAA

FIGURE 2

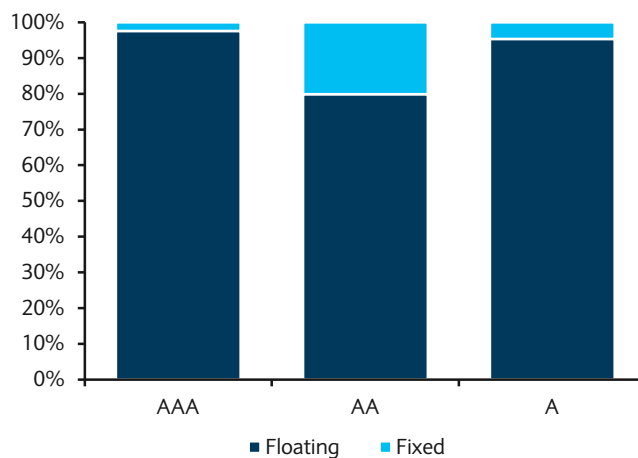
Volcker compliance in European CLO 2.0 issuance



Source: S&P LCD, Barclays Research

FIGURE 3

Share of 2014/15 European CLO 2.0 issuance by tranche rating and coupon type



Source: Barclays Research

investment decisions. In particular, concerns regarding secondary liquidity have contributed to the trend toward 100% Volcker compliance in European CLO 2.0s (Figure 2), even though much of the buyer base for European AAAs is not directly subject to the rule.

Mezzanine

While the term “mezzanine” is often used as a catch-all for any debt tranches that are not AAA rated, in practice there are meaningful differences in the buyer base and risk/reward profile between AA/A rated tranches and BBB/BB/B rated tranches. For the purpose of this report, we therefore break the mezzanine layers down into two groups, which we will refer to as “senior mezz” (AA and A rated tranches) and “junior mezz” (BBB/BB/B rated tranches).

Senior Mezz

While the mix is slightly different, the predominant buyers of AA/A rated CLO tranches are much the same as the buyers of AAAs. Banks and insurers have historically bought senior mezz in reasonable size, thanks to incentives in the current regulatory environment that make these tranches more attractive than lower rated, higher yielding alternatives. Insurers’ participation in AAs is especially evident in the mix of floating versus fixed rate coupons. Some amount of fixed rate collateral (typically senior secured high yield bonds) is usually allowed in CLO collateral pools. To satisfy rating agency requirements regarding the avoidance of rate risk, CLOs typically seek to offset their fixed rate bond collateral with some amount of fixed rate liabilities, but these are far from uniformly distributed across the capital stack. Insurers are the most common fixed rate buyer, and as Figure 3 shows, the fixed rate liabilities have a far higher share for AAs than for any other tranche rating (fixed rate tranches rated BBB or lower are virtually non-existent). As we outline in the regulation section of this article, we expect that upcoming insurance regulation (Solvency 2) will substantially reduce the attractiveness of senior and senior mezzanine tranches for insurers.

Among less heavily regulated investors, pensions and asset managers are active participants in the senior mezz layer, while alternative asset managers (hedge funds, private equity, structured credit specialists, and CLO managers) play a less prominent role.

As is the case for AAAs, the default risk in senior mezz tranches is considered to be very remote thanks to their significant overcollateralization and position within the cash flow waterfall. Historical data bear this out: Moody’s most recent report on structured finance defaults reported a cumulative 10y loss rate of 0.00% for AAA and AA rated CLO tranches globally, and a 0.07% loss rate for A rated tranches. As such, senior mezz investor concerns largely mirror those of AAA buyers, namely manager reputation and track record, documentation regarding limits on post-reinvestment trading, and secondary liquidity.

Junior Mezz

The investor base for junior mezz (BBB/BB/B rated tranches) is more varied than for senior mezz and AAAs, as all potential buyer groups are to some degree constrained. This far down in the ratings spectrum, banks and insurers already face risk weightings and capital charges that can more than offset the advantage of higher carry (see the next section on the changing regulatory environment for further details on this topic). While the yields on offer are appealing relative to comparably rated corporate credit, traditional asset managers are constrained by the lack of benchmark inclusion and UCITS eligibility for most CLO bonds. Hedge fund participation will always depend on market levels, particularly for broad mandates that tend to participate in CLOs opportunistically as relative value dictates. Finally, CLO manager holdings of junior mezz are typically limited to pro-rata 5% vertical strips, meaning manager allocations to these tranches are inherently quite small.

The comparative lack of a “natural” buyer for junior mezz tranches has created an opportunity for dedicated structured credit investors. Because junior mezz has less protection from credit losses than more senior tranches, these investors tend to scrutinize collateral portfolio composition more closely. Post-reinvestment amortisation 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 more nimble investment style of most dedicated structured credit investors, rather than the longer term “buy and hold” approach of more heavily regulated investors further up the capital stack.

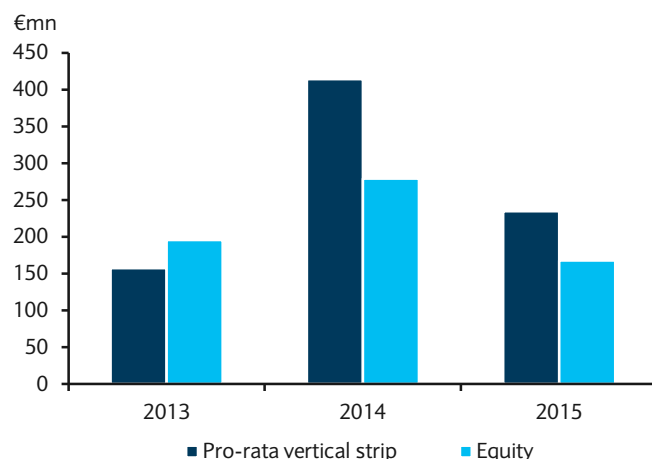
Equity

The investor base for CLO equity is similar to junior mezz, with one important exception. In Europe, risk retention has been in effect since the new issue market reopened in 2013. As a result, CLO managers (either directly, through a subsidiary, or via an originator vehicle) have been required to hold 5% of the interest in all of their 2.0 transactions. The amount of vertical versus horizontal retention has varied year by year (Figure 4), but in aggregate it has been split fairly evenly. The net result is that CLO managers have retained roughly three-quarters of a billion euros in CLO equity (Figure 5), representing nearly 20% of the c.€3.6bn in total European 2.0 equity issuance. While the gross amount of AAAs retained is also considerable, it pales in comparison to the €15bn in AAA issuance. Meanwhile, retention of mezz tranches is small by construction: nothing at all by managers that choose to hold equity, and limited by tranche thickness for pro-rata vertical strip holders.

Apart from retention-driven CLO managers, most CLO equity is held by a combination of the same buyers holding junior mezz, including hedge funds and dedicated structured credit investors. But despite the overlap in buyer bases between equity and junior mezz, the incentives and concerns involved can be quite different. Both share an interest in credit loss avoidance, but equity investors are primarily concerned with maximizing residual cash flows, preferring slow post-reinvestment amortisation which preserves high leverage and a low WACC. This puts them at odds with junior mezz investors and their aforementioned preference for rapid amortisation and accelerated pull-to-par. Equity investors also have highly leveraged exposure to portfolio NAV, and as such are the most attentive to the details of collateral portfolio construction. For managers with 1.0 CLOs, investors are likely to closely scrutinize equity distributions during and after the 2008 financial crisis as a barometer for potential resilience during difficult market conditions.

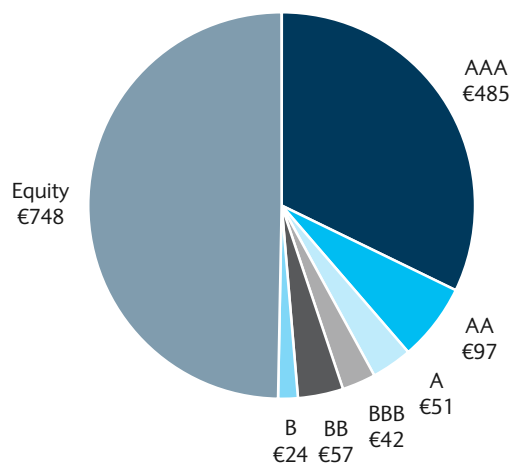
Equity investors are also influenced by changes in the so-called “equity arb”, which is very sensitive to movements in the leveraged loan market. The inherent ~10x leverage of the CLO

FIGURE 4
Risk retention amounts by vintage year and style



Source: S&P LCD, Barclays Research

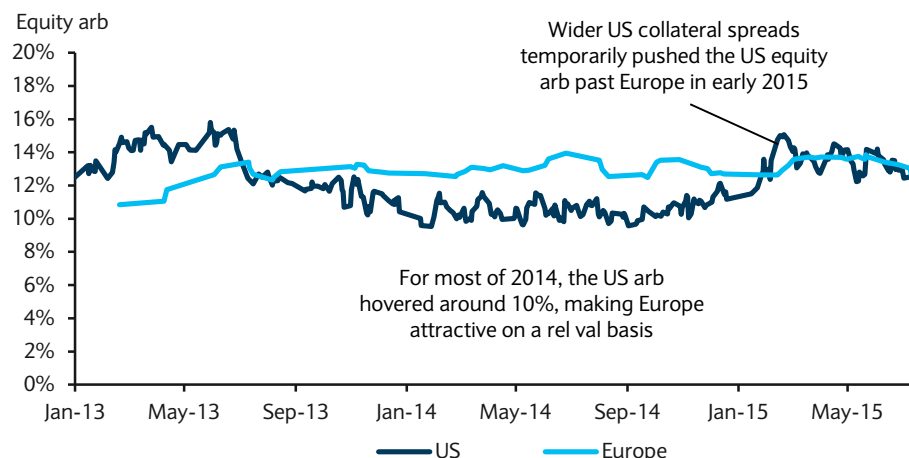
FIGURE 5
Total risk retention amounts by tranche (€mn)



Note: As of April 2015. Source: Barclays Research

structure means that relatively small changes in loan prices can have a dramatic impact on secondary equity trading levels. Particularly for hedge funds that are not dedicated to structured credit, this results in fluctuating demand across time, making the CLO equity buyer base more sensitive to direct relative value comparisons with other asset classes than any other part of the capital structure. Moreover, the buyer base for CLO equity is much more global in nature than the market for more senior tranches, making relative value with the US a key factor. This too has fluctuated over time (Figure 6), driving equity tranche investors to adjust to market conditions and flex their cross-border allocations accordingly.

FIGURE 6
CLO 2.0 new issue equity arb – US versus Europe



Source: S&P LCD, Barclays Research

Summary

Figure 7 summarizes the main groups comprising the CLO investor base, along with the predominant investment priorities and chief concerns by tranche type.

FIGURE 7
Typical CLO investor interests by tranche quality

Tranche Quality	Predominant Buyers	Investor Priorities	Investor Concerns
Senior (AAA)	Banks	Safety of principal	Reinvestment risk due to uncertain timing of principal repayment
	Insurers	Predictability of amortisation speed	Indenture language limiting manager latitude after reinvestment
	Pensions	Secondary market liquidity	Manager track record for principal repayment following reinvestment
Senior mezz (AA/A)	Banks	Safety of principal	Reinvestment risk due to uncertain timing of principal repayment
	Ins/Pension	Predictability of amortisation speed	Indenture language limiting manager latitude after reinvestment
	Asset Mgrs	Secondary market liquidity	Manager track record for principal repayment following reinvestment
Junior mezz (BBB/BB/B)	Asset Mgrs	Credit loss avoidance	Collateral portfolio composition
	Hedge Funds	Acceleration of discount amortisation	Manager track record for uninterrupted payments to all liability holders
	Struc. Credit	Secondary market liquidity	Manager risk retention
Equity	Hedge Funds	Credit loss avoidance	Collateral portfolio composition
	Struc. Credit	Residual cash flow maximization	Manager track record for maintaining equity distributions
	CLO Manager	Maintaining leverage & low WACC	Manager risk retention

Source: Barclays Research

The regulatory environment for European CLOs

After several years of headwinds, European policy makers' attitude towards securitisation began to change for the better in 2012. Several initiatives are now under way to promote a healthy ABS market that can contribute to funding the European real economy. The proposed approach is to define a subset within the wide range of European ABS and 'promote' these sectors via more beneficial regulatory treatment compared with the 'non-promoted' asset classes. Over the past 18 months several proposals have been published on how to define 'qualifying securitisations', 'high quality securitisations', 'simple and transparent securitisations', or similar. In our view, the final criteria that will define the 'promoted' securitisations asset classes will likely reflect the historical performance of the asset classes, but also political considerations.

The securitisation of corporate loans is very high on the agendas of policy makers, European central banks and ABS industry groups. However, this appears to be limited to highly granular portfolios of loans to small and medium-sized entities (SMEs). Hence, in contrast to SME ABS, CLOs will likely not be among the 'promoted' asset classes; a common feature of the various proposals is that CLOs do not meet all criteria for 'qualifying securitisation', 'simple and transparent securitisation', etc. European CLOs feature a number of structural characteristics that, in the view of policy makers, *imply* potential adverse collateral portfolio performance, including insufficient borrower diversity, refinancing risk of the underlying loans due to the lack of self-liquidation, and the fact that CLOs securitise 'managed' loan portfolios. In addition, increased rating volatility during the financial crisis did not help to increase regulatory bodies' confidence in CLOs. As a result, our current expectation is that European CLOs will not be among the securitisation sectors that will be 'promoted' in Europe; our analysis below reflects this opinion.

Demand for investment grade mezzanine CLO tranches likely to decline

Considering future regulatory changes affecting investors in CLOs, namely the revised securitisation framework in bank regulation (likely to come into force in early 2018) and Solvency 2 for European insurers (coming into force in January 2016), we think that:

- Currently, banks only invest meaningfully in investment grade rated CLO tranches which show a beneficial return on risk weighted assets (RoRWA) at current spread levels. Upon implementation of the revised securitisation framework bank demand for AA, single-A and BBB rated non-senior CLO tranches is likely to decline considerably as a result of significantly increased risk weights that will push banks up the capital structure: senior CLO tranches rated AAA would have the best RoRWA. For banks able to use the internal rating based approach in the revised framework, AA rated non-senior classes and other investment grade rated tranches could remain interesting, however.
- For insurers, the standard approach of Solvency 2 lacks credit risk sensitivity. As a result, the implementation of Solvency 2 could theoretically push insurers using the standard approach down the capital structure. But we do not expect this to happen and think that insurance companies will continue to invest in senior and senior mezzanine CLO classes, but likely to a lesser extent than currently. In our view, smaller insurance companies are more likely to reduce their activity in the CLO market than larger insurers.

In summary, upcoming regulation will likely result in less demand for senior mezzanine CLO tranches from two major buyer groups. This could result in spread widening pressure for this part of the CLO capital structure. Investors that could ultimately step into the gap banks and insurance companies are likely to leave are those with access to leverage or unregulated investors. The latter could include pension funds unless they become subject to Solvency 2.

Risk retention regulation reduces the pool of equity investment opportunities

Risk retention has been a reality in European securitisations since 2011. While European CLO creation could have been potentially higher without risk retention obligations, its existence has forced CLO managers to become an important part of the investor base in Europe, unlike in the US. As a consequence, less equity is available for third party investors, supporting equity distribution, in our view. In addition, the existence of originator vehicles with public equity effectively means that anyone can indirectly invest in CLO equity. This avenue could further increase the size of the CLO equity investor base, making its distribution easier and potentially cheaper.

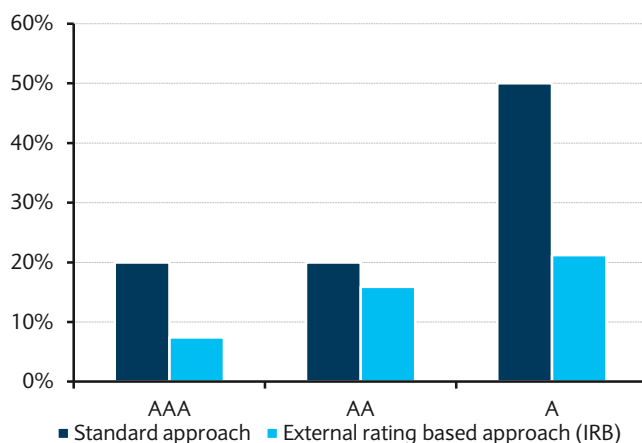
Bank investors in European CLOs

Risk weights

With the exception of re-securitisations, risk weights that have to be used by banks investing in European ABS (including CLOs) have not changed since the onset of the financial crisis in 2008. Figures 8 and 9 show the applicable risk weights in the current European CRD IV/CRR1 standard (SA) and external rating based (ERB) approaches; both are based on external (agency) ratings for the CLO tranches. Banks are only allowed to use the supervisory formula method (based on underlying loans' risk assessments and transaction structure) for unrated CLO positions. The ERB approach is part of CRD IV/CRR1's internal rating based (IRB) framework and distinguishes between granular and non-granular securitisations exposures. With an effective number of exposures¹⁵ above six, CLOs will always fall in the granular exposure category.

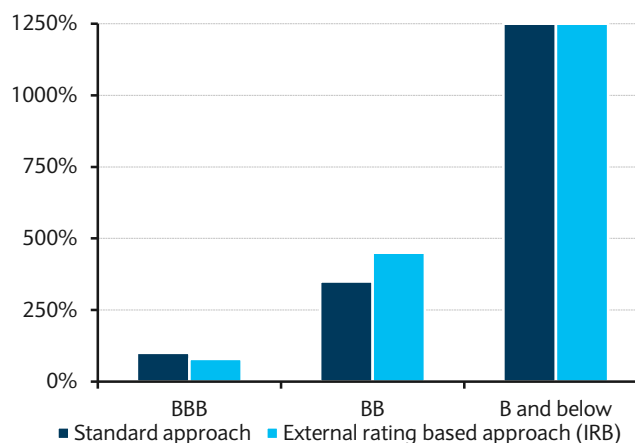
In December 2014 the BCBS¹⁶ published its revised securitisation framework. This will likely not be implemented by BCBS member countries until the beginning of 2018¹⁷ and will affect securitisations held in the banking book (the trading book treatment is currently under review). We expect EBA's¹⁸ implementation of the revised framework to reflect future developments related to the definition of 'promoted' securitisation sectors and bonds. For promoted assets, we do not expect the EBA to increase the risk weights to the same extent as what has been published by the BCBS. For CLOs, however, which we do not expect to belong to the 'promoted' securitisations, we would expect EBA to closely follow the revised BCBS framework.

FIGURE 8
CRD IV/CRR 1 - securitisation risk weights



Source: EBA, Barclays Research

FIGURE 9
CRD IV/CRR 1 - securitisation risk weights



Source: EBA, Barclays Research

¹⁵ In bank regulation the definition of "effective number of exposures" is identical to the adjusted Herfindahl-Hirschman index we describe in *European CLO series: Part II – Collateral*, 1 April 2015. For European CLO 2.0 it currently averages 69 (ranging from 41 to 100).

¹⁶ Basel Committee for Banking Supervision

¹⁷ See "Basel III Document – Revisions to the securitisation framework", BCBS, 11 December 2014

¹⁸ European Banking Authority

The new framework applies a different hierarchy of approaches to banks' securitisation holdings:

- On top of the hierarchy is an internal ratings-based approach (SEC-IRBA) applicable when the bank can determine the capital charge using the IRB approach for at least 95% of the securitised loans; this necessitates a supervisory-approved IRB model for the assets and sufficient information. Considering the extensive obligor overlap in European CLOs, we believe that some larger banks will be able to use SEC-IRBA for CLOs, but note the operational costs of investing in actively managed securitisations like CLOs will increase. Smaller bank investors will likely not be able to use SEC-IRBA due to the lack of an approved model for the underlying loans and/or the lack of resources/information that are needed to monitor the several hundred leveraged loan issuers in CLO portfolios.
- If SEC-IRBA is not possible, the bank will have to use an external ratings-based approach (SEC-ERBA), if the national regulator allows the usage of external ratings for securitisations. Compared with the current ERB approach, the revised framework does not differentiate between granular and non-granular exposures; a new factor introduced is the thickness of non-senior bonds.
- A bank that cannot use SEC-IRBA and SEC-ERBA (for example, if the regulator does not allow the usage of external ratings) will have to use the standardised approach (SEC-SA) which uses the same securitisation formula as SEC-IRBA, but the capital charge for the securitised exposures is derived using the standard approach (as opposed to using a supervisory-approved IRB model for the securitised assets).

FIGURE 10
BCBS revised securitisation framework – hierarchy of approaches

Approach	Condition for usage	Inputs to determine risk weights of underlying exposure	Inputs to determine risk weight of CLO tranche
Internal rating based approach (SEC-IRBA)	Bank can determine the capital charge using the IRB approach for at least 95% of the securitised loans; this necessitates a supervisory-approved IRB model for the assets, sufficient information and ongoing monitoring.	Internal risk assessment for obligor/ exposure (IRB approach)	Formula described in regulatory text
External rating based approach (SEC-ERBA)	SEC-IRBA not possible and national regulator allows usage of external ratings for securitisation	N/A	External rating of CLO tranches
Standard approach (SEC-SA)	SEC-IRBA not possible and national regulator does not allow usage of external ratings for securitisation.	External rating of obligors/ exposure or standard risk weight if not rated (standardised approach)	Formula described in regulatory text

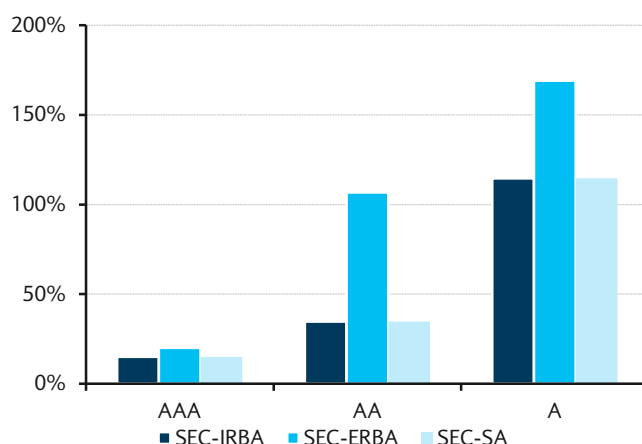
Source: BCBS, Barclays Research

Regardless of the approach used, the absolute risk weight floor will be 15% unless certain maximum risk weights or maximum capital requirement provisions apply.

Figures 11 and 12 show the applicable risk weights of SEC-IRBA, SEC-ERBA and SEC-SA considering a typical European CLO capital structure. For SEC-IRBA and SEC-SA we assumed that for a typical European CLO portfolio (average rating of single-B) the underlying assets' external ratings reflect the respective bank's internal risk assessment and derive their risk weight using the CRD IV/ CRR1 standard approach for corporate exposures. For unrated assets we assumed a low single-B rating. Based on these assumptions the SEC-IRBA and SEC-SA risk weights are identical. Reflecting the on average single-B risk assessment, the average risk weight we use for the securitised assets is 150%. We note that banks' approved internal rating models could result in lower risk weights for the securitised assets, in turn resulting in lower CLO capital charges for SEC-IRBA than the one we show in Figures 11 and 12.

FIGURE 11

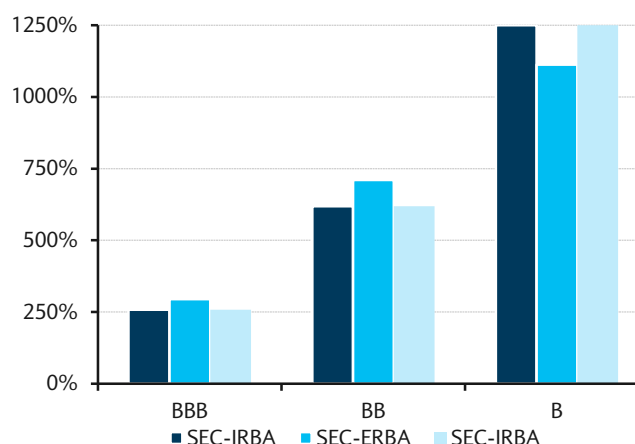
Revised securitisation framework – risk weights



Source: BCBS, Barclays Research

FIGURE 12

Revised securitisation framework – risk weights



Source: BCBS, Barclays Research

A noteworthy characteristic of BCBS' revised securitisation framework is that in relation to CLOs, banks that cannot use SEC-IRBA, but are allowed to use external ratings (this will likely affect most if not all European banks) could be at a disadvantage. This is because banks in jurisdictions that do not allow the usage of external ratings would have to revert to SEC-SA if they cannot use SEC-IRBA. In our example above, SEC-SA often results in lower risk weights than SEC-ERBA (see Figures 11 and 12).

The easiest way to assess the changes of the regulatory treatment for securitisation exposures is to compare the current ERB approach with the revised SEC-ERBA; both are based on external CLO ratings. We think that this comparison is relevant as most European banks will use SEC-ERBA, in our view. We expect that only some of the larger European banks will be able to use SEC-IRBA; and SEC-SA can only be used if regulators prohibit the usage of ratings.

FIGURE 13

Current and revised risk weights for CLOs

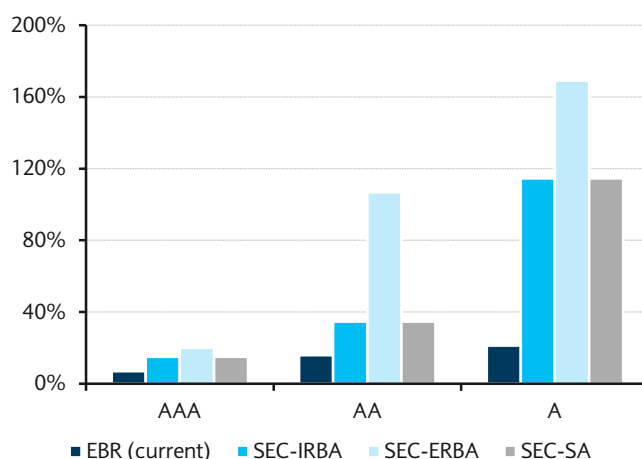
Class	Size (% of capital structure)	Rating (generic)	CRD IV/CRR 1		Revised securitisation framework		
			Risk weight ERB approach	SEC-ERBA	Change (multiple)	SEC-IRBA	Change (multiple)
A	57.5	AAA	7%	20%	2.7x	15%	2.0x
B	11.0	AA	16%	107%	6.7x	27%	1.7x
C	6.0	A	21%	169%	8.0x	92%	4.4x
D	5.0	BBB	80%	295%	3.7x	215%	2.7x
E	6.5	BB	451%	711%	1.6x	539%	1.2x
F	3.0	B	1,250%	1,019%	0.8x	1,083%	0.9x
Equity	11.0	NR	1,250%	1,113%	0.9x	1,250%	1.0x

Source: EBA, BCBS, Barclays Research

For a typical European CLO 2.0 capital structure the weighted average risk weight will likely increase considerably for most parts of the capital structure (Figure 13). Risk weights increase most for investment-grade rated mezzanine bonds; this effect becomes less pronounced when comparing the current ERB approach with the SEC-IRBA or the SEC-SA approaches. For junior bonds the risk weight could be lower than currently, on our estimates.

FIGURE 14

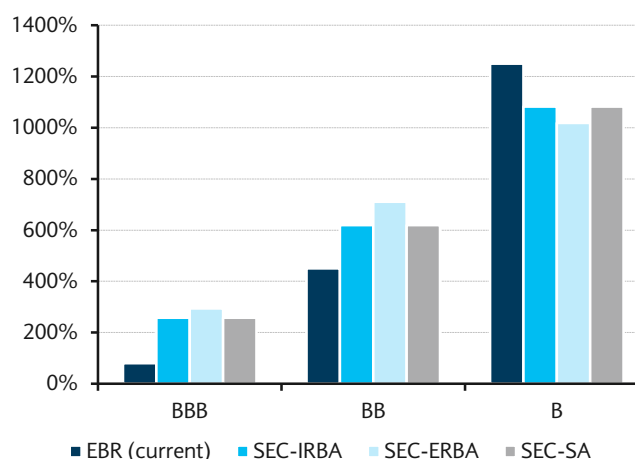
Current and revised securitisation risk weights



Source: EBA, BCBS, Barclays Research

FIGURE 15

Current and revised securitisation risk weights



Source: Source: EBA, BCBS, Barclays Research

The revised risk weights will change the return on capital for banks investing in European CLOs. Measured by return on risk weighed assets (RoRWA), under the current regime and at current spread levels the most efficient position in the capital structure for banks are the AAA, AA and single-A rated CLO tranches (Figure 16).

In the revised securitisation framework RoRWA would be lower amid increased risk weights and the most efficient part in the capital structure for banks would be the CLO senior tranche (usually rated AAA). For banks able to use SEC-IRBA the AA tranche could also remain attractive, in our view.

For banks that can use SEC-IRBA and whose approved internal rating model gives lower risk weights than our 150% assumption, also the single-A or BBB tranche could be attractive. For example, if we reduce our underlying risk weight assumption to 100%, the SEC-IRBA risk weights would be lower than under the current ERB approach.

FIGURE 16

European CLO – return on risk weighted assets (excluding funding costs)

Class	Size (% of capital structure)	Rating (generic)	Spread (bp)	RoRWA CRD IV (ERB approach)	RoRWA revised framework (SEC-ERBA)	RoRWA revised framework (SEC-IRBA)
A	57.5	AAA	135	22.9%	8.0%	10.7%
B	11.0	AA	210	14.8%	2.2%	8.9%
C	6.0	A	310	15.8%	2.0%	3.6%
D	5.0	BBB	400	5.3%	1.4%	2.0%
E	6.5	BB	580	1.3%	0.9%	1.1%
F	3.0	B	800	0.7%	0.9%	0.8%

Source: EBA, BCBS, Barclays Research

If the revised securitisation framework was implemented as proposed, we think that the main repercussions for bank investors in CLOs would be the following:

- Most European banks would have to use the revised ratings based approach (SEC-ERBA) and would face substantial risk weight increases for their holdings. In particular senior mezzanine bonds would become much less efficient. Hence, banks would be pushed up the capital structure, causing a reduction in demand for senior mezzanine bonds, but potentially an offsetting increase in demand for AAA tranches.

- For banks that are able to use the internal rating based model (SEC-IRBA) for CLOs the sweet spots in the CLO capital structure would be the senior and the second-pay (usually AA-rated) bonds. Depending on the internal model for the underlying assets, all investment-grade rated CLO tranches could remain attractive (or become even more attractive than currently). We think, however, that only a limited number of banks will be able to use SEC-IRBA.
- Banks in jurisdictions that do not allow the use of external ratings in regulations could have an advantage as they would not be allowed to use SEC-ERBA and could switch to the more lenient SEC-SA.

Liquidity and funding ratios (LCR and NSFR)

Another consideration for banks investing in securitisation is whether the bonds count as regulatory liquidity and the type of funding that is required for the investment. The former is governed by the CRD IV/CRR's liquidity coverage ratio (LCR) which will be phased in from October 2015; banks will have to comply with 60% of the liquidity requirement starting in October 2015, gradually increasing to 100% in January 2018. As we outline in [European ABS Regulation: Good from afar but far from good](#), 15 October 2014, certain senior ranking securitisation bonds count as high quality liquid assets to some extent. However, unlike the senior bonds of SME ABS, European CLOs are not among the LCR eligible securitisations and as such, will not count against the LCR and putting them at a disadvantage compared with other ABS and investment grade rated corporate bonds (non-investment grade rated bonds are not LCR eligible) and at no advantage compared with their underlying assets (leverage loans and non-investment grade rated bonds are LCR-ineligible, too).

The implementation of the net stable funding ratio (NSFR), scheduled to come into force in 2018, is less progressed than the implementation of the LCR. The NSFR is defined as the amount of *available* stable funding relative to the amount of *required* stable funding; banks will be required to have a NSFR of at least 100%. Bank investments that need to be backed fully by stable funding are assigned a 100% required stable funding factor (RSF); investments that do not need to be backed by stable funding attract a 0% RSF.

In previous draft regulations the LCR and NSFR were closely related: LCR-eligible assets did not have to be fully backed by stable funding (RSF between 0% and 100%), but LCR-ineligible assets attracted a 100% RSF. Given that CLOs are not among the LCR-eligible securitisation bonds in European bank regulation, we expect that in the context of NSFR they will need to be fully backed by stable funding, putting them at a disadvantage compared with other ABS, for example, and at no advantage compared with their underlying assets (leverage loans and non-investment grade rated bonds will need to be fully backed by stable funding, too).

Insurance investors in European CLOs – capital charges under Solvency 2

Capital charges

From January 2016 onwards the amount of capital that European insurance companies have to hold against investments in securitisation bonds will be governed by Solvency 2. For securitisation Solvency 2 differentiates between type 1 and type 2 exposures. Type 1 exposure, which benefit from less harsh capital charges, are senior bonds of ABS certain sectors (RMBS, consumer ABS, SME ABS, for example); the criteria for type 1 securitisation bonds are very similar to the LCR eligibility criteria in bank regulation (see [European ABS Regulation: Good from afar but far from good](#), 15 October 2014). The assets typically securitised in European CLOs do not feature on the list of loans allowed in type 1 exposures and hence, CLOs are classified as type 2 exposure which will likely be subject to very punitive capital charges.

Solvency 2's standard approach to the capital requirement for an insurer's fixed income investment is determined by multiplying the rating dependent capital charge by the duration of the ABS bonds. Our analysis shows that Solvency 2 does not exactly specify how to determine the duration of a securitisation exposure; ie, it is not clear whether insurers have to assume that the securitisation bond's maturity is the final maturity date or whether insurers can use the weighted average life of a bond; and/or whether call options can be taken into account. In our analysis below, we assume six-year duration for class A and seven-year duration for non-senior classes of the CLO.

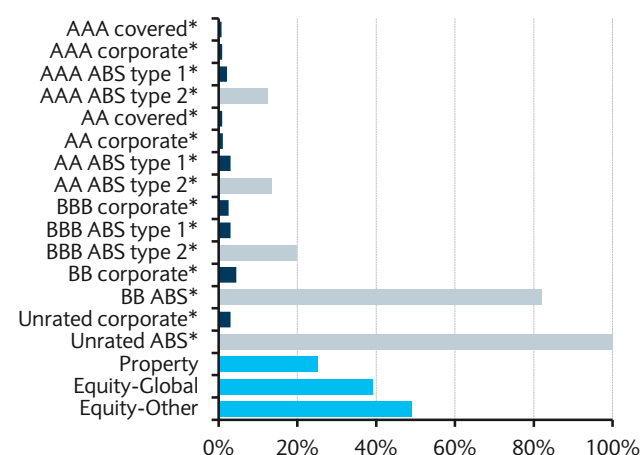
Comparing Solvency 2 capital charges for CLOs with that of the securitised assets, we note that the amount of equity an insurer has to hold against the typically AAA-rated senior bonds from a CLO is nearly double that the insurer has to hold against single-B rated bonds or loans from the underlying collateral pool, despite the demonstrably lower credit risk based on historical default rates. Compared with unrated loans the multiple is even higher (4.2x), because Solvency 2 applies lower capital charges to unrated bonds and loans than to non-investment grade rated bonds/loans.

Solvency 2 capital charges for CLOs are high because EIOPA derived them from historical spread performance. In the context of CLOs and other securitisation asset classes, spreads were very volatile in the aftermath of the 2008 financial crisis. Given the limited price history of European securitisation markets this period of high volatility has a larger effect on the regulator's analysis than in other fixed income markets for which longer time series are available. Despite the penal treatment of CLOs in Solvency 2, we believe insurance companies will continue to invest in the asset class in 2016 and beyond, for several reasons:

- European insurance companies have the option to use internal models rather than the standard approach, if approved by their regulator. It may be easier to achieve approval for a CLO internal model than for models covering other ABS asset classes, likely because the assets securitising CLOs are often rated and also traded. When market prices for the underlying assets are observable, the benefits of the CLO's structural protection become clearer, providing arguments in favour of approving the model. In our view, large insurers will likely be able to use internal models for CLOs. It is not clear whether smaller insurance companies would be able to use a third-party model (from an asset manager, for example).

FIGURE 17

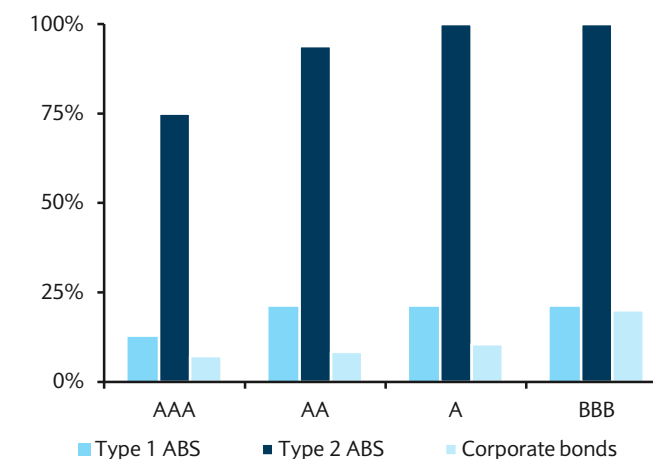
Insurance regulation: proposed capital charges in Solvency 2



Note: * per year of duration. Source: EIOPA, Barclays Research

FIGURE 18

Insurance regulation: proposed capital charge for CLOs



Note: * 6 year duration for AAA, 7 year else. Source: EIOPA, Barclays Research

- Under Solvency 2, some European insurers could have capital ratios that are well above the required level. If an investments' capital charge is a less important factor in the investment decision, the favourable relative value of CLOs could be sufficiently compelling to warrant continued investment. After the rally in other ABS markets, CLOs are currently among the highest yielding asset classes for any given rating category.
- Insurers with large amounts of assets under management (AUM) could continue to invest a small percentage in CLOs. Given the overall AUM of these insurers, the investment of a small percentage in capital inefficient assets might not matter.
- Related to the two points above, CLOs do not look overly inefficient relative to other asset classes even under the standard approach, despite their classification as type 2 exposure. This is a result of the relatively high spread senior European CLOs offer to investors, which offsets their relatively higher capital charge.

CLOs versus other ABS under Solvency 2

In Figure 19, we compare the return on regulatory capital for senior bonds of different ABS asset classes (RMBS, CMBS and CLOs).

FIGURE 19

Solvency 2 spread on regulatory capital for selected senior bonds (standard model, sorted by spread on regulatory capital)

Asset class	Rating	Solvency 2 classification	Capital charge per duration year	Duration*	Total capital charge	Spread	Spread on regulatory capital
Italian RMBS (fast pay)	AA	Type 1	3.0%	2 years	6.0%	50bp	830bp
Dutch RMBS (fast pay)	AAA	Type 1	2.1%	2 years	4.2%	20bp	470bp
Auto ABS	AAA	Type 1	2.1%	3 years	6.3%	20bp	320bp
Italian RMBS (slow pay)	AA	Type 1	3.0%	11 years	33%	65bp	200bp
European CLO	AAA	Type 2	12.5%	6 years	75%	130bp	175bp
German CMBS	AAA	Type 2	12.5%	5 years	56%	100bp	145bp
Dutch RMBS (slow pay)	AAA	Type 1	2.1%	11 years	23%	25bp	110bp

*Note: There is currently uncertainty regarding the treatment of call options for the duration calculation under Solvency 2. In the figure above, we determined the slow-pay RMBS duration assuming no call and a 5% CPR. Source: EIOPA, Barclays Research

Solvency 2 classifies all non-senior bonds as type 2 exposure, irrespective of the asset class. As Figure 20 shows, the capital charges for non-senior bonds will be close to or 100% in the standard approach. With mezzanine European CLOs offering higher spread levels than any other European ABS asset class, they could become the investment of choice for insurance companies that decide to remain invested in non-senior securitisation bonds.

FIGURE 20

Solvency 2 spread on regulatory capital for CLOs (standard model)

Class	Capital charge per duration year	Duration	Total capital charge	Spread	Spread on regulatory capital
AAA	12.5%	6 years	75%	130bp	175bp
AA	13.4%	7 years	94%	200bp	210bp
A	16.6%	7 years	100%	280bp	280bp
BBB	19.7%	7 years	100%	360bp	360bp
BB	80.0%	7 years	100%	560bp	560bp
B	100%	7 years	100%	760bp	760bp

Source: EIOPA, Barclays Research

Like other securitisation asset classes that are classified as type 2 exposures, the capital charges for CLOs are not very sensitive to tranche seniority and credit risk (see Figure 20). This is because the capital charge for AAA rated bonds is already very high, so that incremental increases do not have much effect once duration is considered (ie, the capital charge is close to 100% irrespective of the credit risk).

To summarize, the effects of Solvency 2 on insurance investors in CLOs are as follows:

- Large insurers will be less negatively affected as they are more likely to use internal models. In addition for insurers with large AUM the investment of some investment into capital inefficient assets will matter less than for smaller insurers.
- Under the standard approach, European CLO AAAs are relatively capital-efficient compared with some other European securitisation asset classes. Driven by insufficient differentiation in capital charges for different tranche seniority, the realized spread on regulatory capital increases as the insurance company invests further down the CLO's capital structure.
- The lack of differentiation between tranches with different seniority in Solvency 2's standard approach could theoretically push insurers down the capital structure, but this is unlikely to happen on a large scale. Instead, we believe insurance companies will continue to invest in AAA and senior mezzanine CLO classes, but to a lesser extent than currently. Some insurers using the Solvency 2 standard approach may choose to utilize a barbell strategy, investing primarily in AAA and non-investment grade rated mezzanine notes. This, combined with banks' reduced appetite for mezzanine tranches, could leave something of a hole in the middle of the CLO capital stack which other investors would need to fill.

Risk retention is already reality for European investors

To align the interests of originator/sponsors and investors, since early 2011 European banks have only been able to invest in new securitisations if the originator/sponsor holds 5% of the securitised exposure, unhedged, on an ongoing basis (originally Article 122a of CRD¹⁹ II; now Article 405 of CRD IV/CRR²⁰).

Likewise, AIFMD²¹ (for alternative investment funds, implemented in mid-2013), Solvency 2 and the draft revision of the UCITS directive (mutual funds) also contain risk retention requirements for all securitisations issued after 2010. The European implementation of risk retention requirements is investor-based; ie, regulated investors should only invest in securitisation bonds if the originator/sponsor retains part of the risk. If that is not the case, the investor faces higher capital charges or is obliged to sell the position. *Indirectly*, this pressures the originator/sponsor to retain part of the risk. In contrast, the US implementation of risk retention will likely impose a *direct* obligation to the originator/sponsor of a transaction.

European risk retention rules

For CLOs, the following aspects of the European risk retention rules are important.

- **What needs to be retained?** According to CRR, the originator or sponsor of a securitisation must retain 5%, the nominal value of the securitisation exposure on an ongoing basis. There are five different permitted ways to retain, of which the vertical slice (5% of each class of notes) and the first loss retention are the only relevant for CLOs (Figure 21).

¹⁹ Capital Requirement Directive

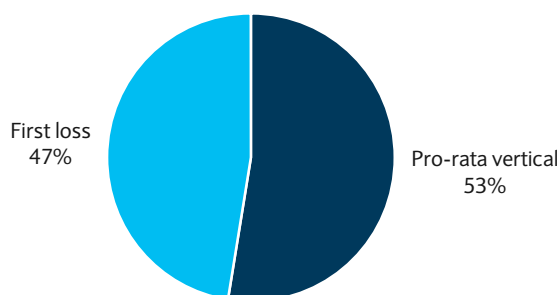
²⁰ Capital Requirement Regulation

²¹ Alternative Investment Fund Managers Directive

- **Who has to retain?** The entity retaining the risk needs to be a credit institution or an investment firm with certain MiFID²² authorisations. This excludes non-EU investment managers/advisors or alternative investment fund managers under the AIFMD, reducing the number of potential European CLO managers. However, there is some flexibility when there is more than one sponsor: each sponsor can retain a pro rata share of its contribution to the pool, or the retention can be held by the dominant sponsor in terms of asset contribution (>50%) or collateral management. The latter option would allow some co-managers to hold smaller retention percentages – a positive, in our view. Risk retention by a third party is no longer permissible, resulting in CRR non-compliance of some European CLOs that were issued in 2013 under the 2010 CEBS²³ guidance for Article 122a of CRD 2. However, full recourse third-party financing can be used to acquire the retained interest. In 2014, CLO “originator SPVs”, privately or publicly funded entities that originate the loans, emerged in Europe as an alternative way to structure risk retention.

FIGURE 21

Risk retention in European CLO 2.0 (by issuance amount, 2013-15ytd)



Source: Barclays Research

European versus US risk retention

At the investor level, implementation of risk retention in Europe has extra-territorial effects. Historically, investor participation in CLOs was more global than for other ABS asset classes. In the US, risk retention will be required under the Dodd-Frank act for new CLOs starting in late 2016. Only a small minority of US CLOs are currently structured to comply with European risk retention obligations. As a result, European investors currently cannot invest in most new issue US CLOs, but this could change in the future depending on how US issuers structure their retention compliance.

Even after coming in force in the US, the risk retention regimes in Europe and the US will differ in some of their technical aspects (Figure 22). This means that in order for European investors to participate in US CLOs, the risk retention solution will have to be structured in a way the specifically complies with European regulation (for example, in terms of risk retention duration). Alternatively, European regulators could elect at some point in the future to accept Dodd-Frank-compliant risk retention as a valid risk retention option for European investors. This would broaden the universe of CLOs available to European investors, which could potentially cause demand for European deals to soften, particularly if US spreads remain wider on a like-for-like ratings basis as they are as of this publication.

²² Markets in Financial Instruments Directive.²³ Committee of European Banking Supervisors, replaced by the EBA on 1 January 2011.

FIGURE 22

Comparison risk retention regimes in Europe versus US

	CRD IV/CRR	Dodd-Frank (proposed as of August 2013)
Risk retention percentage	5%	5%
Risk retention options	<ul style="list-style-type: none"> • 5% of each class of notes or each loan (vertical) • First loss tranche and, if necessary other tranches having the same or more severe risk profile than those sold to investors (horizontal) • 5% of the nominal value of revolving pools (seller's interest) • Randomly selected exposures that would otherwise have been securitised • Subordinated 5% portion of each exposure 	<ul style="list-style-type: none"> • 5% of each class of notes or each loan (vertical) • Structurally subordinated "eligible horizontal residual interest) in an amount of at 5% of the ABS par value (horizontal) • Combination of ABS interest in the form of vertical risk retention and horizontal risk retention (L-shape retention) • 5% of the nominal value of revolving pools (seller's interest) if the principal cash flow allocation is pro rata at any point in time • 5% of each syndicated loan tranche of open market CLOs •
Duration of the retention	Life of the securitisation	Latest of two years after closing, the date on which the portfolio balance has reduced to 33% of the closing balance and the date on which the ABS balance has reduced to 33% of the closing balance
Retainer	<ul style="list-style-type: none"> • Originator/initial originator • Sponsor (collateral manager) • Financial institution • Investment firm with certain MiFID authorisations 	<ul style="list-style-type: none"> • Originator • Sponsor (collateral manager) • Syndicated loan arranger in the case of open-market CLOs
Who is penalised if risk retention is not complied with?	Investor	Sponsor/originator

Source: CRD IV/CRR, FDIC, Barclays Research

CHAPTER 4

European CLO series: Part IV – Market status

This is an edited version of an *article* that was previously published on 3 July 2015.

Driven by ever-evolving regulation, a number of important changes are taking place in the European CLO 2.0 market landscape: originator vehicles are gradually proliferating; the European CLO manager base is becoming more diversified; and the impending regulatory convergence is prompting US managers to issue CRR-compliant CLOs, further increasing the supply available to European investors. Meanwhile, pre-crisis (1.0) transactions are rapidly amortising – by the end of 2015, the majority of European CLO par outstanding will be from 2.0 deals. However, new CLO formation is constrained by lack of available loan supply, which is being hampered by strong competition from the HY bond market and a challenging LBO environment. As a result, annual issuance remains at roughly half of its pre-crisis peak, and absolute market growth has yet to emerge.

In this chapter, we take stock of the current state of the market, including an examination of the following topics:

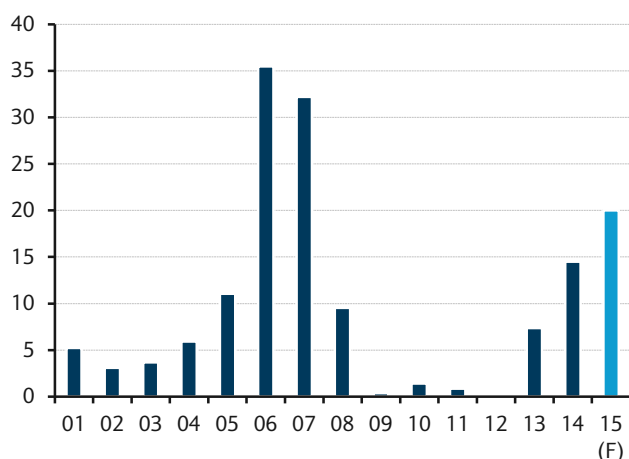
- The pace of CLO 2.0 issuance against 1.0 amortisation, and their respective effects on aggregate reinvestment capacity.
- The gradual acceptance of CLO originator vehicles as an alternative to sponsor-held risk retention, pending further clarity from regulators.
- The growing diversification of the European CLO manager base, including the presence of CRR-compliant US managers, which in tandem could help alleviate manager concentration issues and position the market for growth.

2.0 issuance, 1.0 redemption, and reinvestment capacity

European CLO issuance amounts

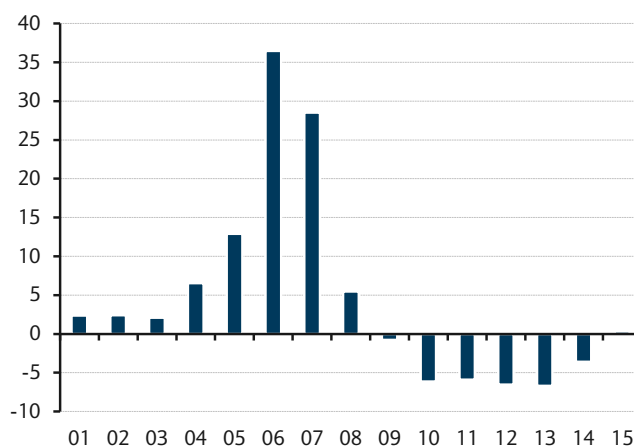
Between 2000 and 2005, annual European leveraged loan CLO issuance ranged from €1.5bn to €11.0bn. After two years of very strong issuance in 2006 and 2007, CLO creation was virtually dormant for five years, as nearly all 2008-2012 issuance was retained. European CLO 2.0 made

FIGURE 1
European CLO issuance (€bn, gross)



Source: S&P Capital IQ LCD

FIGURE 2
European CLO issuance (€bn, net)



Source: Bloomberg, Barclays Research

its debut in 2013 when €7.5bn was placed with investors, and the market has grown steadily since then. After issuance nearly doubled to €14.5bn in 2014, we expect €15-20bn for 2015 (Figure 1). But, despite the rapid growth in new CLO creation, amortisation of pre-crisis (“1.0”) transactions has caused net issuance to be negative every year since 2009, albeit with some improvement in 2014 (Figure 2). Based on our expectations for issuance through year-end and the current pace of 1.0 amortisation, 2015 should be the year where net issuance finally gets back to flat, and potentially even into positive territory.

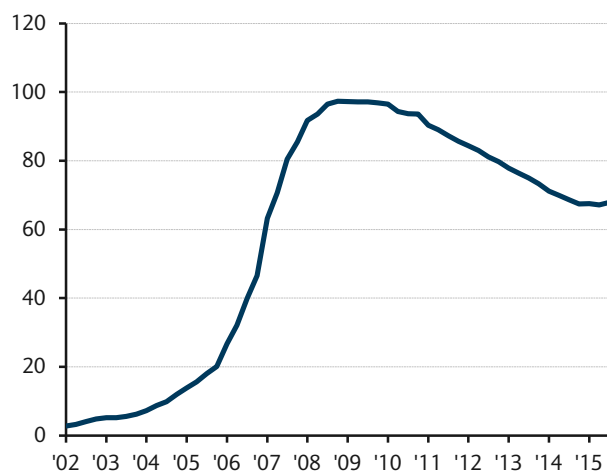
As a result of this historical issuance pattern, the outstanding amount of European CLOs peaked at just below €100bn in 2008 and has been declining gradually ever since (Figure 3). We estimate that the overall market size is approximately €65bn currently, including pre-crisis (1.0) and post-crisis (2.0) deals. Between 2009 and 2012 the pace of market size decline was cushioned by the fact that many European CLO 1.0 transactions were still in their reinvestment period (Figure 4), and thus able to recycle principal repayments from the collateral pool by adding loans to the securitised portfolio, rather than amortising the notes.

1.0 redemption rates

European CLO 1.0 total redemption rates dropped to nearly zero in 2008 and 2009 (Figure 5). During this time period less than 10% of all CLOs had entered their amortisation period, while many leveraged loans were extended amid borrowers’ difficulties to refinance maturing debt. Redemptions began to resurface in 2010, but grew rather slowly through the end of 2013. Approximately 40% of CLO 1.0s exited their reinvestment period during this time, but with Europe mired in a double-dip recession, loan extensions remained common while actual repayments were scarce.

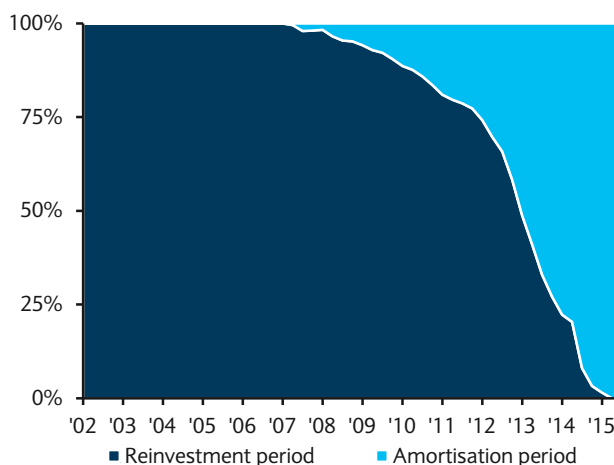
CLO 1.0 redemption rates skyrocketed in mid-2013, driven by a combination of three factors. First, after Europe finally emerged from recession for good in Q2 2013, loan repayment rates began to rise (Figure 6). In addition to facilitating a few IPO exits for leveraged loan issuers, the improving economic conditions drove strong investor demand for HY bonds, resulting in a surge in “debut issuance” in the European HY bond market with proceeds often used to take out loans (Figure 7). Second, between January 2013 and January 2015, the remaining 50% of outstanding pre-crisis CLOs exited their reinvestment periods, putting all 1.0 portfolios into amortisation. Third, the re-opening of the CLO primary market has facilitated European CLO 1.0 optional redemptions, with collateral being recycled in new transactions. As a result of these factors, the total CLO 1.0 redemption rate (including transaction calls) is currently running at above 30% on an annualised basis, a pace we expect to continue.

FIGURE 3
European CLO outstanding (€bn)



Source: Bloomberg, Barclays Research

FIGURE 4
European CLO 1.0 – reinvestment vs amortisation period



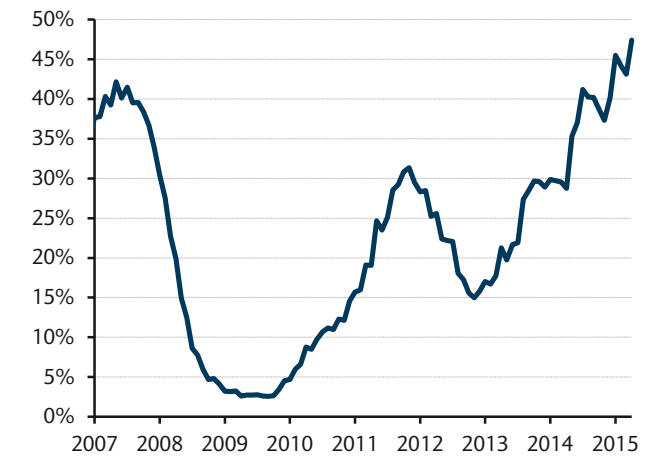
Source: Bloomberg, Barclays Research

FIGURE 5
European CLO 1.0 aggregate annualised redemption rate



Source: Bloomberg, Barclays Research

FIGURE 6
European leveraged loan repayment rates



Source: S&P LCD

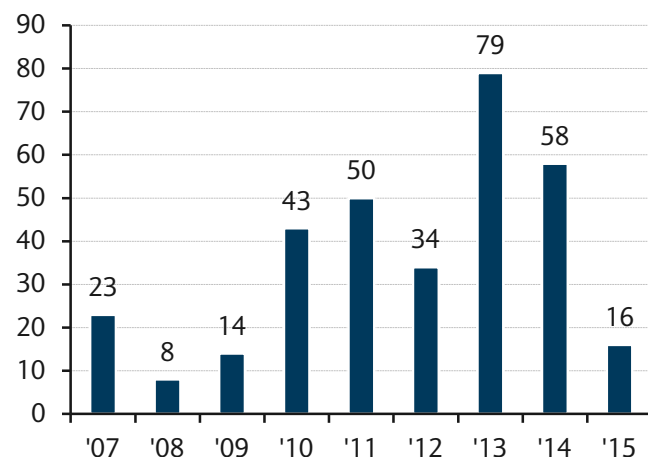
Reinvestment capacity growth

The accelerated redemption of European CLO 1.0s combined with increasing 2.0 issuance is causing a rapid shift in the complexion of the market. As recently as 18 months ago, substantially all CLO par outstanding in Europe was from 1.0 transactions. By the end of 2015, more than half of the total European CLO notional will be from 2.0s (Figure 8). As noted above, the pace of 1.0 amortisation and 2.0 issuance is now roughly equal, which has arrested the decline in market size but has not yet translated into actual growth in overall CLO notional amount outstanding.

The transition of the market from being almost exclusively 1.0 to majority-2.0 does have one important side effect: it increases the total amount of CLO notional outstanding that is still within its reinvestment period. This is potentially beneficial for secondary market liquidity in the European leveraged loan market, which became increasingly challenged as more and more 1.0 transactions exited reinvestment and all but ceased their trading activity.

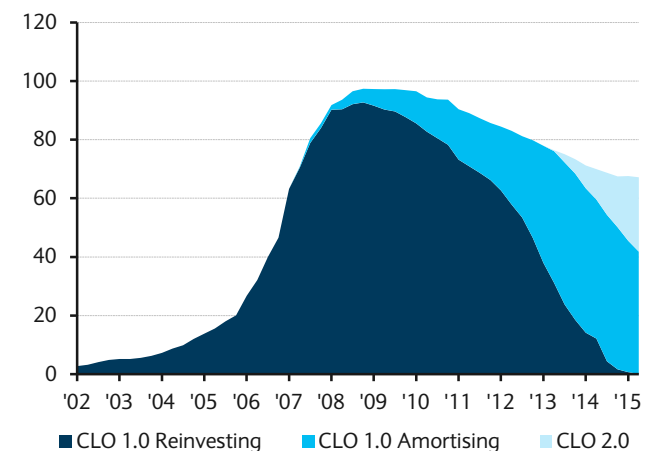
As Figure 9 shows, the total amount of CLO notional within reinvestment troughed in Q3 of 2014, and has grown in the three quarters since, thanks to ongoing CLO 2.0 issuance. With

FIGURE 7
Number of debut issuers in the European HY bond market



Source: Barclays Research

FIGURE 8
European CLO outstanding – CLO 1.0 vs 2.0 (€bn)

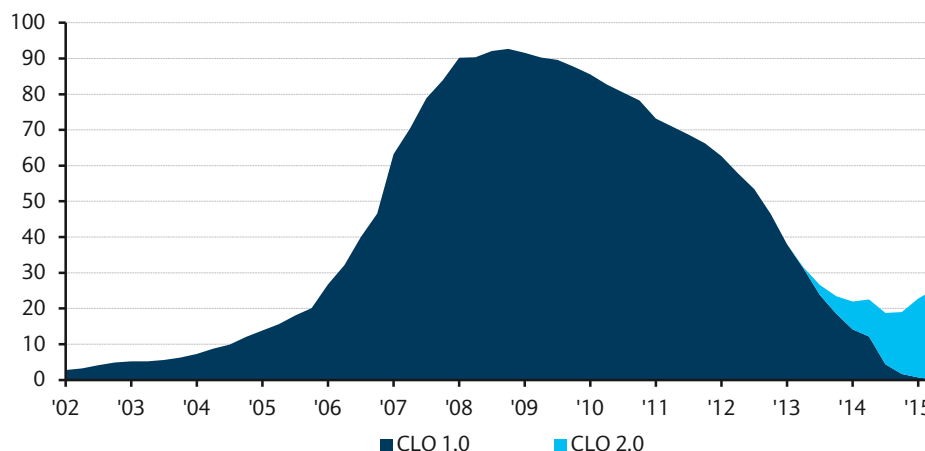


Source: Bloomberg, Barclays Research

all 1.0 deals now in their amortisation period, the aggregate reinvestment capacity will grow 1-for-1 with CLO issuance until the 2013 vintage 2.0 deals begin to exit reinvestment in early 2017. Assuming an issuance run rate of €15-20bn annually, total reinvestment capacity should exceed €30bn by year-end and could exceed €50bn by the end of 2016, or roughly double current levels. This is likely to help loosen up secondary trading conditions for leveraged loans, all else equal.

FIGURE 9

European CLO notional amount still within the reinvestment period (€bn)



Source: Bloomberg, Barclays Research

Originators' role in risk retention

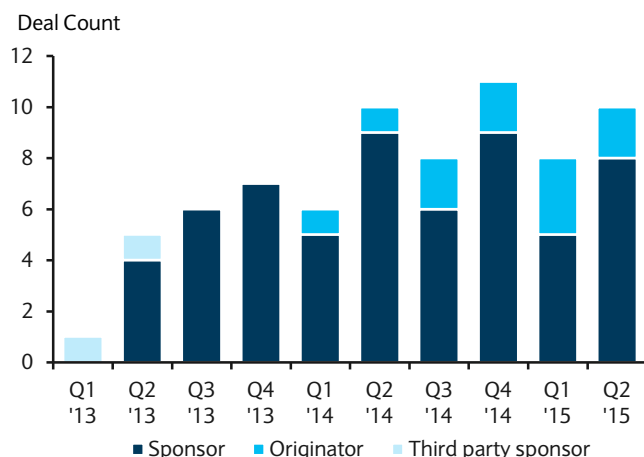
Recapping the risk retention options

Unlike in the US, where risk retention regulations will not become binding for new CLOs until the end of 2016, risk retention has been a reality for European managers and investors since the CLO 2.0 market opened. Originally encapsulated in rule 122a of the second iteration of the EU's Capital Requirements Directive (CRD II), the rule was later formalized by the EBA under CRD IV, and became effective as law at the start of 2014 under the EU's Capital Requirements Regulation (CRR), with the related Regulatory Technical Standards in force as of July 2014. Likewise, AIFMD (in force since mid-2013) prohibits EU alternative investment fund managers from investing in CLOs that do not comply with risk retention, and under Solvency 2 (to come into force in January 2016) European insurance companies will be subject to risk retention rules as well when investing in CLOs issued after 2010. Although the requirement for ensuring retention compliance specifically falls on the CLO investor in Europe (indirect risk retention approach), the economic burden associated with retaining a 5% stake in each transaction largely became the CLO manager's problem.

As providers of investment services rather than capital, CLO managers were not necessarily equipped to handle retention internally under their pre-crisis business models. Not surprisingly, an effort was made early on to find an external solution, in the form of third-party sponsors who would supply the necessary capital and retain the unhedged risk for the life of the transaction. However, after this approach was used in two of the first three European 2.0 CLOs of 2013, the reaction from regulators was swift and decisive: the use of third-party sponsors was deemed incompatible with the spirit and letter of the risk-retention regulation by the EBA, and the practice was immediately discontinued.

FIGURE 10

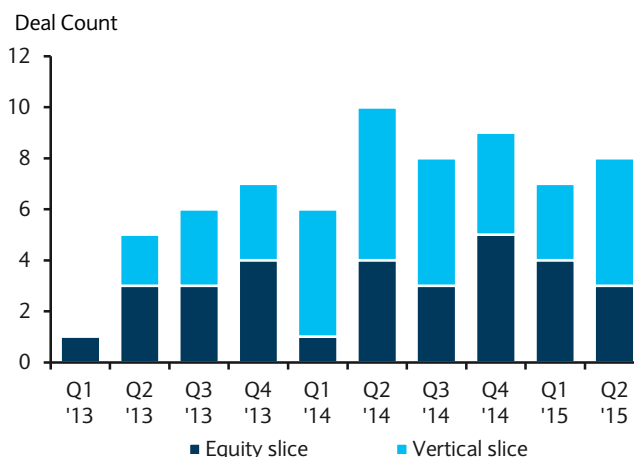
Quarterly deal count by risk retention source



Source: S&P LCD, Barclays Research

FIGURE 11

Quarterly deal count by risk retention style



Source: S&P LCD, Barclays Research

This left managers with two potential alternatives: risk retention by the sponsor and/or risk retention by the originator. With the third party route closed, the sponsor option effectively meant retention by the manager. This quickly became the market standard, as all European CLOs priced during the latter half of 2013 used the sponsor method. However, in March of 2014, CVC Credit Partners priced CVC Cordatus Loan Fund III, which became the first European CLO to achieve risk retention compliance through an originator. Others followed, as originators have become an increasingly popular alternative to sponsor retention (Figure 10). At the same time, the split between horizontal (equity tranche only) and vertical (pro-rata across all tranches) retention has remained fairly balanced (Figure 11).

Conceptually, the originator risk-retention concept is reasonably straightforward. 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 transfers (effectively 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 (Figure 12). As a direct participant in leveraged credit markets, the originator is presumed to be sufficiently aware of issuer credit quality to make capital allocation decisions and prevent the origination of loans to unsound corporate borrowers. Furthermore, the requirement to hold unhedged risk for the life of the transaction ensures that the originator has an incentive to avoid supplying the CLO with unsafe collateral.

Originator vehicles and regulators

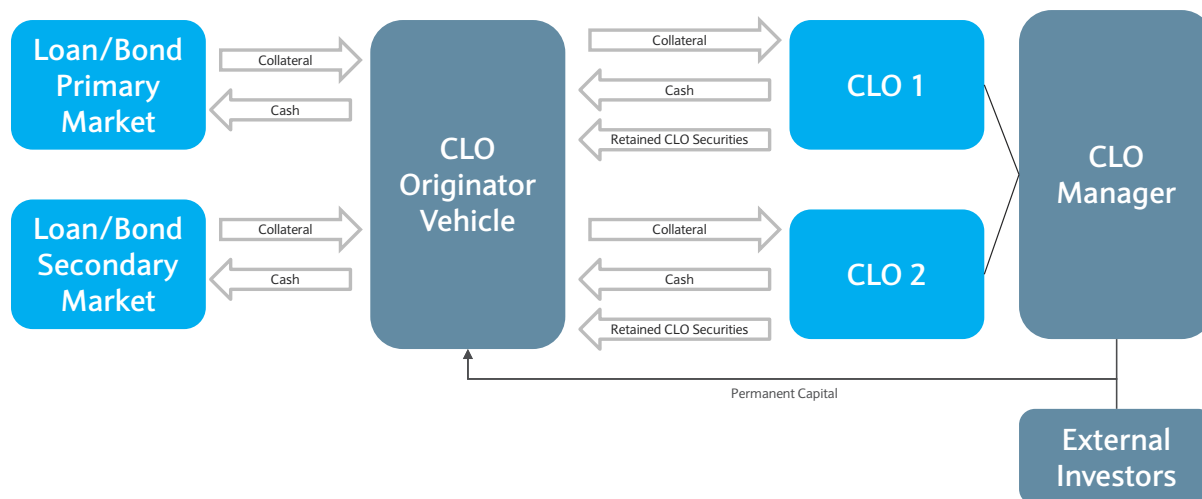
Even as originators gained traction in 2014, some market participants remained wary that regulators might come to view these vehicles as an attempt to circumvent or dilute risk retention requirements. As a result, the EBA’s year-end statement on risk retention was hotly anticipated and closely scrutinised upon its release on 22 December, 2014²⁴. Unfortunately, the EBA declined to provide specific guidance or a list of requirements on what exactly constitutes a compliant originator. It did, however, indicate that it deemed certain types of originator SPVs to be non-compliant with the “spirit” of risk retention regulation, and recommended narrowing the definition of originators to ensure that they had “real economic substance.” Despite the lack of specifics, investors have generally interpreted this term to mean that the originator should have their own employees (apart

²⁴ For details, see *EBA report on securitization risk retention, due diligence and disclosure*, 22 December 2014.

from those of the manager), permanent capital, and a meaningful holding period for the originated assets. In the end, most market participants viewed the EBA's release positively for the CLO market, as the existing CLO originators were not believed to be among the SPVs being criticised (some very short-lived originator vehicles had been used in other securitisation asset classes and were most likely the target of the EBA's comments).

FIGURE 12

Conceptual diagram of the CLO originator vehicle model



Source: Barclays Research

The ECB and Bank of England joined the debate in a subsequent joint response to a consultation document from the European Commission regarding simple, transparent and standardised (STS) securitisation.²⁵ In their response, the central banks argued that a “loophole” in the CRR’s originator definition, identified as CRR Article 4(13)b, could “allow an entity to purchase a third party’s exposures” (ie, buy loans on the secondary market) and then securitise them in short order, effectively allowing the originator to act as a short-term conduit that facilitates securitisation without aligning the interests of the original underwriter of corporate credit risk and the final investor.

The ECB and BoE also indicated their agreement with the EBA’s recommendation to move to a direct approach for risk retention that would shift the compliance responsibility onto the originator or sponsor, rather than the investor. Such a change would reduce the cost of compliance for investors, but would also likely require that CLO managers have greater clarity from regulators regarding the acceptability of originator structures if ultimate certification of compliance is to fall upon them. At this point, investors are expecting further clarification on all of these issues when the European Commission publishes its report on STS securitisations (leverage loan CLOs will very likely not be included in STS securitisations), which is currently expected in October 2015. However, CLOs will almost certainly not be included under the definition of STS securitisations and, as a result, it is very likely that the existing indirect risk retention approach will remain in place for the CLO market.

Choices made by the market so far

After the originator concept was utilized successfully by CVC Credit Partners, other European CLO managers chose to go down the same route. While details regarding capital sources are not publicly available for some originators, July of 2014 brought forth the first publicly traded CLO originator, as Blackstone listed a closed-end investment

²⁵ For details, see *Joint response from the Bank of England and ECB to the Consultation Document of the European Commission*, 27 March, 2015

company called Blackstone/GSO Loan Financing Ltd (BGLF) on the London Stock Exchange (LSE). The fund's prospectus indicated that Blackstone would contribute the lower of 25% or €50mn while seeking to raise as much as €200mn from outside investors. After a follow-on offering, BGLF has a total capitalisation slightly in excess of €330mn, giving Blackstone a 15% share. Therefore, from Blackstone's perspective, the originator has effectively reduced the economic burden of risk retention by 85% versus a traditional sponsor option. BGLF has also been able to secure financing for the accumulation of loan collateral. Since its listing, BGLF has acted as the retention provider on all of Blackstone/GSO's European subsequent CLOs.

The apparent success of BGLF in raising permanent retention capital via public equity markets has not gone unnoticed by other managers. According to a recent report by S&P LCD, credit manager Chenavari listed its CLO originator (Toro Limited) via the LSE's Specialist Fund Market in May of 2015. Chenavari reportedly plans to issue its second European CLO 2.0 later this year, with Toro Limited acting as the retention provider. LCD also reported that HIG Capital plans to list a closed-end originator fund on the LSE. Unlike BGLF, which to date has only been used as the retention provider for Blackstone/GSO CLOs, both Chenavari and HIG Capital have marketed their funds as potentially providing originator services for third-party managers. This could potentially ease the path into the 2.0 market for smaller debut managers that may lack the necessary capital to finance the full risk retention themselves amount via the sponsor route.

A full list of CLOs that have used the originator route for risk retention compliance through mid-year 2015 is shown in Figure 13.

FIGURE 13

European CLOs utilizing the originator option for risk retention

Transaction Name	CLO Manager	Size (€mn)	Month Priced	Retention Style
CVC Cordatus Loan Fund III	CVC Credit Partners	450.0	Mar-14	Vertical slice
Phoenix Park CLO	GSO/Blackstone Debt Funds Management	413.3	Jun-14	Equity slice
Toro European CLO I	Chenavari Credit Partners	307.8	Aug-14	Vertical slice
Sorrento Park CLO	GSO/Blackstone Debt Funds Management	517.0	Sep-14	Equity slice
CVC Cordatus Loan Fund IV	CVC Credit Partners	400.0	Nov-14	Vertical slice
Castle Park CLO	GSO/Blackstone Debt Funds Management	415.0	Nov-14	Equity slice
Dartry Park CLO	GSO/Blackstone Debt Funds Management	411.1	Feb-15	Equity slice
BNPP IP EURO CLO 2015-1	BNP Paribas Asset Management	308.5	Mar-15	Vertical slice
GLG EURO CLO I	GLG Partners	309.2	Mar-15	Vertical slice
CVC Cordatus Loan Fund V	CVC Credit Partners	463.5	Apr-15	Vertical slice
Orwell Park CLO	GSO/Blackstone Debt Funds Management	415.0	May-15	Not known
Black Diamond 2015-1	Black Diamond Capital Management	417.4	Jul-15	Not known
Adagio IV CLO	AXA Investment Managers	362.3	Jul-15	Vertical slice

Source: S&P LCD

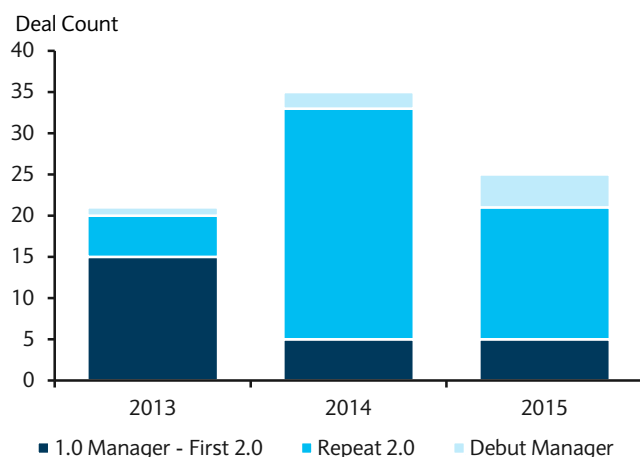
Growing diversity in the CLO manager landscape

Debut managers are arriving in 2015

By late 2014, manager concentration limits were becoming a significant impediment to further growth in European CLO 2.0 issuance, as most regular CLO investors had accumulated significant exposure to the comparatively small number of managers that had printed post-crisis deals. As Figure 14 shows, 2014 issuance was overwhelmingly from repeat European 2.0 managers, most of whom had brought their first post-crisis deal to market during the prior year. In 2013 and 2014 combined, only three issuers were completely new to Europe: Apollo in 2013, followed by Oaktree and Chenavari in 2014. In addition, cross-border manager consolidation further reduced the available diversity for European investors, as several large post-crisis acquisitions (KKR/Avoca, etc.) tied up formerly separate managers under unified platforms.

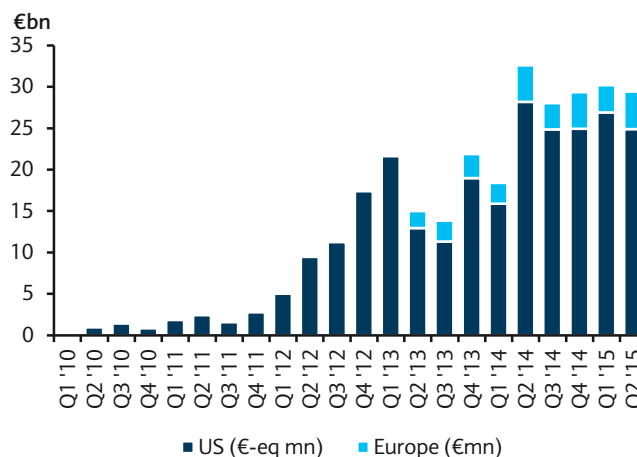
Fortunately for managers and investors alike, two trends have helped to alleviate the manager concentration burden in 2015: better market access for debut European managers and US managers printing CRR-compliant deals following the finalisation of US risk retention regulations. So far, there have been four European CLOs from debut managers in 2015 (more than the previous two years combined): Bosphorus CLO 1 from Commerzbank Debt Fund Management (a static deal with no reinvestment period), Aurium CLO 1 from Spire Partners, Tikehau CLO from Tikehau Capital Europe, and Black Diamond 2015-1 from Black Diamond Capital Management. Additional debut managers are expected to price transactions in the H2 15. A list of first half 2015 CLOs from new 2.0-era managers appears in Figure 16. The presence of the BNP, GLC, Black Diamond, and AXA transactions on both the new 2.0 manager and originator lists is noteworthy – as originator vehicles proliferate, market access for new managers should continue to improve.

FIGURE 14
Annual deal count by repeat vs. first time CLO managers



Source: Intex, Barclays Research

FIGURE 15
Quarterly post-crisis issuance: US and Europe



Source: S&P LCD, Bloomberg, Barclays Research

FIGURE 16

2015 European CLOs from new 2.0 managers

Debut Status	Transaction Name	CLO Manager	Size (€mn)	Month Priced
Debut Manager	Bosphorus CLO I	Commerzbank Debt Fund Management	233.4	Feb-15
Debut Manager	Aurium CLO I	Spire Partners	308.8	Mar-15
1.0 Manager - First 2.0	BNPP IP Euro CLO 2015-1	BNP Paribas Asset Management	308.5	Mar-15
1.0 Manager - First 2.0	GLG Euro CLO I	GLG Partners	309.2	Mar-15
1.0 Manager - First 2.0	Oak Hill European Credit Partners III	Oak Hill Advisors	416.7	Apr-15
1.0 Manager - First 2.0	Penta CLO 2	Partners Group	414.1	May-15
Debut Manager	Tikehau CLO	Tikehau Capital Europe	354.7	Jun-15
Debut Manager	Black Diamond CLO 2015-1	Black Diamond Capital Management	420.1	Jul-15
1.0 Manager – First 2.0	Adagio IV CLO	AXA Investment Management	362.3	Jul-15

Source: S&P LCD, Intex, Barclays Research

US managers reach out to European investors

The second trend helping to increase manager diversity in the European 2.0 market is, ironically, the long overdue arrival of US risk retention. Unlike Europe, the US 2.0 (and 3.0, denoting Volcker-compliant) market was allowed to grow for several years while still unfettered by risk retention regulations, causing issuance to grow much more rapidly (Figure 15) than in Europe. However, the rules were at last finalised in December 2014, meaning they will become binding (with full grandfathering) near the end of 2016. Already, some US managers have begun preparing for the inevitable by working out their retention strategy and source(s) of capital. At the same time, managers were enticed by the potential combination of wider US collateral spreads and tighter European liabilities, particularly for AAAs. The result has been a significant influx of US CLO issuance that complies with European risk retention rules, making it available to European CLO investors. After very limited issuance of CRD IV / CRR-compliant from US managers in 2013/14, the first six months of 2015 brought 16 such transactions totalling more than \$7bn in notional amount (listed in Figure 17).

FIGURE 17

USD-denominated 2015 CLOs that are believed to be CRD IV / CRR-compliant for risk retention

Transaction Name	CLO Manager	Size (\$mn)	Month Priced
Dorchester Park	GSO Capital/Blackstone	509.4	Jan-15
Clear Creek CLO	CreekSource	307.0	Feb-15
Flatiron CLO 2015-1	New York Life Investment Management	415.0	Feb-15
NewStar Commercial Loan Funding 2015-1	NewStar Financial	496.1	Mar-15
WhiteHorse X	HIG White Horse Capital	512.5	Mar-15
JFIN Revolver 2015-3	Jefferies Finance	440.0	Mar-15
Crown Point III CLO	Valcour Capital	416.0	Mar-15
JFIN CLO 2015	Jefferies Finance	512.6	Mar-15
OCP CLO 2015-8	Onex Credit Partners	764.0	Apr-15
Allegro CLO III	Axa Investment Management	414.0	May-15
Monroe Capital BSL CLO 2015-1	Monroe Capital Management	412.0	May-15
Garrison Funding 2015-1	Garrison Investment	413.7	May-15
OCP CLO 2015-9	Onex Credit Partners	757.1	Jun-15
Carlyle GSM Finance MM CLO 2015-1	Carlyle Inv Mgmt	398.9	Jun-15
ICG US CLO 2015-1	International Capital Group (ICG)	410.8	Jun-15
Ivy Hill Middle Market Credit Fund X	Ivy Hill Asset Management	384.78	Jun-15

Source: S&P LCD, Intex, Barclays Research

The combined effect: significantly greater manager choice for CLO investors

The net effect of more European debut CLO issuance and more CRR-compliant issuance from the US has been a fairly significant step change in the manager diversity available to European CLO investors. As Figure 18 shows, the number of 2.0 managers grew rapidly in 2013 (from a starting point of zero), but then plateaued in 2014 as most new CLO issuance repeatedly came from the same sources. Fortunately, the growth trend has returned in 2015, as the number of unique 2.0 managers (including CRR-compliant US managers) has risen from 28 at the start of the year to 45 at the mid-point. Assuming a fairly active second half calendar based on the known pipeline, it is likely that by year-end the figure will be over 50, meaning manager diversity for European CLO investors will have nearly doubled in just one year.

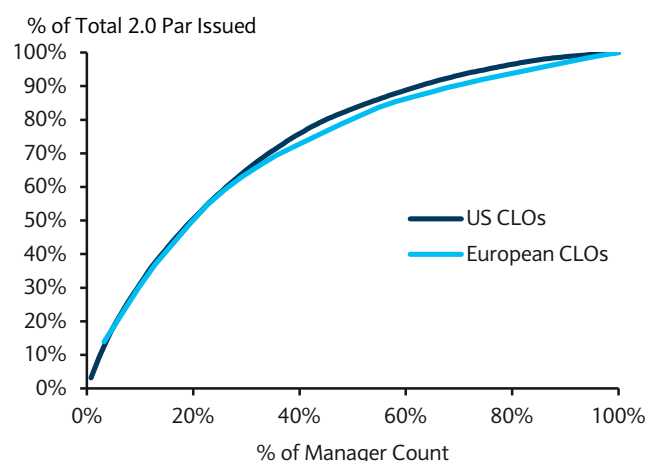
This growth in manager count has helped alleviate some of the well publicised concentration issues that have plagued the European 2.0 market during its early recovery years. While Europe's smaller size relative to the US will always mean that the top 5 or 10 European CLO issuers account for a greater share of the market, this is a somewhat misleading comparison. When we instead compare the share of par outstanding against % of manager count, the two markets show a nearly identical level of concentration (Figure 19). For example, the top 25% of managers by count (ie, the top 8 of 31 overall for European managers, or the top 33 of 130 in the US) account for approximately 59% of total CLO par outstanding in both markets. The takeaway is that, once adjusted for size, the European CLO market is not materially more concentrated than the US market, and with manager diversity continuing to grow thanks to improved access for debut issuers, the market appears poised to finally resume growth in total notional outstanding, nearly seven years after the 2008 financial crisis that initiated the contraction in the first place.

FIGURE 18
Total number of unique managers available to European CLO investors



Source: S&P LCD, Intex, Barclays Research

FIGURE 19
US & European CLO concentration metric: % of total 2.0 par versus % of 2.0 manager count



Source: S&P LCD, Intex, Barclays Research

FIGURE 20

European 2.0 CLOs outstanding by manager

Manager	# of 2.0 CLOs	Total 2.0 Notional (€mn)
GSO Capital/Blackstone	9	4,117
CELf Advisors	7	2,802
3i Debt Management	6	2,554
Alcentra	5	2,344
Pramerica	6	2,191
Avoca/KKR	5	2,174
International Capital Group (ICG)	4	1,753
Babson Capital	3	1,394
CVC Credit Partners	3	1,313
Apollo Credit Management	3	1,128
Cairn Capital	3	918
Oaktree Capital	2	750
Sankaty	2	725
CQS	2	724
CSAM	2	723
Pinebridge	2	670
Ares	2	662
Black Diamond Capital Management	1	420
Oak Hill Advisors	1	417
Partners Group	1	414
HayFin	1	395
AXA Investment Manages	1	362
Rothschild	1	359
Tikehau Capital Europe	1	355
Halcyon Loan Advisors	1	310
GLG Partners	1	309
Spire Partners	1	309
BNP Paribas Asset Management	1	309
Chenavari Credit Partners	1	308
NIBC Bank	1	306
GoldenTree	1	303
Commerzbank Debt Fund Management	1	233

Note: As of July 2015. Source: S&P LCD, Bloomberg, Barclays Research

FIGURE 21

Top 10 remaining CLO 1.0 managers by amount still outstanding

Manager	# of CLO 1.0s Still O/S	1.0 Notional O/S (€mn)	Original Notional O/S (€mn)
Alcentra	14	3,904	6,697
GSO Capital/Blackstone	14	3,124	7,681
3i Debt Management	11	2,536	5,365
Avoca Capital Holdings	10	2,223	4,529
CELf Advisors	7	1,487	3,370
Babson Capital	8	1,460	4,225
Intermediate Capital Managers Limited	10	1,437	4,572
IKB Deutsche Industriebank AG	5	1,436	2,340
Highland Capital Management	4	1,342	2,443
Taberna Capital Management	2	1,209	1,500

Note: As of July 2015. Source: Intex

CHAPTER 5

European CLO series: Part V – Performance

This is an edited version of an *article* that was previously published on 7 August 2015.

Like any form of securitisation, the returns realized by CLO investors are ultimately a function of collateral performance. In general, the performance of pre-crisis (1.0) CLOs has validated that the model works: credit performance has been very good, with all senior and most mezzanine tranches experiencing no loss of principal and full coupon payments to date. Cash distributions to equity holders have varied dramatically from deal to deal, underscoring the importance of manager selection. However, elevated loan default rates in Europe over the past seven years have taken a toll on lower-rated mezzanine and equity performance, and have also contributed to significant volatility in all tranche ratings and secondary trading levels. With loan defaults expected to be lower in future years, the performance outlook for post-crisis (2.0) European CLOs is improved.

In this chapter, we take a closer look at CLO securities from the investor's perspective. After analysing the performance of CLO debt and equity in terms of ratings, secondary trading levels, and the cash flows, we make the following observations:

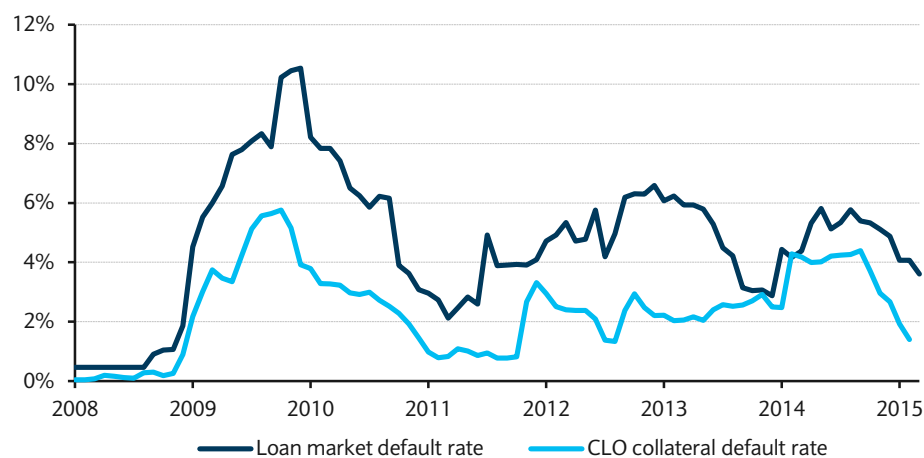
- CLO collateral has experienced a lower incidence of defaults and CCC downgrades than the overall leveraged loan and high yield bond markets, owing primarily to managers' credit selection skills and their flexibility to actively trade the collateral pool.
- Across the entire capital stack, CLOs have been one of the best performers among all securitized products globally; loss rates for rated tranches are much lower than, for example, most European CMBS, US RMBS, or structured credit (ex-CLO) asset classes.
- For 1.0 tranches originally rated AAA, AA, and A, realized credit performance (as measured by principal loss rates) has also been better than corporate bonds with the same rating; BBB par loss rates will be similar to corporates; 1.0 BB/B-rated tranches will likely underperform equivalent corporates in terms of eventual credit losses.
- Cumulative rating performance (net downgrades and upgrades) for 1.0 tranches originally rated AAA or AA has been better for CLOs than for other European ABS sectors; rating performance for A and lower-rated tranches has not. For all tranches, ratings volatility has been high owing to rating agency methodology changes post-crisis.
- Secondary prices and liquidity were severely impacted by the 2008 financial crisis, which caused a large supply overhang as many investors lost confidence in securitised products and liquidated their holdings. Prices have recovered and liquidity has slowly returned, delivering outsized gains to investors during the post-crisis period.
- Cash flow performance of equity tranches has varied tremendously from deal to deal; in aggregate it has clearly been impacted by higher-than-average loan default rates over the past seven years. With loan defaults now sub-2.5% and expected to remain around this level as European growth improves, 2.0 mezzanine and equity performance prospects are better.

Collateral performance

After remaining low during the early years of the CLO 1.0 era, European loans' 12-month rolling default rates increased dramatically in 2009 as a result of the financial crisis and global recession, exceeding 10% by the end of that year (Figure 1). Loan default rates naturally fell as the recovery gained strength in 2010, but have remained elevated relative to pre-crisis norms, staying in the 4-6% range for most of the past five years. Europe's austerity-driven "double-dip" recession pushed default rates back up in 2011/12, and the default of large issuer Vivarte created another spike in early 2014. While the outlook for defaults appears much more favourable going forward (see our [2015 Default Outlook](#) for details), the extended period of moderately high loan market defaults has impacted the performance of CLOs in various ways.

Given that CLOs constitute the majority of the European institutional leveraged loan market buyer base, it is not surprising that the CLO collateral default rates are highly correlated with the total market's performance (Figure 1). However, despite the directional similarity, European CLO collateral default rates have been consistently lower than the loan market overall. This reflects two factors, in our view. First, European CLO managers have been able to use their credit selection skills to outperform the market. Second, European CLO managers tend to sell underperforming loans if the issuer begins to encounter significant financial stress; after the sale, the underperforming or defaulted loan remains part of the market, but not of the aggregate European CLO collateral.

FIGURE 1
European loan market and CLO collateral 12-months default rate (2004-07 CLO vintages)



Note: CLO collateral defaults reflect weighted average default rate of approximately 160 transactions rated by S&P from the 2004-07 vintages.

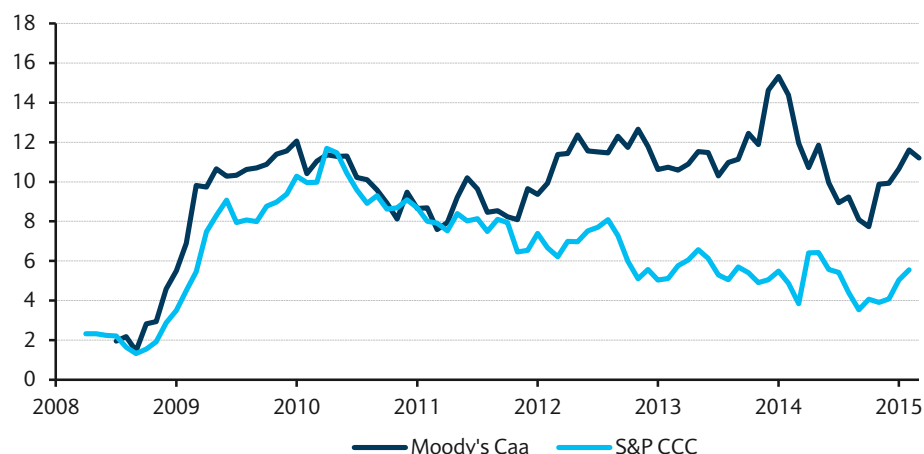
Source: S&P LCD European Leveraged Loan Index, S&P Ratings, Barclays Research

Another performance indicator for CLOs is the total size of CCC/Caa buckets – rating agencies usually refer to the CCC/Caa rating as the lowest rating for non-defaulted assets, making these buckets a good proxy for perceived near-term default risk. In CLOs, the percentage of CCC/Caa-rated assets forms part of the portfolio profile tests – in European CLO 2.0, the maximum level of these assets is usually set at 7.5% and, if breached, collateral managers can only add loans or bonds on a “maintain or improve” basis relative to portfolio limits (see Chapter 2 for more details regarding collateral limits).

By this measure, in line with default rates, the performance of European CLO collateral pools worsened until end-2009 when the CCC/Caa bucket reached 12%, followed by a recovery through to early-2011. Since March 2011, Moody's and S&P report somewhat divergent performance trends. While the S&P index shows a gradually improving performance until recently, the Moody's measure actually increased and reached an all-time high (14.5%) in

December 2013, before dropping sharply until September 2014 (Figure 2). The divergence is likely owing to a combination of two reasons. First, the two rating agencies do not rate exactly the same CLOs. Secondly, different rating agencies might assess the same CLO's underlying assets differently, resulting in split-rated collateral that falls into one agency's CCC bucket but not the other's.

FIGURE 2
European CLO CCC/Caa bucket (%)

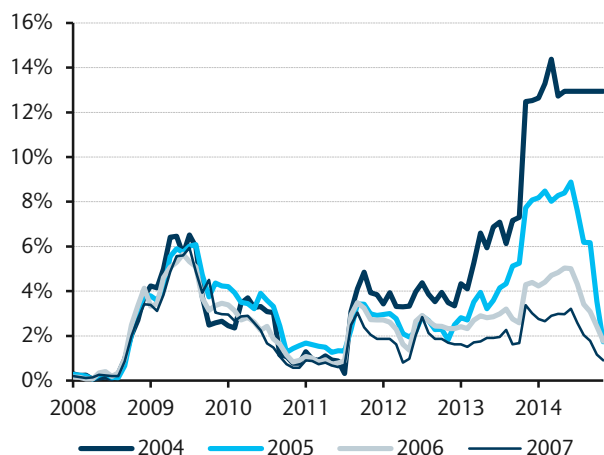


Source: Moody's, S&P, Barclays Research

By vintage, European CLO default rates (Figure 3) and CCC percentages (Figure 4) were highly correlated until late-2010, in part reflecting the large obligor overlap in European CLO collateral pools. Since then, later CLO vintages have shown better collateral performance in terms of both defaults and CCC percentages, which can be explained by the typical pattern of portfolio repayments after CLOs enter their amortisation period. Better assets will typically be refinanced more quickly, while loans from more challenged credits tend to linger (the so called “credit burnout” effect). Over time, this dynamic will mechanically increase the percentage of poorer-performing loans and bonds in the remaining portfolio for older deals, even if collateral quality was comparable at the end of reinvestment.

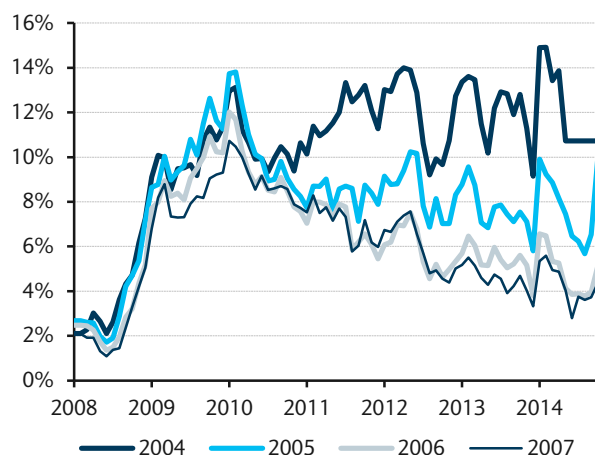
However, these aggregate performance indicators for European CLO collateral mask a substantial difference between transactions. Illustrated by collateral default rates in the 2007 vintage, CLO collateral managers as a whole outperformed the European institutional

FIGURE 3
European CLO collateral 12-month default rates by vintage



Source: S&P

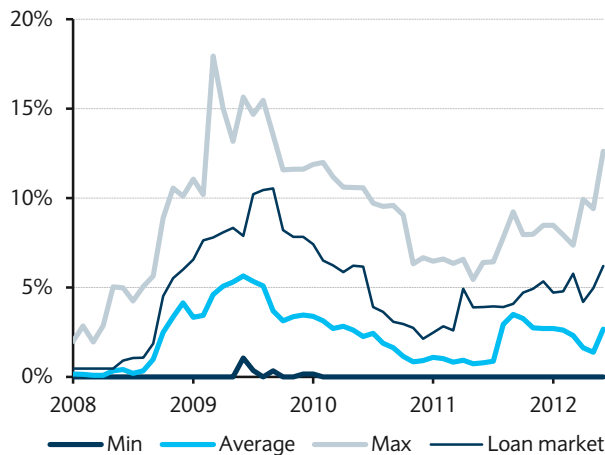
FIGURE 4
European CLO collateral rated CCC by vintage



Source: S&P

FIGURE 5

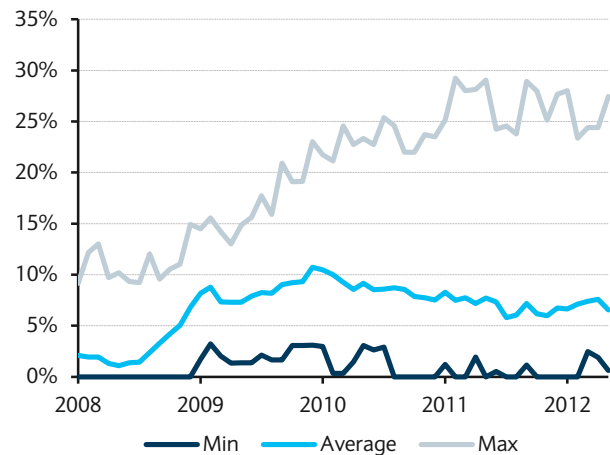
European CLO collateral defaults: 2007 vintage



Source: S&P LCD ELLI, S&P Ratings

FIGURE 6

European CLO CCC bucket: 2007 vintage



Source: S&P

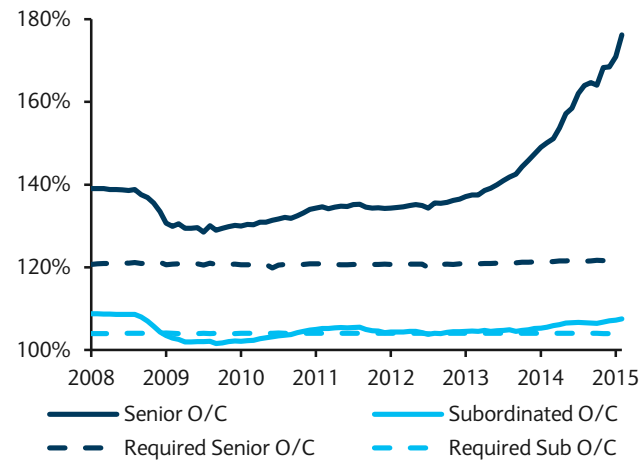
leveraged loan market, but while the best-performing CLOs did not have any defaults, the worst-performing transactions consistently underperformed the market (Figure 5). Similarly, the best-performing CLOs had less than 5% CCC-rated assets in 2008 to 2012 while in the worst-performing transactions nearly one third of the collateral was in the CCC bucket (Figure 6). This wide range of outcomes in individual portfolios underscores the importance of manager selection, and also helps debunk the notion that the smaller size of Europe's leveraged loan market results in all CLOs holding very similar pools of assets.

O/C and I/C test performance

When combined with falling loan market values, collateral defaults and CCC downgrades will result in declining CLO over-collateralisation (O/C) levels. This was the outcome in 2009 for the European CLO market, as senior and subordinate (junior) O/C fell significantly in the wake of the financial crisis (Figure 7). Since that time, O/C levels have been increasing from their 2009 lows in line with the broader market recovery. This trend was interrupted during H2 11 and H1 12 amid increasing default rates and falling loan prices as the European sovereign crisis escalated, but resumed in early 2013 when more European CLO 1.0s exited their reinvestment period. The start of amortisation results in gradual deleveraging and increased O/C levels, especially at the senior end of the capital structure owing to sequential principal repayment. We expect the aggregate O/C levels of European CLO 1.0s to increase further now that all such deals have exited reinvestment.

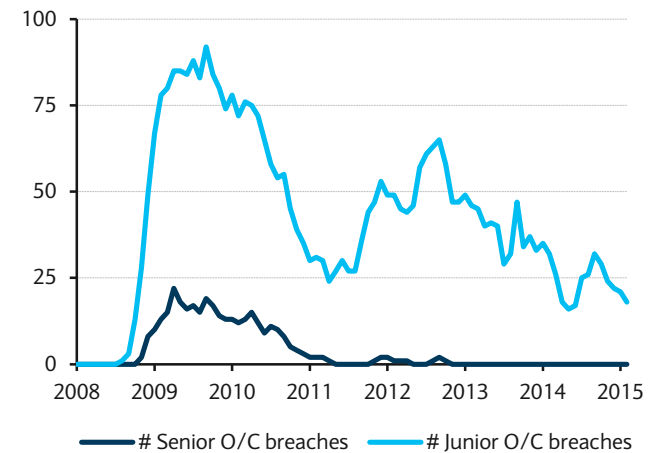
Reduced O/C levels can affect CLO interest and principal cash flows if they fall below certain minimum levels defined in the CLO documentation (see Chapter 1 for details regarding the CLO cash flow waterfall). In 2009 and 2010, the average junior O/C levels dropped below the average junior O/C trigger level of 104%, with nearly 100 of the 160 transactions (58%) rated by S&P breaching their minimum junior O/C threshold (Figure 8). While dropping considerably, average senior O/C levels remained well above the average senior O/C trigger level, although some underperforming CLOs also breached their senior O/C. Reflecting the recovering O/C levels during the post-crisis period, the number of transactions in breach of their triggers declined sharply starting in 2010, and despite rising again in 2011/12, the total amount is now quite low. However, as we illustrate later, the fact that 25% or more of the market was in breach in 43 separate months had a significant impact on equity cash flows, many of which were diverted to pay down senior liabilities in order to cure these test breaches.

FIGURE 7
European CLO average O/C levels (vintages 2004-07)



Source: S&P, Barclays Research

FIGURE 8
O/C test breaches (by number of deals, vintages 2004-07)



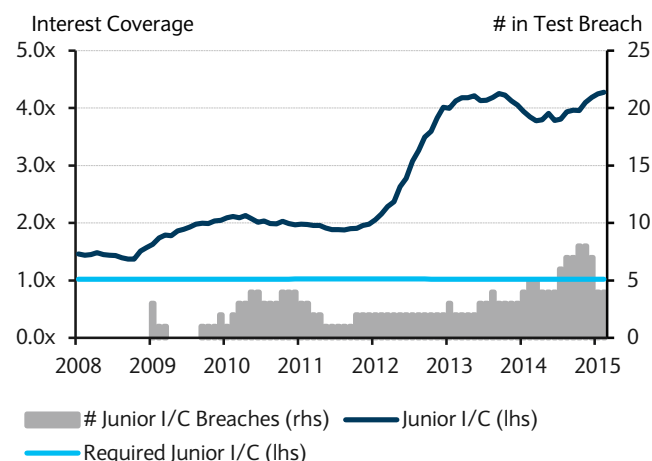
Source: S&P, Barclays Research

As we outlined in the first part of our European CLO series, another test that determines the allocation of CLO cash flows is based on interest coverage (I/C). As a result of declining short-term interest rates (and thus declining liability coupons for 1.0 transactions) senior and junior I/C levels have been increasing over time and, on average, have been well above the minimum threshold levels (Figure 9). Only recently have a handful of 2004 and 2005 vintage transactions breached their junior I/C minimum threshold, owing to credit burnout and sequential principal amortisation that led to increasing weighted average cost of debt.

The breach of junior O/C triggers typically results in interest due on junior notes being diverted to amortise senior notes (the same is true for mezzanine notes in cases where mezzanine O/C tests fail). As a consequence, it is not surprising that the number of CLOs showing partial amortisation of their senior notes despite still being in their reinvestment period is highly correlated with the number of transactions in breach of their junior O/C trigger. We estimate that in late-2009/early-2010, nearly 80 European CLO transactions which were still in their reinvestment period returned principal to investors (Figure 10).

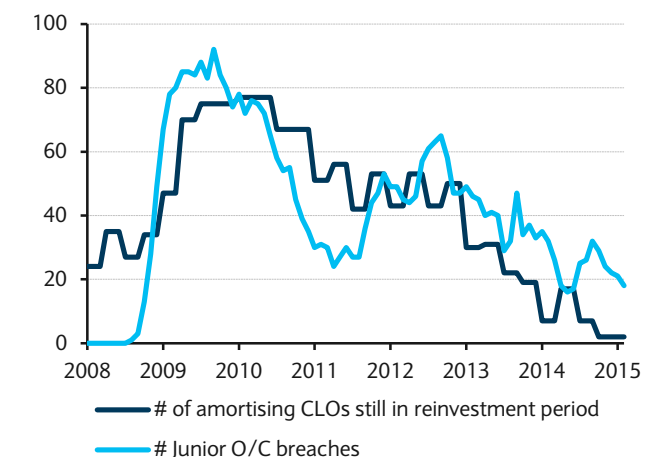
Aggregate data clearly show that the European CLO 1.0 market weathered the loan market downturns of 2008/09 and 2011/12 reasonably well. On average, collateral managers

FIGURE 9
European CLO average junior I/C levels (2004-07 vintages)



Source: S&P, Barclays Research

FIGURE 10
Junior O/C trigger breaches and amortising CLOs



Source: S&P, Bloomberg, Barclays Research

outperformed the broader loan market, although obligor overlap did result in a generally high correlation of CLO performance statistics. At the same time, there were outliers within the CLO sector with some transactions significantly out- or under-performing the market average. In our view, European CLO structures have worked as intended, giving collateral managers enough flexibility to manage their portfolios through the twin downturns. In addition, O/C triggers safeguarded senior bondholders, with interest due on junior or mezzanine notes being diverted as principal payment for senior notes. During the 2013-15 European loan market recovery, most of CLO O/C levels have increased significantly, and trigger breaches have been cured. As a result, only one European CLO 1.0 has suffered a principal loss to date, as we discuss in more detail in the following section.

European CLO rating performance

In rating agencies' regularly published default and rating transition statistics, European CLOs are often combined with US CLO (forming the global CLO sector), or combined with collateralised debt obligations (CDOs, including CDO of ABS), forming the structured credit sector. However, on an ad-hoc basis, rating agencies provide some data on European CLOs only; we base most of our analysis on Moody's performance data, which only covers transactions that Moody's has rated.

When comparing the current rating of a CLO bond (or the last rating at the time of withdrawal in the case of redemption or write-off) with the bond's original rating, European CLO ratings prove to have been relatively stable across time on a net basis (Figure 11). At 82.2%, the cumulative stability of European CLO Aaa ratings is higher than for European structured finance as a whole (67%), and higher than individual European securitisation asset classes like ABS (75%), RMBS (73%) and CMBS (56%). One reason for the higher stability compared with ABS and RMBS is that the European CLO sector has not been affected by sovereign-related rating caps, thanks in part to collateral limits on peripheral debt.

FIGURE 11
EMEA CLO cumulative rating transitions by original rating (as of December 2013)

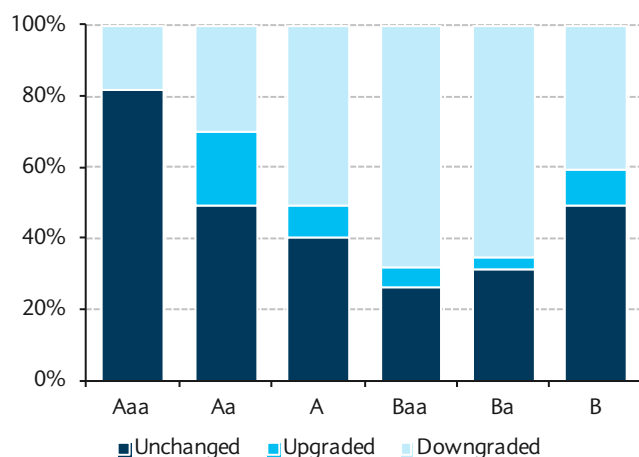
Initial rating	New Rating						
	Aaa	Aa	A	Baa	Ba	B	Caa-C
Aaa	82.2%	16.9%	0.7%	0.2%			
Aa	20.3%	49.6%	26.0%	3.7%	0.4%		
A	2.4%	5.2%	40.7%	37.5%	11.7%	1.2%	1.2%
Baa	0.6%	0.3%	4.0%	26.9%	48.3%	13.8%	6.1%
Ba				1.5%	32.8%	40.5%	24.1%
B					8.3%	50.0%	41.7%

Source: Moody's Investors Service

However, the comparably higher rating stability of European CLO has been limited to the senior part of the capital structure (initially rated Aaa or Aa). The rating of 70% of the bonds initially rated Aa by Moody's is either unchanged or higher, a better rating performance than European securitisation as a whole; in particular, the portion of upgrades has been higher than for European ABS, RMBS, and CMBS. In contrast, the ratings of European CLO bonds rated single-A or below have been relatively less stable compared with the overall market (see Figures 12 and 13 for a comparison of CLOs versus ABS by original rating).

FIGURE 12

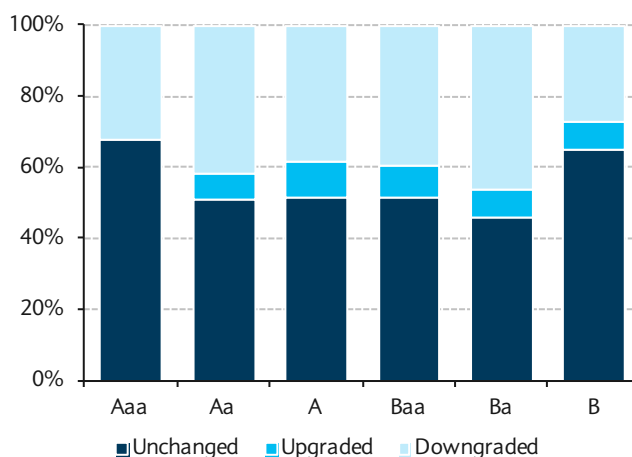
European CLO cumulative upgrade and downgrade rates



Note: as per December 2013. Source: Moody's

FIGURE 13

European ABS cumulative upgrade and downgrade rates



Note: as per December 2013. Source: Moody's

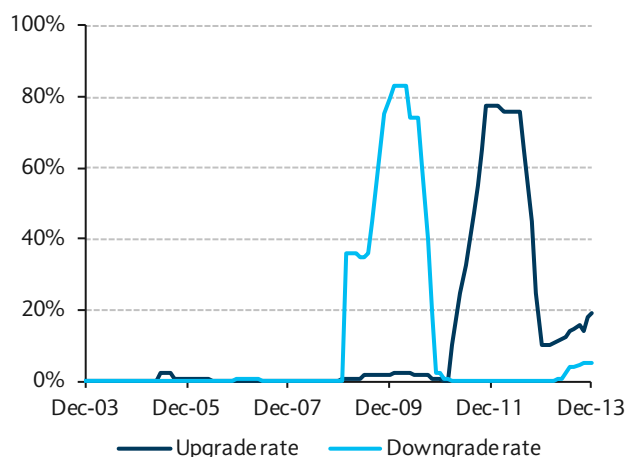
However, perhaps more importantly for investors, the cumulative European CLO rating stability masks significant rating volatility during the interim period. The sector experienced a large number of downgrades in 2009 and 2010, such that Moody's 12-month rolling downgrade rate reached 80% at the beginning of 2010 (Figure 14), far higher than for the European securitisation market as a whole and higher than for any other individual sector. On average, Moody's downgraded European CLO tranches by 3-5 notches at that time, which was substantially less than for European CDOs, a sector with similar downgrade rates but an average magnitude of 8-9 notches. The negative European CLO rating actions were not limited to mezzanine and junior bonds of the sector; while downgrades started later, Moody's 12-month rolling downgrade rate for Aaa-rated bonds was above 50% at its peak, higher than the downgrade rate for Baa-rated bonds (Figure 15).

Rating agency methodology changes

The heavy downgrade actions were partially a result of adverse collateral performance following the 2008 financial crisis and subsequent global recession (see the collateral performance section above for more details). To a greater extent, however, the downgrade actions were driven by rating agency methodology changes. In March 2009, Moody's

FIGURE 14

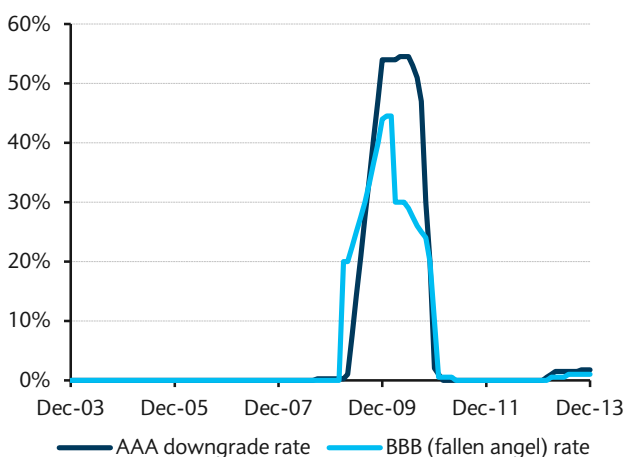
European CLO upgrade and downgrade rates



Source: Moody's

FIGURE 15

European CLO AAA and BBB (fallen angel) downgrade rates



Source: Moody's

announced that it would use a lower corporate rating for securitised loans subject to corporate rating review / negative outlook and generally increased its default probability assumption for securitised loans by 30%, to “reflect the significantly elevated corporate default rate expectations stemming from the global recession and tightened credit conditions”. In addition, the rating agency “updated its calculation of the diversity score in response to the increasing complexity and interdependence of the global credit markets”²⁶. In other words, the changed assumptions aimed to pre-empt potential corporate bond rating downward trends and to increase the portfolio correlation assumptions.

S&P enacted similar a methodology change later that year; in September 2009 the rating agency updated its assumptions for corporate cash flow CDOs²⁷ which included the recalibration of its default model to harsher macroeconomic scenarios and higher correlation assumptions. This resulted in a substantial number of downgrades; for example, between January 2009 and December 2012 S&P downgraded 75% of all AAA-rated European CLO bonds to AA or A.

Fitch changed its CLO rating methodology in April 2008, incorporating higher asset default probabilities and correlation assumptions. Combined with increasing default rates, negative rating migration in the European leveraged loan market, and falling over-collateralisation levels amid lower loan market values and valuation haircuts²⁸, the methodology change resulted in many downgrades starting in early 2009. Fitch rating actions were concentrated on junior and mezzanine bonds: for example, approximately 60-65% of all AA, A and BBB-rated bonds were downgraded, and 97% of all BB-rated bonds were downgraded. Meanwhile, only 20% of all AAA-rated senior bonds were affected.

The agencies reverse course

The period of substantial negative rating activity in 2009/10 was followed by a large number of upgrades starting in mid-2011. In Moody's case, nearly 80% of all European CLO tranches were upgraded in 2011/12 (Figure 14). Very often, and in particular for senior tranches, the rating action reversal was to ratings at the same level or even better than the original rating, resulting in the cumulative ratings stability previously discussed. Junior and mezzanine classes also experienced a positive rating trend in 2011/12, but the upgrades were often not all the way back to the initial rating level. In relation to Moody's ratings, the upgrades starting in mid-2011 were mainly the result of removing the 30% default probability stress for the underlying loans introduced in 2009²⁹.

Unlike Moody's, S&P did not formally reverse its 2009 European CLO methodology change, but it did begin upgrading CLO classes in 2012 amid improved collateral performance, deleveraging and increased excess spread. Likewise, Fitch eventually reversed many of the negative rating actions that were taken in 2009 and 2010.

The combination of comparative stability in cumulative rating transitions and the extreme interim ratings volatility suggests that rating agencies may have overreacted to the 2008/09 financial crisis and recession. In particular, the agencies appear to have overestimated the effects of the recession on European CLO collateral performance, causing methodology changes and downgrades that would shortly thereafter be reversed. The net result is that most of the “economic stress” factors have been removed, but ratings criteria do remain somewhat more stringent in the 2.0 era relative to 1.0 standards, as agencies apply their “lessons learned.” This is most visible when comparing the capital structures of newly issued CLO 2.0s against their 1.0 era predecessors (see Chapter 1 for a detailed comparison of 1.0 and 2.0 structures).

²⁶ “Moody's updates key assumptions for rating CLOs”, Moody's, 4 February 2009

²⁷ “Update to Global Methodologies and Assumptions for Corporate cash flow and synthetic CDOs”, S&P, 17 September 2009

²⁸ “Fitch places 112 European CLO Tranches on Rating Watch Negative”, Fitch, 26 August 2009

²⁹ “Moody's finalises CLO rating methodology update and expects upgrades”, Moody's, 22 June 2011

European CLO bond defaults and principal losses

Ultimately, the performance of European CLO debt securities will be measured by bond default rates and principal losses. Such an outcome could take several forms, including: failure to pay interest on senior bonds at any time; failure to repay principal to any rated tranche when due at bond maturity; and senior over-collateralisation level falling below a certain threshold (usually 100-105%).

Historical loss rates

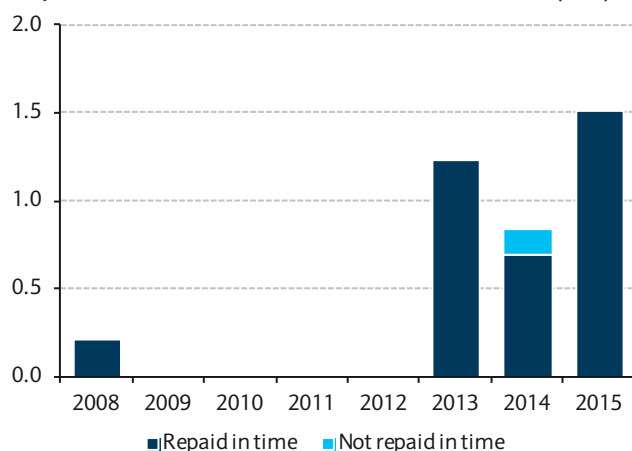
To our knowledge, no European CLO senior bond (defined for this purpose as AAA-rated class A and AA-rated class B bonds) has suffered an interest default or principal loss to date. In fact, the only European CLO that has so far failed to repay principal in full to all rated tranches at bond maturity was Harbourmaster CLO 3 (2002 vintage) in July 2014. At maturity, the collateral backing Harbourmaster CLO 3 was sold, but sales proceeds were less than the total outstanding debt amount. Class A noteholders were repaid in full, class B (initially rated single-A) received 52% of its outstanding principal amount, while Class C (initially rated BBB) and the subordinated class D (equity) were written off in full. The aggregate €21mn principal loss on classes B and C were the only losses realised to date for any European CLO 1.0 debt tranches, amounting to a realized principal loss rate of 0.04% of the total European CLO 1.0 debt ever issued. According to Fitch, the adverse performance at the end of the transaction life was a result of the “amend-and-extend” activity, which resulted in several assets having maturities after the CLO’s bond maturity date. We note that in European CLO 2.0 asset extensions to a date after bond maturity are typically not allowed, which should further reduce the risk of principal losses on CLO bonds at maturity.

Given our expectation that defaults in the European leveraged loan market should be lower over the next several years than the 2009-14 period, we think that the likelihood of failure to pay CLO senior bond interest continues to be very low. As such, principal losses on rated tranches (if any) will likely only occur on or after bond maturity. In this respect, the €3.8bn in par amount from European CLO 1.0 bond maturities that have already passed as of mid-2015 has shown a very good performance, with nearly every bond being repaid in full (Figure 16) – most often some time before bond maturity.

Most of the approximately €115bn of European CLO 1.0 that was ever issued has not passed its bond maturity date. However, as mentioned in Chapter 4 above, all outstanding European CLO 1.0 transactions are now in the amortisation phase, resulting in relatively high redemption rates. Currently, there is approximately €37.5bn CLO 1.0 outstanding, most of which matures in 2022 and beyond, depending on the length of amortisation periods (Figure 17).

FIGURE 16

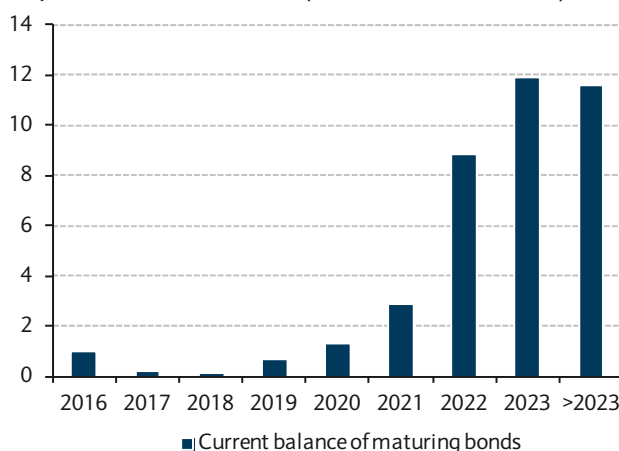
European CLO 1.0 bond maturities before mid-2015 (€bn)



Note: initial balance. Source: Bloomberg, Barclays Research

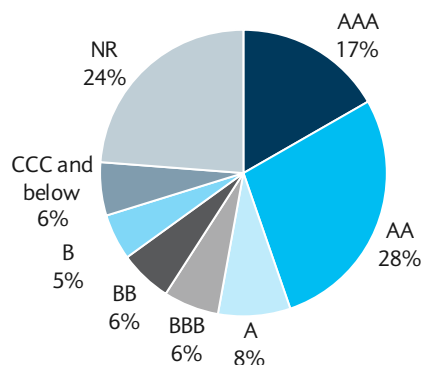
FIGURE 17

European CLO 1.0 maturities (current balance in €bn)



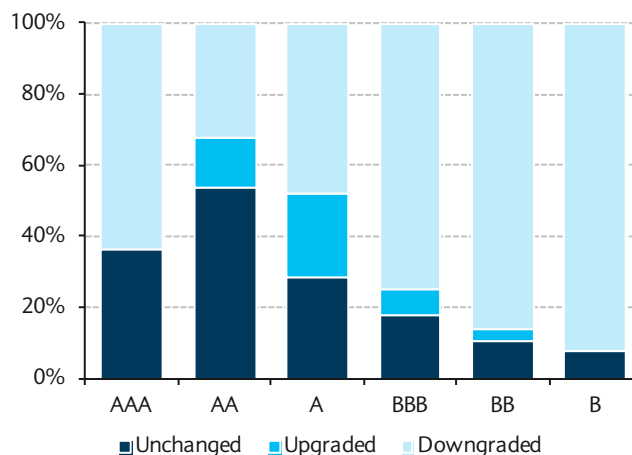
Source: Bloomberg, Barclays Research

FIGURE 18
European CLO 1.0 – rating distribution (lowest rating)



Source: Bloomberg, Barclays Research

FIGURE 19
European CLO 1.0 – rating performance (by initial rating)



Source: Bloomberg, Barclays Research

Signals from the rating agencies

Of the remaining European CLO 1.0 par amount outstanding, approximately 60% is rated investment grade, 17% carries a sub-IG rating (BB thru C), and slightly less than a quarter of the outstanding amount is unrated CLO equity (Figure 18). The larger proportion of sub-IG bonds and equity outstanding reflects the deleveraging that occurs during the amortisation phase, during which debt is paid down in order of seniority. Importantly, approximately 6% of the current outstanding 1.0 par amount is now rated CCC or below. As we noted in Chapter 1 (Structures), most 1.0 CLOs did not originally have a single-B rated tranche, meaning that tranches now rated CCC or lower have experienced multiple-notch net downgrades relative to their original rating, despite the general recovery in loan prices and the partial reversal of rating agency methodology changes. This is a strong signal that at least one rating agency assesses a high risk of principal losses in the future, suggesting that CLO 1.0 loss rates will rise going forward as more of these bonds approach maturity.

Measured by rating performance, the pre-crisis European CLO's classes that are still outstanding have underperformed the overall market; this is evident when figure 19 is compared with the previously discussed Figure 12. The ratings underperformance of bonds still outstanding is especially apparent at the junior part of the capital structure. This is not surprising, in our view, as we would have expected the transactions with the best-performing collateral to be repaid first, as faster collateral amortisation typically triggers an earlier redemption or a refinancing transaction into a new CLO.

Future loss potential for rated 1.0 tranches

To assess the potential magnitude of future CLO tranche defaults and the ultimate credit performance of pre-crisis European CLOs, we assume that all currently outstanding bonds which are rated CCC or lower by at least one rating agency will become impaired. This is likely to ultimately prove to be a conservative assumption, as cumulative 7y historical default rates for CCC-rated assets, while high, are lower than 100%. Under this assumption, approximately €1.4bn in outstanding par amount from 112 tranches of rated pre-crisis European CLO debt (ie, equity excluded) could ultimately experience principal losses. By par amount, this represents 1.25% of all rated debt issued; by number of tranches the percentage is 6.4%, reflecting the relative smaller size of non-senior bonds that are more likely to default. Notably, no rating agency currently expects any bond that was originally rated AAA or AA to default, and only one initially A-rated bond is now rated CCC or below.

In Figure 20, we compare the estimated default rate of all pre-crisis European CLOs with Moody's corporate bond default statistics, using the long-term default rate of corporate bonds after seven years (the approximate weighted average life of a CLO) as a benchmark. We conclude from this comparison that for the AAA through A rated part of the CLO capital structure, credit performance for CLO bonds is likely to ultimately be better than comparably rated corporates, while loss rates for BBBs likely to be in line with corporates on a par-weighted basis. Clearly, bonds in the investment grade portion of the CLO 1.0 capital structure benefitted during the downturn from the structural protection (triggers, junior bond interest diversion, sequential pay-down, etc.) inherent in the CLO construct.

However, unlike their IG-rated counterparts, European CLO 1.0 bonds originally rated BB or lower will likely underperform equivalently rated corporates in terms of default rates. Due to their lower levels of overcollateralization, sub-IG mezzanine tranches have a much smaller cushion against credit losses in the collateral pool. This comparative lack of protection has had consequences due to the protracted period of elevated loan defaults that has accompanied Europe's double-dip recession and tepid recovery over the past seven years. Rating agencies have responded to this outcome by reassessing their rating methodology for the sub-IG portion of the CLO capital structure. As a result, CLO 2.0s tend to have lower overall leverage and greater structural subordination at each rating tier relative to 1.0 CLOs. These structural changes, combined with our expectation that loan defaults should be lower on average going forward, suggest that the eventual loss rates on sub-IG rated 2.0 bonds should be lower than what their 1.0 predecessors will ultimately experience.

FIGURE 20

European CLO 1.0 estimated default rate by rating

Initial CLO rating	Estimated cumulative default rate by bond count	Estimated cumulative default rate by amount issued	Moody's long-term corporate bond 7-year default rate (1920-2014)
AAA	0.0%	0.0%	0.4%
AA	0.3%	0.4%	1.5%
A	1.0%	0.3%	2.2%
BBB	7.2%	4.5%	4.3%
BB	27.3%	24.8%	13.0%
B	71.4%	83.2%	26.8%

Source: Bloomberg, Moody's, S&P, Fitch Barclays Research

European CLO secondary market performance

Until mid-2007, the European CLO market was characterised by stable to gradually declining new issue spreads. For example, AAA spreads averaged 29bp in 2005 and then tightened to 25bp in 2006 and H1 07. Over the same time period, the spreads of BBB-rated bonds were stable at approximately 160bp. As a result of this spread stability, CLO bond prices in the secondary market typically oscillated around their issue price, which was most often par.

The financial crisis and market technicals

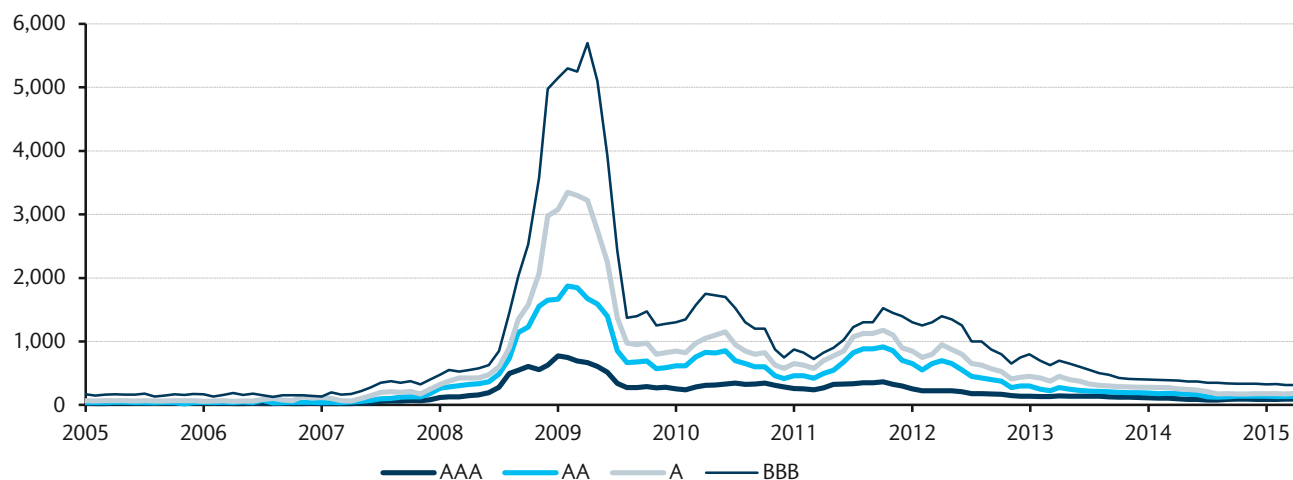
In mid-2007, as the cracks that would ultimately culminate in the 2008 global financial crisis began to appear, global securitisation spreads started to widen as an indirect result of weakness in the US housing market. In July and August 2007, several funds investing in US subprime MBS collapsed or halted redemptions amid difficulties to assess value for the investments, given the decline in the buyer base. Shortly thereafter, off balance sheet structured investment vehicles (SIVs), which relied on the issuance of short-dated commercial paper to fund the purchase of longer-dated ABS assets, started to have difficulties rolling over their short-term debt amid increased risk aversion and uncertainty regarding portfolio valuations. As a consequence of these funding difficulties, sponsors (mostly banks) elected to take most of the \$400bn SIV market onto their balance sheets.

The events of mid-2007 caused significant negative market technicals due to the expectation that banks that took on SIV assets and other leveraged investors would have strong incentives to sell their ABS holdings. This threat of price-insensitive selling, along with reduced confidence in the credit quality of securitised assets in general, caused buyers to step away, resulting in spread widening and a cessation of new issuance. The large losses on securitisation holdings of banks and other market participants (monoline insurers, for example) and the lack of transparency about those holdings caused a confidence crisis in the global banking system. Ultimately, this resulted in a number of bank bailouts and the failure of Lehman Brothers in September 2008, which turned what was to that point a mild US-led recession into the worst global economic downturn in more than 70 years.

During this period, investors also increasingly had to consider the risk of rating downgrades, which started in H1 07 in US subprime MBS but affected other sectors throughout the crisis as well, including European CLOs as described above. Rating downgrades can cause additional pressure on market technicals, particularly for securitised products which have buyers that, for regulatory reasons, are often more ratings-sensitive than price-sensitive. During the crisis period, uncertainty about future downgrades and rating agency methodology changes added to the downward pressure on CLO bond prices.

While European CLOs were obviously not near the heart of the financial crisis, secondary trading levels were severely impacted in 2008 and early 2009 by these negative market technicals and the general loss of confidence in securitisation. As a result, CLO valuations declined in tandem with other global ABS markets; valuations reached their bottom and spreads their peak in early 2009 (Figures 21 and 22). The price recovery that started in H2 09 was subsequently interrupted twice: first in mid-2010, and then again in H2 11 / H1 12 due to the escalation of the European sovereign crisis. Only after Mario Draghi's "whatever it takes" declaration in June 2012 have CLOs (along with most risk assets) been able to stage a durable recovery.

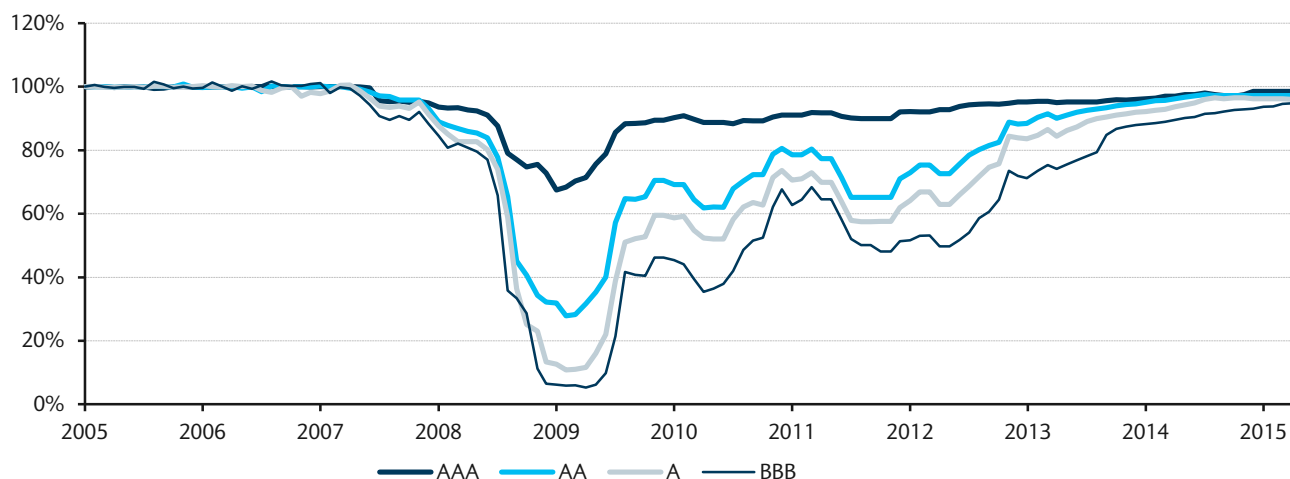
FIGURE 21
European CLO 1.0 spreads by initial rating (bp)



Source: Bloomberg, LCD S&P, Barclays Research

FIGURE 22

European CLO 1.0 secondary market prices by initial rating (% of par)



Source: Bloomberg, LCD S&P, Barclays Research

As a result of these technical pressures on securitisation markets, the spread widening of European CLO tranches occurred several months before a visible worsening of collateral portfolio performance. In fact, to some extent the causation ran in the opposite direction, in that the performance of European institutional leveraged loans was negatively impacted by the freezing of CLO new issuance, which raised concerns about loan issuers' ability to refinance when maturities came due. Ultimately, driven by securitisation market technicals, European CLO spreads peaked before collateral performance indicators (default rates, % of assets rated CCC) reached their highs in late 2009 / early 2010 (Figure 23).

The relationship to collateral prices

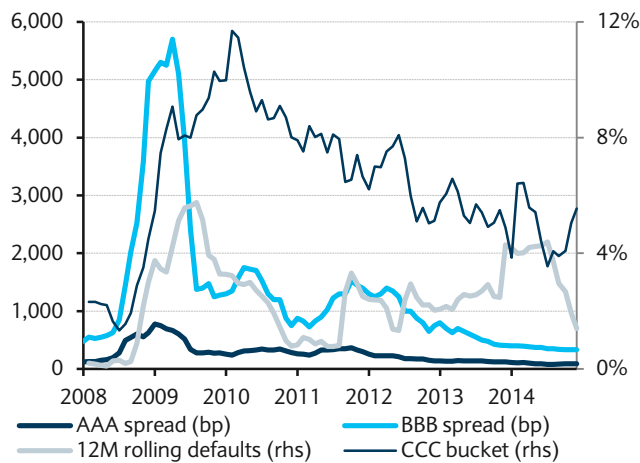
Relative to most other securitisation asset classes, CLO collateral has very transparent price discovery. Unlike (for example) commercial mortgages or credit card balances, leveraged loans and high yield bonds are financial instruments that are traded individually. As a result, CLO 1.0 bond prices do tend to closely track leveraged loan pricing, but with a higher "beta" than would be implied by CLO structures. As Figure 24 shows, the path of leveraged loan prices over the past 10 years has been broadly similar to AAA-rated CLO 1.0 bond prices. Considering the massive credit enhancement supporting CLO AAAs, one might expect their prices to be less volatile than the underlying collateral. The fact that the price decline of senior CLO bonds nearly matched the price decline of leveraged loans in 2009 is illustrative of the power of the negative market technicals impacting securitisation markets at that time.

As securitisation markets have recovered, however, senior European CLO 1.0 prices have gradually become less volatile than leveraged loan valuations. Therefore, we continue to be surprised that under Solvency 2, insurers will incur 4x higher capital charges for AAA-rated CLOs than for unrated loans, and twice as high than for sub-investment grade rated loans (see Chapter 3 for details regarding the impact of regulation on various CLO investor types). Solvency 2 is a value-at-risk model that was calibrated using historical market data according to EIOPA³⁰, but our analysis of post-crisis history suggests that European CLO senior classes should attract a lower capital charge than the underlying loans.

³⁰ European Insurance and Occupational Pensions Authority

FIGURE 23

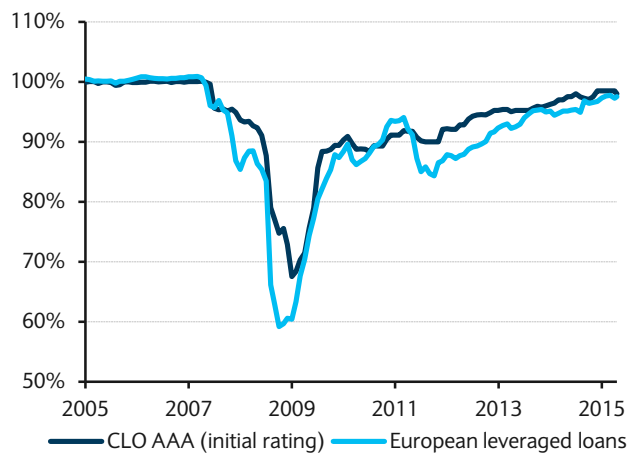
European CLO pricing versus collateral performance



Source: S&P, Barclays Research

FIGURE 24

European CLO senior classes vs leveraged loans (% of par)



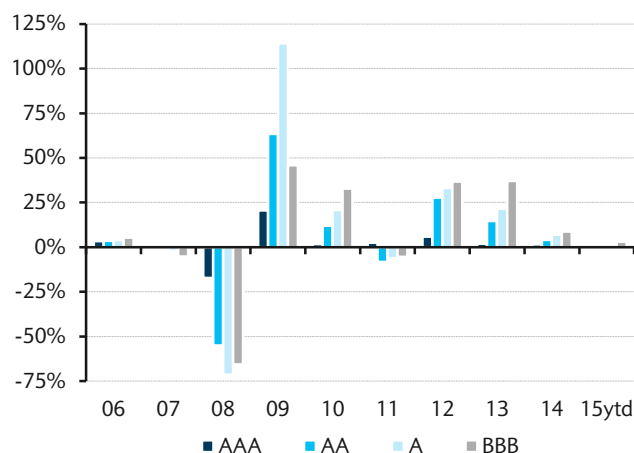
Source: Bloomberg, S&P LCD ELLI, Barclays Research

Returns performance

Not surprisingly, CLO price volatility during the financial crisis and the subsequent years has outweighed coupon payments and dominated the sector's returns performance. Total returns for all original rating tiers were negative in 2008, and negative for all except AAAs in 2011 (Figure 25). During the years of price recovery (2009, 2010, 2012 and 2013) CLO bonds offered outsized returns, with BBBs returning more than 25% in each of those four years, and A-rated tranche returns exceeding 100% in 2009. After a seven year period of oscillation between crisis and recovery, CLO prices and returns finally entered a normalised path in 2014 and have continued to follow it in 2015. After the financial crisis, initially AAA-rated senior bonds recovered the fastest, achieving a positive cumulative total return from the start of 2005 in September 2009. Further down the CLO capital structure, the price recovery took a bit longer; cumulative returns since 2005 turned positive for AA through BBB-rated bonds in a short span of time during the sharp rally of late 2012 (Figure 26). Today, cumulative 10y returns are ordered inversely by quality, although on a risk-adjusted basis AAAs have arguably been the top performer.

FIGURE 25

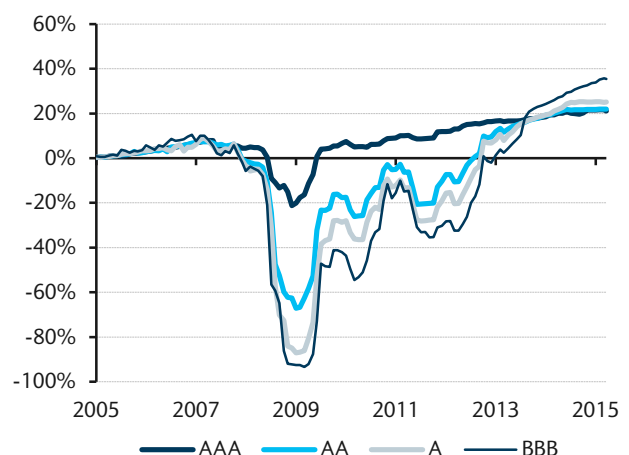
European annual total returns (by initial rating)



Source: LCD S&P, Barclays Research

FIGURE 26

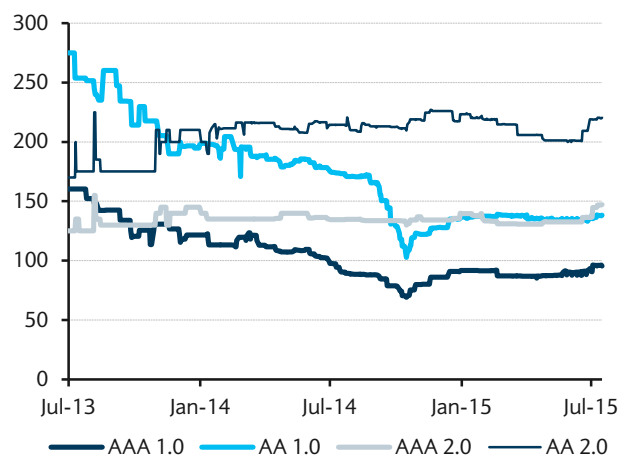
European CLO 1.0 cumulative total return (by initial rating)



Source: LCD S&P, Barclays Research

FIGURE 27

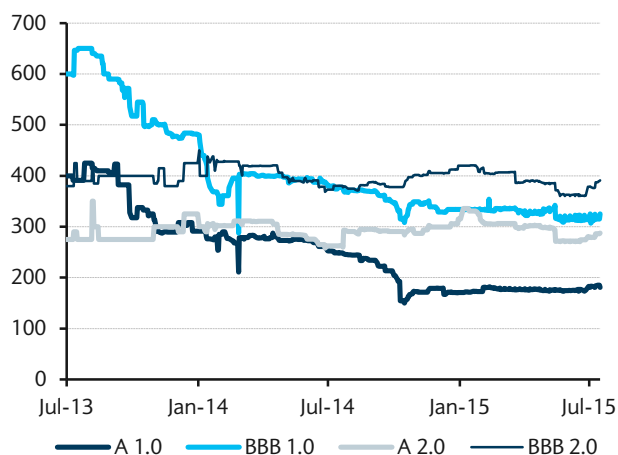
European CLO 1.0 versus 2.0 pricing (spread in bp)



Source: LCD S&P, Markit, Barclays Research

FIGURE 28

European CLO 1.0 versus 2.0 pricing (spread in bp)



Source: LCD S&P, Markit, Barclays Research

1.0 versus 2.0 spreads

As Figures 27 (AAA & AA) and 28 (A & BBB) show, European CLO 1.0 bonds experienced spread tightening in 2013 and most of 2014 amidst a generally positive credit market sentiment and the ECB announcing its ABS purchase programme (ABSPP). While the ECB does not target CLOs in its ABSPP, the programme reinforced the already strong supply-demand imbalance in €denominated ABS, which in turn created higher demand for non-ABSPP sectors including European CLOs. However, since the actual start of ABSPP, European CLO 1.0 spreads have largely moved sideways, as the ECB has been less determined than expected in its ABS purchase programme.

European CLO issuance first restarted in early 2013, and has steadily gained momentum in the two years since. The first CLO 2.0s priced inside of CLO 1.0 secondary market levels, but issuance spreads have subsequently lagged the rally in CLO 1.0 spread tightening. In our view, the main reason for this is the rapidly falling weighted average life expectancy of remaining CLO 1.0s. The 1.0 market is now amortising very quickly, as the last European CLO 1.0 exited its reinvestment period in Q2 2015 and loan repayment rates remain elevated. As a result of the increasingly dramatic WAL difference between 1.0 and 2.0 transactions, 1.0 spreads are likely to remain well inside of 2.0s on a like-for-like ratings basis.

Equity cash flow performance

The CLO arb and equity distributions in theory

CLO equity derives its value from the so-called “CLO arb”, which is a function of two factors: the difference between the CLO’s weighted average cost of debt and the average coupon spread generated by the collateral; and the number of turns of leverage in the structure. In practice, this translates into equity holders receiving surplus coupon income from the collateral after all of a CLO’s debt tranches have been paid their interest due, and the requisite O/C and I/C tests have been passed.

Under normal circumstances, this arrangement results in a stream of distributions to equity holders that should vary somewhat from period to period as the underlying collateral pool evolves. In theory, these payments should be reasonably large during the first two years of the reinvestment period, provided the collateral pool is ramped efficiently. The distributions could then perhaps grow slightly larger if any or all of the liability tranches are refinanced after the noncall period (normally two years) has expired. Once the reinvestment period

ends (typically an additional two years after noncall expiry), equity distributions should begin to decrease as senior liability tranches are paid down; the sequential nature of repayments results in a rising cost of debt and falling leverage, and thus erosion of the arb. If/when the distributions to equity holders fall below a satisfactory level, the CLO can be redeemed by a majority of equity holders, at which point the collateral can either be liquidated in the secondary market or used as the basis for a new CLO. Proceeds from the collateral disposal are used to repay all debt holders, after which equity receives any residual principal amount. Depending on how successful the CLO manager has been at building par during the life of the CLO (by acquiring assets at a discount), this final distribution of principal may be less than the original notional amount of the equity, due to a combination of collateral defaults, fees paid, and discounted liabilities. However, even without the eventual return of the entire principal amount, equity can deliver an attractive internal rate of return (IRR) if the interim distributions are sufficiently consistent.

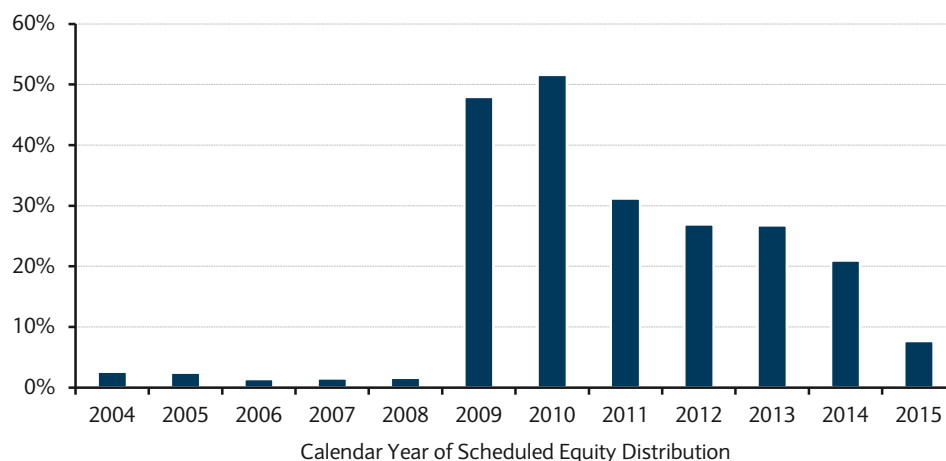
The arb in practice for 1.0 equity holders

In practice, the reality was much different for CLO 1.0 equity holders during the crisis period. As mentioned above in the section entitled “O/C and I/C test performance,” by mid 2009 nearly 60% of CLOs outstanding were in breach of the junior O/C test, and a small number were even in breach of the senior test. While interest coverage was generally better, the O/C test breaches were sufficient to divert a significant amount of cash flow away from equity holders in order to pay down liabilities. The result was that the rate of ‘missed’ equity distributions (ie, equity holders received no payment at a scheduled distribution date) ballooned from virtually nothing during the pre-crisis era to approximately 50% of all potential payments in 2009 and 2010 (Figure 29). In the three years that followed, roughly 25% of all CLO 1.0 equity was still unable to make distributions to their equity holders. Fortunately, as markets have normalized in 2014/15, the percentage of missed equity payments has fallen dramatically, although still not quite to pre-crisis levels.

As a result of the large number of missed distributions, the payment profile over time to CLO equity holders has been anything but smooth. As Figure 30 shows, pre-crisis distributions were robust and rising through 2008. However, the large number of missed equity distributions in 2009/10 (and smaller payments when they were made) caused the average to fall below 5% for a two-year period. While equity payments slowly recovered thereafter, they never again reached the pre-crisis peak, an outcome that may be surprising given the combination of much wider collateral spreads along with pre-crisis liability

FIGURE 29

Percentage of CLO 1.0 equity distributions that were missed in each payment year

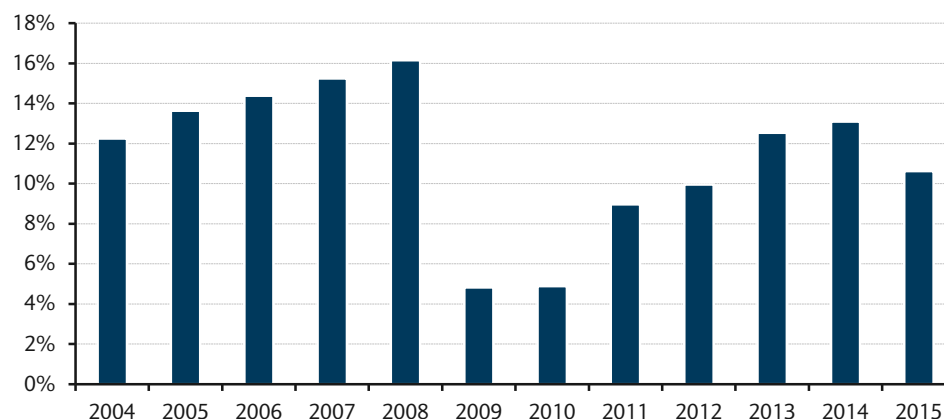


Source: Intex, Barclays Research

coupons (as mentioned previous, new issue AAA spreads averaged 25bp between 2006 and H1 07, versus 125-140bp for most of the post-crisis 2.0 era). In addition to lingering missed payments, this is driven by the lower average leverage of CLOs that were forced to pay down a significant portion of their senior tranche in order to cure failing O/C tests. Finally, the falling average payment in 2015 is a function rapid deleveraging, as the entire 1.0 cohort is now out of reinvestment. We expect 1.0 equity distributions to continue to fall for this reason, which should result in increasing CLO 1.0 redemptions over the next few years.

FIGURE 30

Average annualized CLO 1.0 equity distribution by payment year



Source: Intex, Barclays Research

The net result is that CLO 1.0 equity performance has been widely varied. While the majority of 1.0 deals are still outstanding, a reasonable number have been redeemed, such that an early assessment of total performance can be made. Using Intex data, we constructed a database of 46 CLO 1.0 equity tranches for which we believe all cash flows have been distributed (in some cases there are multiple subordinated tranches from the same CLO). Figure 31 ranks them by cumulative cash return (undiscounted), with segmentation by IRR band. We make the following observations about this distribution of outcomes:

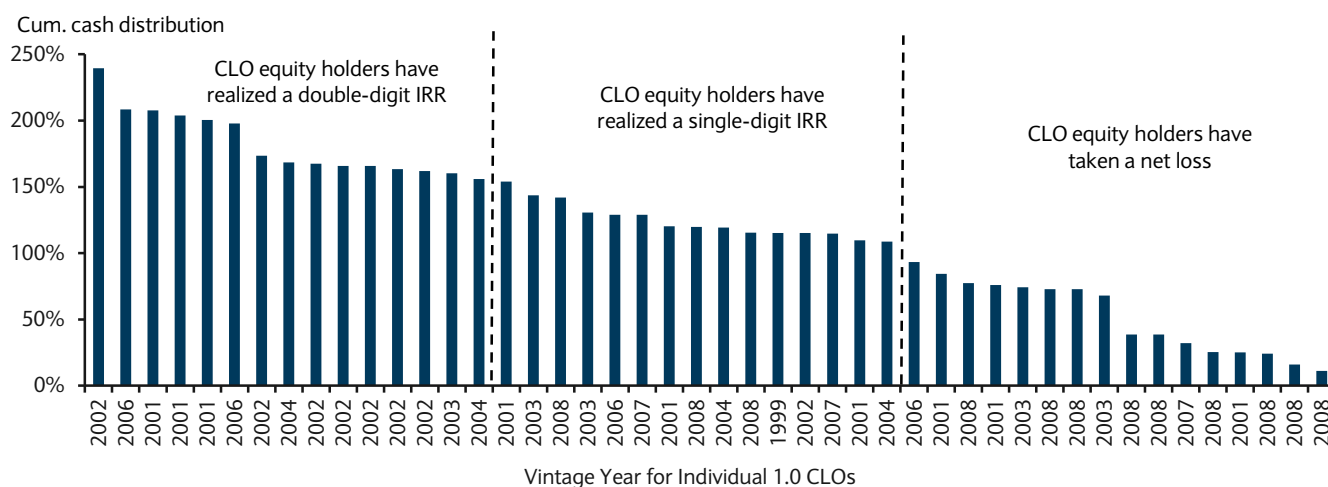
- 1) Despite the smaller size (relative to the US) of the European CLO and leveraged loan markets, the performance of CLO equity can vary dramatically from manager to manager. Much like the previously discussed divergence of outcomes in portfolio default rates and CCC bucket size, this should help to debunk the notion that obligor overlap prevents meaningful performance differentiation across different CLOs.
- 2) Of the CLO 1.0s that have been redeemed thus far, most of the worst performers (particularly those where equity holders have taken a loss) were originated shortly before the 2008 financial crisis. As a result, their portfolios were impacted by higher loan market default rates almost from inception, hampering their ability to keep O/C tests in compliance and cutting off distributions to equity much earlier in the deal's lifespan.
- 3) Conversely, most of the best-performing CLO 1.0s were issued many years prior to the crisis. Operating in a low default environment allowed them to make larger distributions to equity holders for a much longer period of time.

While it is difficult to estimate the ultimate return distribution for all CLO 1.0 equity, it is likely that realized cash-on-cash IRRs for the 1.0 equity tranches that are still outstanding today will be lower than for those that have already been redeemed. As noted earlier, the net ratings migration performance of the rated 1.0 CLO bonds still outstanding is worse than for those that have been redeemed, especially at lower-quality levels (see Figures 19

and 12 for the comparison). This is a direct reflection of the relative collateral performance in these deals, which should ultimately flow through to equity distributions.

The implications for long-term 2.0 equity performance are fairly clear. As a leveraged play on corporate credit, CLO equity will perform well from a cash distribution perspective under normal market conditions, but will not hold up under extended periods of elevated default rates for leveraged borrowers. As stated previously, the combination of falling loan and bond default rates, gradually improving European macro, and ongoing monetary stimulus from the ECB make us optimistic that the widespread collateral deterioration experienced by many 1.0 portfolios is unlikely to be repeated in the near term. If, as we expect, default rates are lower on average over the next 5-7 years than they have been during the prior 5-7 years, the eventual distribution of CLO 2.0 equity performance is likely to look better than the 1.0 cohort.

FIGURE 31
Distribution of cumulative cash distributions for redeemed CLO 1.0s



Note: Chart shows our estimate of cash-on-cash IRR for individual CLO 1.0 equity tranches. The x-axis value indicates the vintage year for each individual CLO.

Source: Intex, Barclays Research

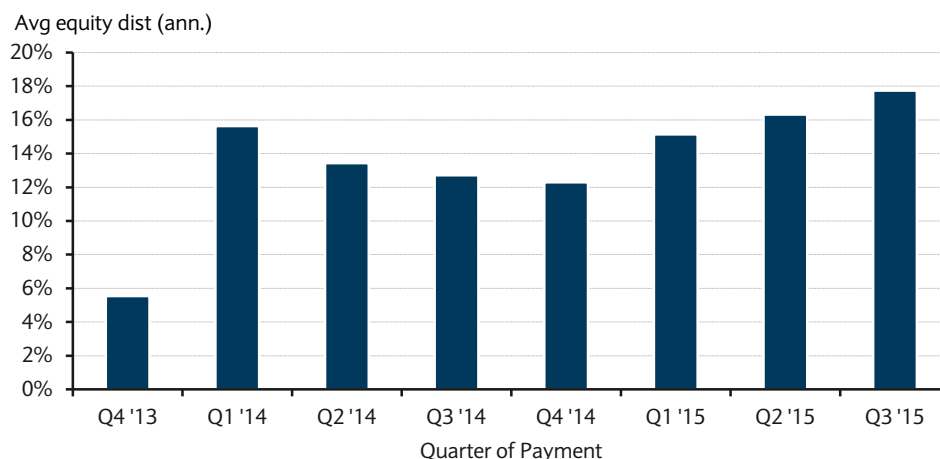
2.0 equity distributions – the story so far

As one might expect, the cash flow distribution performance of CLO 2.0 equity tranches has thus far been very strong. Falling default rates for leveraged corporates and improving economic prospects have facilitated healthy collateral performance, keeping O/C and I/C tests satisfied and equity distributions flowing. To our knowledge, only one CLO 2.0 equity tranche has missed a scheduled equity distribution thus far, and that was on the deal's very first payment date, suggesting that the collateral portfolio may not have been sufficiently ramped to generate excess coupon income. Importantly, all of the transaction's liability tranches were paid, and a 'catch-up' equity distribution in excess of 20% (annualized) was made on the second payment date. Moreover, our analysis indicates that all European CLO 2.0s are currently passing both senior and junior O/C tests, with an average senior O/C test cushion of 9.7%. As such, we feel reasonably confident in stating that all CLO 2.0 transactions are currently positioned to continue making equity distributions for the foreseeable future.

And as Figure 32 shows, those distributions thus far have been robust. After a small number of deals made limited payments to equity in Q4 2013 as early 2.0 portfolios finished ramping, the 2.0 market has found a fairly consistent level in the mid-teens area over the past two years. Recently, the annualized pace of distributions has been rising as a greater proportion of the 2.0 market is finished ramping and actively managing the portfolio for income generation.

FIGURE 32

Annualized distributions to CLO 2.0 equity holders by quarter

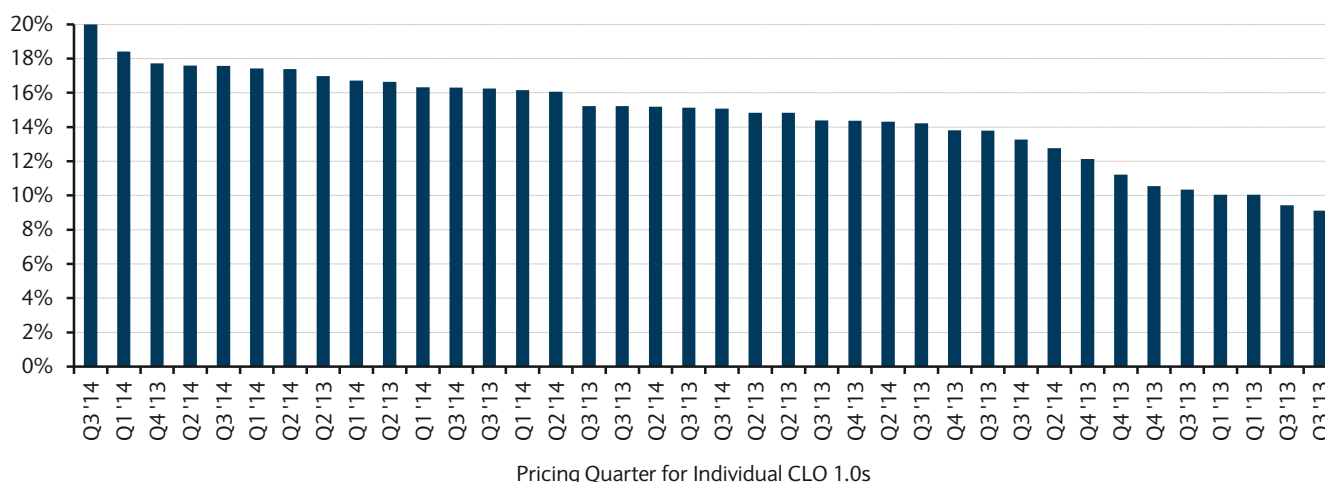


Source: Intex, Barclays Research

As was the case for 1.0s, however, market-wide averages mask considerable variation across individual deals. In Figure 33, we present the average annualized equity distribution for all European CLO 2.0s that have made at least two such payments to date (the initial equity distribution is sometimes not representative of the eventual run rate). Although most deals are clustered in the mid-teens, the full range is more than 10% wide, clearly indicating that manager selection can make a significant difference in the cash flow outcome for equity investors. Notably, all of the deals that have delivered sub-12% average annualized equity distributions were from the 2013 vintage; this reflects the more conservative structures and lower leverage that were prevalent when the CLO 2.0 market first reopened in Europe. The average annualized distribution for all 2013 vintage CLOs making two or more payments is currently 13.5%; certainly a healthy return, but significantly lower than the 16.9% average thus far for deals from the 2014 vintage. As collateral has firmed and AAA spreads have drifted slightly wider, the arb has suffered modestly in 2015, but the current vintage is more similar to 2014 than 2013 from a structural standpoint. As such, we expect the first few equity distributions from this year's crop of CLOs to fall in between the 2013 and 2014 averages, but probably closer to 2014 levels.

FIGURE 33

Average annualized equity distribution from European CLO 2.0s



Note: Dataset is limited to CLOs that have made at least 2 equity distributions. The x-axis value indicates the quarter in which each individual CLO was priced. Source: Intex, Barclays Research

The future: 2.0 repricings and redemptions

Unlike the US, where the 2.0 era is already five years old (and in fact has already had its era label 'upgraded' to 3.0 thanks to the Volcker rule), the European CLO 2.0 market has only recently entered the phase where noncall periods will begin expiring, opening the door to the repricing of liability tranches as well as the outright early redemption of entire transactions. To date, Europe has seen one example of each. Grand Harbour CLO from GSO/Blackstone was recently redeemed after making three scheduled coupon payments to all noteholders and delivering a final IRR in excess of 20% to equity holders.

Although they are usually not welcomed by senior bond investors, repricings can deliver significant upside to mezzanine tranches that are issued at a discount. Thus far, the only repriced European CLO 2.0 bond is the senior (AAA) tranche of Carlyle's Global Market Strategies Euro CLO 2013-1, which reduced the nominal spread by 15bp and also Volckerised the transaction. Since AAAs are normally issued at or very close to par, their convexity is extremely poor, making them vulnerable to this type of spread shaving. However, if the US is a reasonable indicator of the path forward, the European market is likely to eventually see full capital structure repricings, as WAL rolldown alone can potentially lower weighted average liability spreads by 15-20bp across the structure. As is the case with early redemptions, such an outcome would deliver near-term returns upside to investors who purchased new issue mezzanine at a significant discount to par (albeit at the expense of subsequent coupon income).

Conclusion: CLOs deliver the goods (and the bads) from the loan market

We hope that this fairly exhaustive look at all aspects of CLO performance proves useful to current and prospective CLO investors. In our view, the performance delivered by the asset class during and after the financial crisis is consistent with how securitised products should work. Senior bondholders in 1.0 transactions have benefitted from the various structural protections and cash diversion mechanisms, and ultimately should realize better ratings-adjusted performance than corporate bond investors. However, junior mezzanine and equity investors, who by construction are taking amplified exposure to the underlying collateral, will bear the brunt of Europe's twin recessions and slow recovery. With CLO 2.0 cash flows already at healthy levels, future returns will depend on Europe's ability to fully escape this long period of economic stagnation and elevated corporate defaults. With macroeconomic indicators improving and the ECB firmly on the throttle, we believe such an outcome is achievable for Europe, and for CLO investors.

APPENDIX 1 – GLOSSARY OF TERMS AND ACRONYMS

Amortisation Period

After the reinvestment period ends, the amortisation period begins, during which most portfolio principal and sales proceeds must be used to redeem the CLO notes sequentially, starting with the most senior (ie, AAA rated) class. The CLO manager is usually still allowed to reinvest unscheduled principal repayments and sales proceeds from credit improved assets, but tests on WAL, WARF, and CCC buckets typically become absolute during this phase.

BCBS (Basel Committee for Banking Supervision)

The BCBS is the primary forum for cooperation among regulators from various banking jurisdictions, including all major developed markets globally. In particular, the body's Policy Development Group (PDG) is instrumental in guiding the evolution of bank regulation, several aspects of which have affected the European CLO market due to the importance of banks as investors in CLO bonds and transaction arrangers.

CLO 1.0/2.0/3.0

These naming conventions typically refer to the following periods:

- 1.0 (US & Europe) = All CLOs issued through the end of 2008 (ie, pre-crisis issuance)
- 2.0 (Europe) = All post-crisis issuance thus far (2013-2015).
- 2.0 (US) = Post-crisis issuance prior to the Volcker rule (2010-2013)
- 3.0 (US only) = Post-Volcker rule issuance, typically with no bond bucket (2014-2015)

Collateral Quality Tests

Collateral quality tests refer to average portfolio quality, and typically include limits on WARF, WARR, WAS, DS, and WAL. In many cases the limits are not absolute, but rely on a matrix that may include WAS/WARF/WARR or WAS/DS/WARR.

Constant Default Rate (CDR)

CDR is an input to the cash flow modelling processes that are typically utilised in the analysis and pricing of CLO tranches. It assumes that collateral defaults are constant over time, which is an unrealistic assumption but does provide a standard for comparison across multiple CLOs or issuers (in practice, corporate borrower default rates spike dramatically in recessions). A common CDR assumption is 2% annually.

Constant Prepayment Rate (CPR)

CPR is an input to the cash flow modelling processes that are typically utilised in the analysis and pricing of CLO tranches. It assumes that collateral prepayments are constant over time, which is an unrealistic assumption but does provide a standard for comparison across multiple CLOs or issuers (in practice, corporate borrower prepayment rates rise significantly during strong markets as credit spreads tighten). A common CDR assumption is 20% annually.

Cov-lite

While the exact definition can vary, cov-lite (short for covenant-light) loans typically lack two key maintenance covenants: a leverage test (typically debt/EBITDA) and an interest coverage test (typically EBITDA/cash interest). Cov-lite loans still have incurrence covenants that govern management's ability to take on additional debt, dispose of assets, or divert excess cash flow away from creditors. Some CLOs define cov-lites broadly, whereas others do not consider a term loan to be cov-lite if it is pari passu with a fully covenanted revolver or TLA.

CRD IV / CRR 1

The Capital Requirements Directive (CRD)/Capital Requirements Regulation (CRR) is a supervisory framework for European banks that incorporate Basel II and III rules on bank capital measurement and standards. Several aspects of this regulation are important for the CLO market:

- 1) Risk retention (replaces the original rule 122a of CRD II)
- 2) Risk weights under the standard (SA) and external rating based (ERB) approach
- 3) Liquidity coverage ratio (LCR) – unlike the senior bonds of SME ABS, European CLOs are not among the LCR-eligible securitisations, putting them at a rel val disadvantage versus other ABS as well as investment grade corporate debt
- 4) Net stable funding ratio (NSFR) – related to LCR, in that LCR-ineligible assets typically have to be fully backed by stable funding, putting them at a rel val disadvantage versus other ABS and no advantage relative to the CLO's underlying collateral

Credit Risk/Credit Improved Assets

Assets in the collateral pool that experience meaningful credit deterioration (possibly including a ratings downgrade from one or more agencies) are said to be credit risk or credit impaired, while assets that experience a meaningful improvement in their credit outlook (and possibly upgrades) are defined as credit improved. During the amortisation phase, when active buying and selling of collateral is generally prohibited, a manager retains some flexibility with respect to the sale and reinvestment of proceeds from assets that are defined as credit risk/impaired or credit improved.

Diversity Score (DS)

DS represents the equivalent number of completely non-correlated assets for a portfolio with assets that are assumed to be correlated to some degree. Minimum DS thresholds ensure that an adequate level of economic and geographic diversification is maintained in the collateral portfolio, so that the collateral pool's default rate does not escalate more quickly than expected in the event of a material increase in default rates (for example, during a recession).

EIOPA (European Insurance and Occupational Pensions Authority)

The EIOPA is the primary regulatory authority governing European pensions. Its upcoming implementation of Solvency 2 is likely to negatively impact insurance demand for CLO tranches, particularly in the IG-rated mezzanine classes (AAs and single-As) for which they have historically been an important buyer.

Eligibility Criteria

Defined at the asset level, these criteria must be met in order to add an asset to the collateral pool. They include restrictions on asset type (loans, bonds, etc), borrower domicile (EM is typically not allowed), currency denomination, and interest payment frequency (typically at least semi-annually).

Equity Arb

Although it does not meet the technical definition of arbitrage (the simultaneous buying and selling of securities in different markets to take advantage of differing prices for the same asset), CLO market participants often refer to prospective equity returns under a certain set of assumptions as the "equity arb". The "arb" in this case is created by the difference between the average spread from a CLO's collateral and the weighted average cost of its liabilities, which is magnified by the number of turns of leverage. Market participants typically use relatively stable assumptions for collateral spreads, which makes the modelled arb appear most sensitive to AAA

spread levels. In practice, European loan spreads have proven to be much more variable over time than CLO liabilities, and the leverage of the arb to loan spreads is nearly double the leverage to AAAs. Nevertheless, the modelled arb remains a useful tool for assessing the state of the CLO market at a given point in time.

Euribor Floor

Reference rate floors on leveraged loans specify a minimum amount to which the loan's nominal coupon spread is added. As of the date of this publication, floors of greater than 0bp remain a minority in Europe, unlike the US where nearly all loans that were syndicated over the past several years have floors of at least 75bp. If they are widespread in a CLO's collateral pool, rate floors can adversely impact equity returns when short-term interest rates are rising, because the cost of liabilities goes up while collateral income remains constant until the floor is breached.

Event of Default

A very rare occurrence, in which a CLO's senior noteholders can accelerate the notes and direct the trustee to liquidate the collateral, with proceeds being used to redeem the notes in accordance with the post-acceleration waterfall. Defined events of default typically include non-payment of interest to the AAA or AA rated notes, non-payment of principal on the maturity date, the senior O/C level falling below 102.5%, or the insolvency of the CLO issuer.

Final Maturity

At the legal final maturity of the CLO, all outstanding CLO bonds become due and fully payable. In practice, most CLOs are not expected to ever reach their final maturity, as they are likely to be called at some point during the amortisation phase, when deleveraging and rising weighted average liability spreads begin to erode the economics for equity investors.

Interest Coverage (I/C)

The interest coverage ratio represents the degree to which cash flows produced by the collateral portfolio cover the interest owed to CLO liability tranche holders, along with all liability tranches that are senior to the tranche in question.

Examples of the calculation are as follows:

- 1) Senior notes: $\text{[Collateral Interest Proceeds]} / \text{[Senior Notes Interest Due]}$
- 2) Mezzanine notes: $\text{[Collateral Interest Proceeds]} / \text{[Senior + Mezzanine Interest Due]}$

Theoretically, if one of these ratios were to fall below 100%, insufficient proceeds would be available to pay the full amount of interest owed to the tranche in question. In practice, interest coverage tests specify minimum thresholds for these ratios, and are set significantly above 100%. If the calculated ratio falls below the threshold, the test fails. In that event, all cash flows owed to more junior noteholders are diverted to pay down the principal balance of senior liabilities until the interest coverage ratio once again exceeds the threshold.

Liquidity Coverage Ratio (LCR)

The LCR is an aspect of CRD IV / CRR I that governs which of a bank's holdings qualify as regulatory liquidity. Unlike senior bonds from SME ABS and IG corporates, European CLOs are not LCR-eligible. This puts CLOs at a comparative disadvantage, which requires additional compensation in the form of spread to overcome.

Manager Fees

In exchange for managing the CLO's collateral pool, the CLO manager typically earns a stream of fee income. While the specifics can vary from transaction to transaction as a result of negotiations between the manager and various investors, CLOs typically have three classes of fees:

- 1) Senior: generally 15bp, paid before senior noteholders, not subject to any tests
- 2) Junior: generally 35bp, paid after mezzanine noteholders and before equity, subject to senior and junior O/C and interest coverage tests
- 3) Incentive: generally 20% of equity cash flows after an IRR hurdle rate of 10-15% is cleared, paid alongside equity and subject to all tests governing the distribution of cash to equity holders

Mezzanine Tranches

All tranches below the AAA tranche are typically referred to as mezzanine, although AAAs and AAs are sometimes referred to collectively as the senior tranches. Mezzanine tranches are sometimes further subdivided into IG and sub-IG, or senior and junior mezz. In practice, the investor base changes significantly across the AA/A/BBB part of the spectrum.

Net Stable Funding Ratio (NSFR)

Under CRD IV / CRR 1, the NSFR is the ratio of available stable funding to required stable funding. This ratio must be maintained at a minimum of 100%. As LCR-ineligible assets, CLO holdings are assigned a 100% required stable funding (RSF) factor, meaning they must be fully backed by stable funding.

Noncall Period

The noncall period typically lasts for two years after the CLO's effective date, during which the transaction cannot be called by a majority equity holder. After the noncall period ends, a majority equity holder can call the deal at any time, an option which can sometimes be used to refinance the CLO's liabilities at lower spreads.

Original Issue Discount (OID)

A loan's OID is the discount to par offered to investors that participate in a new leveraged loan syndication. Capturing OIDs in the primary market is an important part of efficient CLO portfolio construction, as it helps the manager to "build par" by acquiring assets at less than full face value, which improves the status of O/C tests.

Originator

CLO originators are one of two routes available for compliance with European risk retention regulations (the other is "sponsor" retention, which typically means the CLO manager). 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 transfers (effectively 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 managers have begun setting up originator vehicles with 3rd party capital, including publicly listed funds that theoretically provide anyone who can buy shares with an opportunity to indirectly participate in CLO risk retention. Regulators have expressed concerns about originators without any real economic substance, but most CLO market participants believe those concerns are primarily directed at other securitisation asset classes rather than CLOs.

Over-Collateralisation (O/C)

The over-collateralisation ratio represents the degree to which available collateral exceeds the notional amount of a CLO liability tranche, along with all liability tranches that are senior to the tranche in question. Theoretically, it represents the percentage of the collateral pool that could be removed due to credit loss before the principal of the tranche in question would become impaired. Examples of the calculation are as follows:

- 1) Senior notes: $[\text{Collateral Notional}] / [\text{Senior Notes Notional}]$
- 2) Mezzanine notes: $[\text{Collateral Notional}] / [\text{Senior} + \text{Mezzanine Notes Notional}]$

Under certain circumstances, some of the collateral in the numerator may be counted at market value rather than par. Examples include excess CCC holdings beyond the prescribed collateral limit, as well as loans that are purchased at a significant discount to par (discount obligations).

Over-collateralisation tests specify minimum thresholds for these ratios. If the calculated ratio falls below the threshold, the test fails. In that event, all cash flows owed to more junior noteholders are diverted to pay down the principal balance of senior liabilities until the over-collateralisation ratio once again exceeds the threshold.

Portfolio Profile Tests

These tests describe the acceptable aggregate portfolio characteristics and are intended to augment eligibility criteria and collateral quality tests, determining the minimum and/or maximum exposures to various eligible assets. Examples include the minimum senior secured assets, maximum obligor and industry concentrations, maximum foreign currency assets, maximum fixed rate assets, maximum CCC/Caa rated assets, maximum cov-lite bucket size, and maximums on various assets other than 1st lien leveraged loans (PIKs, 2nd liens, rescue loans, etc).

Reinvestment Criteria

The reinvestment criteria describe the conditions that need to be met for the collateral manager to reinvest asset amortisation or asset sale proceeds. During the reinvestment phase, these typically include the CLO not being in an event of default, O/C and IC tests being satisfied (or not worsened if already not satisfied), and the portfolio profile and collateral quality tests being satisfied (or maintained/improved if already not satisfied). After reinvestment, the criteria are often extended to include requirements on principal balance, WAL tests, CCC/Caa tests, and restricted trading conditions.

Reinvestment Period

The reinvestment period typically lasts for four years after the CLO's effective date, during which the CLO manager is permitted to reinvest scheduled and unscheduled principal repayments in new collateral, subject to certain limits regarding collateral quality and portfolio profile tests.

Required Stable Funding (RSF) Factor

Under CRD IV / CRR 1, the RSF is the amount of stable funding that is required to be held against a particular asset type. For CLOs, which are not LCR-eligible, the RSF is 100%, meaning that a bank's CLO holdings must be fully backed by stable funding.

Restricted Trading Period

Restricted trading periods typically occur when the ratings on the CLO notes are either withdrawn or downgraded by a certain number of notches. However, when this happens, the controlling class (usually the holders of the most senior class of notes) of the CLO can voluntarily decide that no restricted trading period has occurred. The existence of a restricted trading period effectively prohibits reinvestment of any kind during the amortisation (post-reinvestment) phase.

Return on Risk-Weighted Assets (RoRWA)

This metric is most commonly used by banks in their assessment of CLO economics. Under the revised Basel III securitisation framework expected to come into force in early 2018, risk weights for European banks are likely to increase significantly for AA, A, and BBB rated CLO tranches, making them significantly less attractive on an RoRWA basis.

Rule 3a-7

This rule is an exemption from registration requirements under the US Investment Company Act of 1940. CLOs that are structured to comply with the requirements of this exemption are considered to be Volcker compliant. However, as this rule was initially created for static securitisations, there is some debate as to its appropriateness for actively managed CLOs. In particular, the practical limitations posed by the rule's trading restrictions are open to interpretation, leaving CLOs structured in this way exposed to the possibility of adverse regulatory clarifications in the future.

SEC-ERBA

SEC-ERBA stands for Securitisation – External Ratings Based Approach. This option is in the middle of the regulatory hierarchy for determining risk weights on a bank's securitisation holdings. Banks that are unable to use the internal ratings based approach must use SEC-ERBA instead, as long as their regulator allows the use of external ratings for securitisations. SEC-ERBA typically has higher risk weights than SEC-IRBA, particularly for AA and A rated tranches.

SEC-IRBA

SEC-IRBA stands for Securitisation – Internal Ratings Based Approach. This option sits at the top of the regulatory hierarchy for determining risk weights on a bank's securitisation holdings. A bank must have a supervisory-approved internal ratings based model and sufficient information to determine the capital charge for at least 95% of the assets being securitised. Larger banks are more likely to have the necessary resources to implement SEC-IRBA.

SEC-SA

SEC-SA stands for Securitisation – Standard Approach. This option is at the bottom of the regulatory hierarchy for securitisation risk weights, and is only available if a bank is unable to implement SEC-IRBA and the regulatory does not permit SEC-ERBA. Risk weights tend to be similar to SEC-IRBA, making them less punitive than SEC-ERBA for most ratings.

Solvency 2

Developed by EIOPA, Solvency 2 is the primary regulatory framework governing the security holdings of European insurance companies. Capital charges for CLOs under Solvency 2 are very high, in part because EIOPA used historical performance during the post-crisis period in its assessment of the asset class, and also because there is limited differentiation in capital charges across the CLO capital stack.

Volcker Rule

Named after Paul Volcker (former US Secretary of the Treasury), this rule is also known as the “prop trading ban” enacted as part of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. This rule prohibits US banks from having an ownership interest in what it calls “covered funds,” the definition of which includes CLOs (as well as private equity and hedge fund stakes, among others). Compliance with the Volcker rule for European CLO 2.0s can be achieved in one of three ways:

- 1) Eliminate all non-loan collateral (ie, the CLO is a “loan-only” securitisation)
- 2) Structure the CLO in accordance with the rule 3a-7 exemption of the US Investment Company Act of 1940, which includes significant restrictions on trading the portfolio
- 3) Make a portion of the AAA notes non-voting with respect to manager removal rights, which market participants believe avoids the definition of “ownership interests”

Voting/Non-voting/Exchangeable AAA Tranches

The non-voting option for AAAs is one of the ways the European market has adapted to the implementation of the Volcker Rule for US banks. By renouncing their voting rights with

respect to manager removal, AAA investors believe they avoid the definition of a “covered fund”. While regulators have not explicitly endorsed this view, the non-voting option has become the most common Volcker compliance choice for the European CLO market. Making the voting and non-voting tranches freely exchangeable for one another alleviates the need for a prospective seller of AAAs to find a buyer in the secondary market that has identical Volcker-compliance requirements.

Weighted Average Life (WAL)

WAL is the par-weighted average remaining life of the collateral portfolio. It takes into account any scheduled principal repayments prior to final maturity, but does not assume any voluntary prepayments. Maximum WAL thresholds ensure that adequate principal repayments will be available in the collateral pool to pay down CLO liability tranche holders in full prior to the final maturity of the CLO.

Weighted Average Ratings Factor (WARF)

WARF is the par-weighted average ratings factor, based on the Moody’s facility rating for each loan in the collateral pool. Ratings factors increase as credit quality (and published credit ratings) decrease, per the following schedule:

FIGURE 1
Moody’s Credit Ratings and Rating Factors

Moody’s Rating	Rating Factor
Ba1	940
Ba2	1,350
Ba3	1,766
B1	2,220
B2	2,720
B3	3,490
Caa1	4,770
Caa2	6,500
Caa3	8,070
Ca-C	10,000

Source: Moody’s Investor Services

Weighted Average Recovery Rate (WARR)

WARR is the par-weighted average projected recovery rate for the CLO’s collateral pool, as estimated by S&P, Moody’s or Fitch (differences in rating agency methodologies can produce different recovery estimates for the same issuer). Minimum WARR thresholds are intended to ensure that the CLO’s collateral portfolio would not suffer inordinately high credit losses in the event of a material increase in default rates (for example, during a recession).

Weighted Average Spread (WAS)

WAS is the par-weighted average nominal coupon spread from the CLO’s collateral pool, inclusive of any benefit from reference rate floors. Minimum WAS thresholds are intended to ensure that the CLO’s collateral produces sufficient cash flow to pay interest due to liability tranche holders.

APPENDIX 2 – ADDITIONAL DATA AND CHARTS

FIGURE 1

European CLO 2.0 Transaction List

Pricing Month	Transaction Name	CLO Manager	Size (€mn)	Lvg.	Coupon (E + bp)						Discount Margin					
					AAA	AA	A	BBB	BB	B	AAA	AA	A	BBB	BB	B
Feb-13	Cairn CLO III	Cairn Capital	300.5	4.0x	140	235	325	425			140	235	325	425		
Apr-13	Dryden XXVII Euro CLO 2013	Pramerica	300.0	4.9x	135	190	290	400	475		135	190	290	400	515	
Apr-13	ALME Loan Funding 2013-1	Apollo	334.2	6.4x	130	185	285	390	475	600	130	185	285	390		
May-13	Grand Harbour CLO	GSO /Blackstone	403.4	7.3x	130	160	260	365	425	550						
Jun-13	CGMSE CLO 2013-1	CELF Advisors	300.0	7.3x	130	175	275	400	550		130	175	275	400	590	
Jun-13	Goldentree Euro CLO 2013-1	GoldenTree	303.0	4.1x	135	205	300	400	475		135	205	300			
Jun-13	Jubilee CLO 2013-X	Alcentra	400.0	6.3x	125	170	275	380	450							
Jul-13	Cadogan Square CLO V	CSAM	307.8	7.2x	135	200	290	380	525							
Jul-13	St. Paul's CLO II	ICG	400.0	5.5x	135	175	290	425	550							
Jul-13	Ares European CLO VI	Ares	310.5	5.8x	125	175	275	390	450							
Aug-13	Harvest CLO VII	3i Debt Management	309.6	6.4x	135	175	280	370	550							
Aug-13	HayFin Ruby II (MM CLO)	HayFin	395.3	5.4x	159	225	350	425	700							
Aug-13	Herbert Park CLO	GSO/Blackstone	413.2	8.2x	135	185	300	385	510	610						
Aug-13	CGMSE CLO 2013-2	CELF Advisors	360.3	7.6x	130	175	275	400	550							
Oct-13	Grosvenor Place 2013-1 CLO	CQS	361.6	8.1x	140	210	300	385	510	610						
Nov-13	Avoca Capital CLO X	Avoca	310.8	6.1x	140	190	300	390	450							
Nov-13	St. Paul's CLO III	ICG	556.5	8.6x	145	200	300	415	550	600						
Nov-13	Euro Galaxy III	Pinebridge	335.0	7.7x	138	210	300	380	520		138	210	300	430	600	
Nov-13	Dryden XXIX Euro CLO 2013	Pramerica	414.8	8.5x	140	200	300	380	525	625						
Dec-13	Richmond Park CLO	GSO/Blackstone	615.7	8.1x	140	210	290	390	525	600						
Dec-13	North Westerly CLO IV	NIBC Bank	306.0	7.2x	145	210	325	425	600							
Jan-14	Jubilee CLO 2014-XI	Alcentra	413.5	8.8x	140	200	265	335	460	560						
Feb-14	CGMSE CLO 2014-1	CELF Advisors	375.0	8.9x	140	200	265	355	500	550						
Feb-14	Harvest CLO VIII	3i Debt Management	425.0	8.2x	140	190	235	325	450	525						
Mar-14	St. Paul's CLO IV	ICG	435.1	9.0x	140	180	260	340	480	600	145	200	265	350	510	600
Mar-14	Babson European CLO 2014-1	Babson	412.5	8.4x	140	200	265	340	460	560						
Mar-14	CVC Cordatus Loan Fund III	CVC Credit Partners	450.0	8.4x	135	180	260	340	480	600	140	200	265	350	500	600
Apr-14	Holland Park CLO	GSO/Blackstone	513.6	8.5x	140	200	265	345	475	575						
Apr-14	Jubilee CLO 2014-XII	Alcentra	513.1	9.7x	135	192	258	342	490	570						

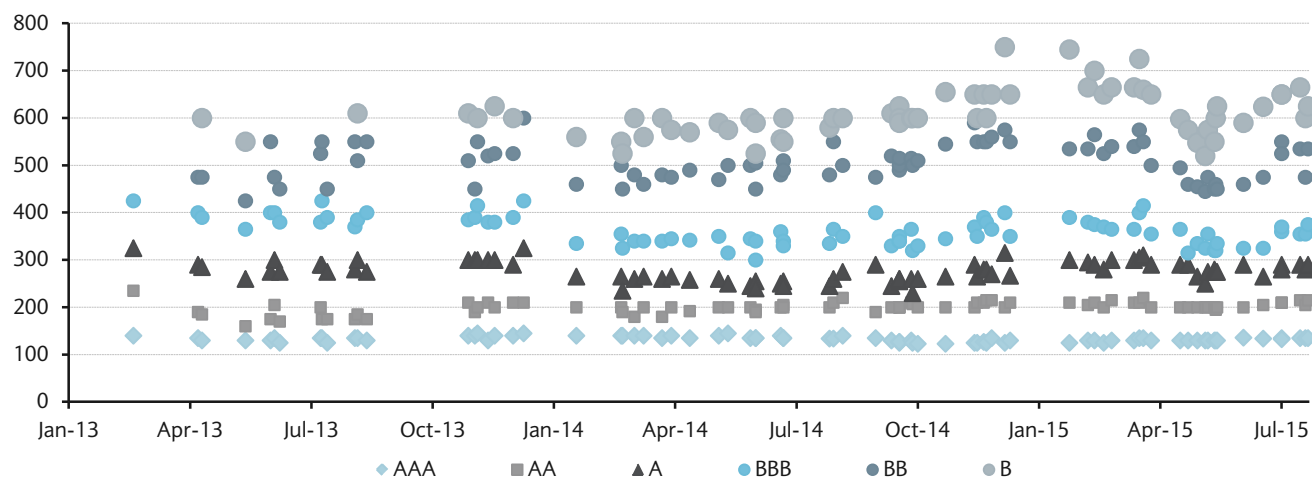
					Coupon (E + bp)						Discount Margin					
Pricing Month	Transaction Name	CLO Manager	Size (€mn)	Lvg.	AAA	AA	A	BBB	BB	B	AAA	AA	A	BBB	BB	B
May-14	Avoca Capital CLO XI	Avoca	518.5	7.9x	140	200	260	350	470	590	140	200	260	350		
May-14	Oaktree Arbour CLO	Oaktree Capital	375.0	8.5x	145	200	250	315	500	575	145	200	250	340	525	600
Jun-14	CGMSE CLO 2014-2	CELF Advisors	402.0	9.3x	135	200	245	345	500	600						
Jun-14	ALME Lond Funding II	Apollo	382.4	9.3x	135	195	255	340	505	590						
Jun-14	Harvest CLO IX	3i Debt Management	525.0	8.5x	135	190	240	300	450	525						
Jun-14	Dryden XXXII Euro CLO 2014	Pramerica	416.7	9.6x	140	200	250	360	480	555	140	200		360		
Jun-14	Phoenix Park CLO	GSO/Blackstone	413.3	8.1x	135	205	255	340	510	600	135	210	255	350	600	700
Jun-14	Ares European CLO VII	Ares	351.9	8.9x	135	200	245	330	490	550	135	200				
Aug-14	St. Pau's CLO V	ICG	361.4	8.4x	134	200	245	335	480	580						
Aug-14	Avoca CLO XII	Avoca	415.0	7.8x	134	210	260	365	550	600						
Aug-14	Toro European CLO 1	Chenavari Credit Ptnrs	308.0	8.3x	140	220	275	350	500	600	140	225	285	400	650	760
Sep-14	Dryden XXVII (tap)	Pramerica	201.9	4.6x	135	190	290	400	475							
Sep-14	Newhaven CLO	Sankaty	361.4	8.5x	130	200	245	330	520	610	130	200	260	340	580	700
Sep-14	Sorrento Park CLO	GSO/Blackstone	517.0	8.1x	125	200	255	340	490	625	130	200	270	350	590	740
Sep-14	Jubilee CLO 2014-XIV	Alcentra	566.7	8.8x	127	200	260	350	500	600	127	200	260	350	590	750
Sep-14	CGMSE CLO 2014-3	CELF Advisors	450.0	9.2x	127	200	260	340	515	590	127	200	260	365	605	745
Oct-14	Contego II	Rothschild	359.3	8.6x	130	210	260	365	515	600						
Oct-14	Harvest CLO X	3i Debt Management	466.5	8.3x	125	207	230	320	500	600	125	207	265	375	635	775
Oct-14	Babson European CLO 2014-2	Babson	565.5	8.7x	123	200	260	330	510	600						
Oct-14	ALME Loan Funding III	Apollo	411.1	8.6x	123	200	265	345	545	655	123					
Nov-14	CVC Cordatus Loan Fund IV	CVC Credit Partners	400.0	8.1x	125	200	290	370	590	650	125	200				
Nov-14	Avoca CLO XIII	Avoca	414.0	8.0x	125	210	265	350	550	600						
Nov-14	Halcyon Loan Advisors 2014	Halcyon Loan Advisors	309.9	9.0x	127	210	280	390	550	650						
Nov-14	Cairn CLO IV	Cairn Capital	309.4	8.5x	125	215	280	380	550	600						
Dec-14	Castle Park CLO	GSO/Blackstone	415.0	8.0x	135	215	270	365	560	650						
Dec-14	Arbour CLO II	Oaktree Capital	375.0	8.5x	125	200	315	400	575	750	135	225	315	415	655	850
Dec-14	Rye Harbour CLO	Sankaty	364.0	7.8x	130	210	267	350	550	650	132	210	317	410	650	840
Jan-15	CGMSE CLO 2015-1	CELF Advisors	500.0	8.3x	125	210	300	390	535	745	130	210	300	415	625	840
Feb-15	Bosphorus CLO I (Static)	Commerzbank	233.4	10.7x	115	195	250	310	550	700						
Feb-15	Dryden XXXV Euro CLO 2015	Pramerica	442.6	8.4x	130	205	295	380	535	665	130	205	295	380	535	665
Feb-15	Dartry Park CLO	GSO/Blackstone	411.1	8.2x	130	210	290	375	565	700	130	210	300	410	625	840
Feb-15	Harvest CLO XI	3i Debt Management	414.7	8.1x	125	200	280	370	525	650	130	225	315	420	635	830
Mar-15	Aurium CLO I	Spire Partners	308.8	9.1x	130	215	300	365	540	665	135	220	315	420	635	830

					Coupon (E + bp)						Discount Margin					
Pricing Month	Transaction Name	CLO Manager	Size (€mn)	Lvg.	AAA	AA	A	BBB	BB	B	AAA	AA	A	BBB	BB	B
Mar-15	Grosvenor Place 2015-1 CLO	CQS	362.0	8.7x	130	210	300	365	540	665	130	210	305	385	600	800
Mar-15	BNPP IP Euro CLO 2015-1	BNP Paribas AM	308.5	8.6x	135	210	305	400	575	725	135	225	325	420	630	830
Mar-15	GLG Euro CLO I	GLG Partners	309.2	8.3x	135	220	310	415	550	660	140	220	315	415	615	815
Apr-15	CVC Cordatus Loan Fund V	CVC Credit Partners	463.5	8.7x	130	200	290	355	500	650	130	200	300	375	565	780
Apr-15	Jubilee CLO 2015-XV	Alcentra	450.8	8.8x	130	200	290	365	495	598	130	200	300	375	550	725
Apr-15	Oak Hill Eur Credit Partners III	Oak Hill Advisors	416.7	7.7x	130	200	290	315	460	575	130	200	300	350	525	700
May-15	Penta CLO 2	Partners Group	414.1	8.0x	130	200	265	335	455	548						
May-15	Orwell Park CLO	GSO/Blackstone	415.0	7.7x	130	200	250	325	445	520	130	200	275	350	515	675
May-15	Avoca CLO XIV	Avoca	516.1	8.5x	130	200	275	355	475	575	130	200	275	355	510	685
May-15	Cadogan Square CLO VI	CSAM	413.5	8.1x	130	200	280	320	450	550						
May-15	Cairn CLO V	Cairn Capital	308.6	8.6x	130	195	275	320	460	600	130	195	275	340	515	675
May-15	Euro Galaxy IV	Pinebridge	335.1	7.7x	130	200	275	335	450	625	130	200	275	350	520	700
Jun-15	Tikehau CLO	Tikehau Capital Europe	354.7	7.5x	136	200	290	325	460	590	140	205	290	375	580	720
Jun-15	Harvest CLO XII	3i Debt Management	413.0	8.6x	134	205	265	325	475	624						
Jul-15	CGMSE CLO 2015-2	CELF Advisors	414.3	8.7x	135	210	290	360	550	650	138	215	300	400	625	810
Jul-15	Black Diamond 2015-1	Black Diamond Capital	420.1	8.1x	133	210	280	370	525	650	156	250	350	508	747	952
Jul-15	Adagio IV CLO	AXA IM	362.3	8.8x	135	215	290	355	535	665	135	215	290	390	610	790
Jul-15	Babson European CLO 2015-1	Babson	416.2	7.8x	135	205	280	355	475	600	135	205	290	385	600	800
Jul-15	Dryden XXXIX Euro CLO 2015	Pramerica	415.1	8.8x	135	215	290	375	535	625	135	217	295	400	600	790

Note: Leverage reflects the ratio of debt to equity in each transaction, and is calculated as total notional of rated liability tranches divided by equity notional. Source: S&P LCD, Bloomberg, Barclays Research

FIGURE 2

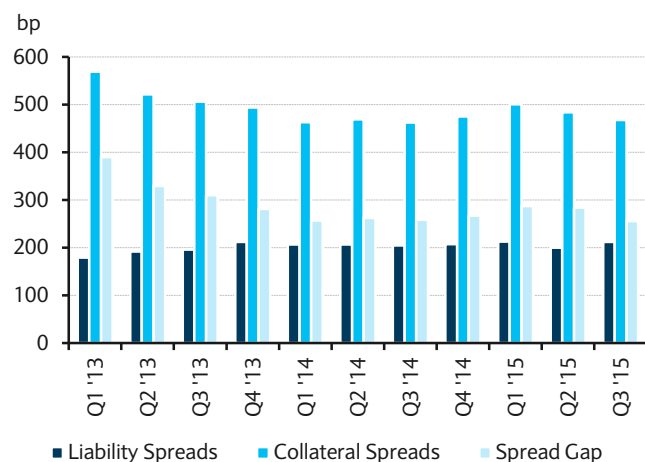
European CLO 2.0 new issue nominal coupon spreads by tranche rating (bp)



Source: S&P LCD, Bloomberg, Barclays Research

FIGURE 3

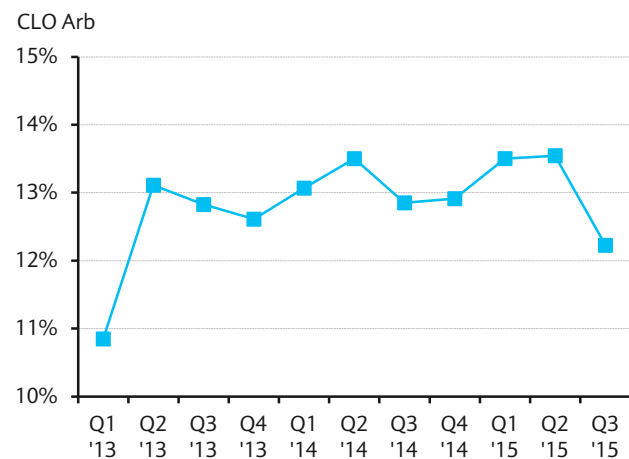
European CLO 2.0 liability and collateral spreads by quarter



Source: S&P LCD, Bloomberg, Barclays Research

FIGURE 5

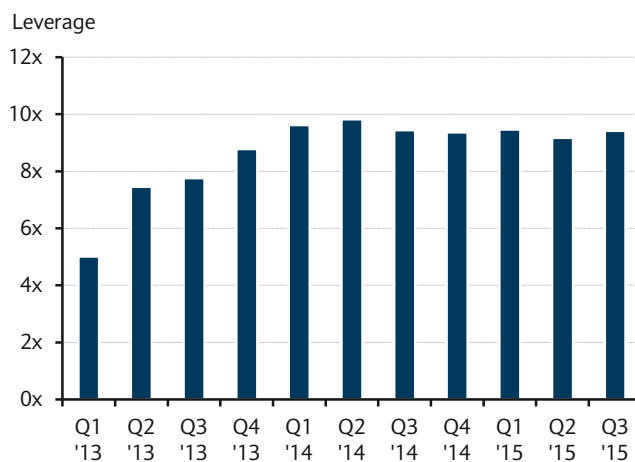
European CLO 2.0 modeled CLO arb by quarter



Source: S&P LCD, Bloomberg, Barclays Research

FIGURE 2

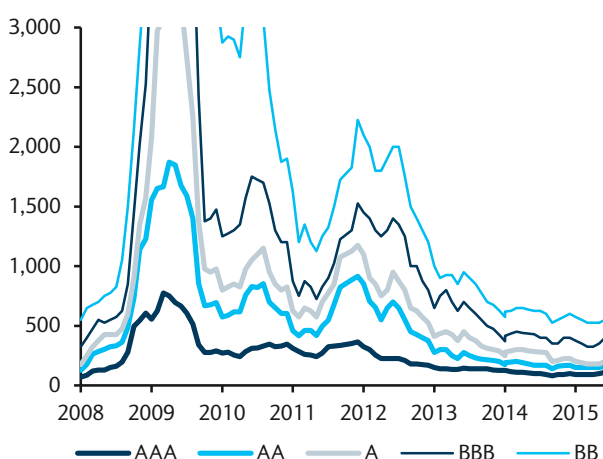
European CLO 2.0 average leverage by quarter



Source: S&P LCD, Bloomberg, Barclays Research

FIGURE 6

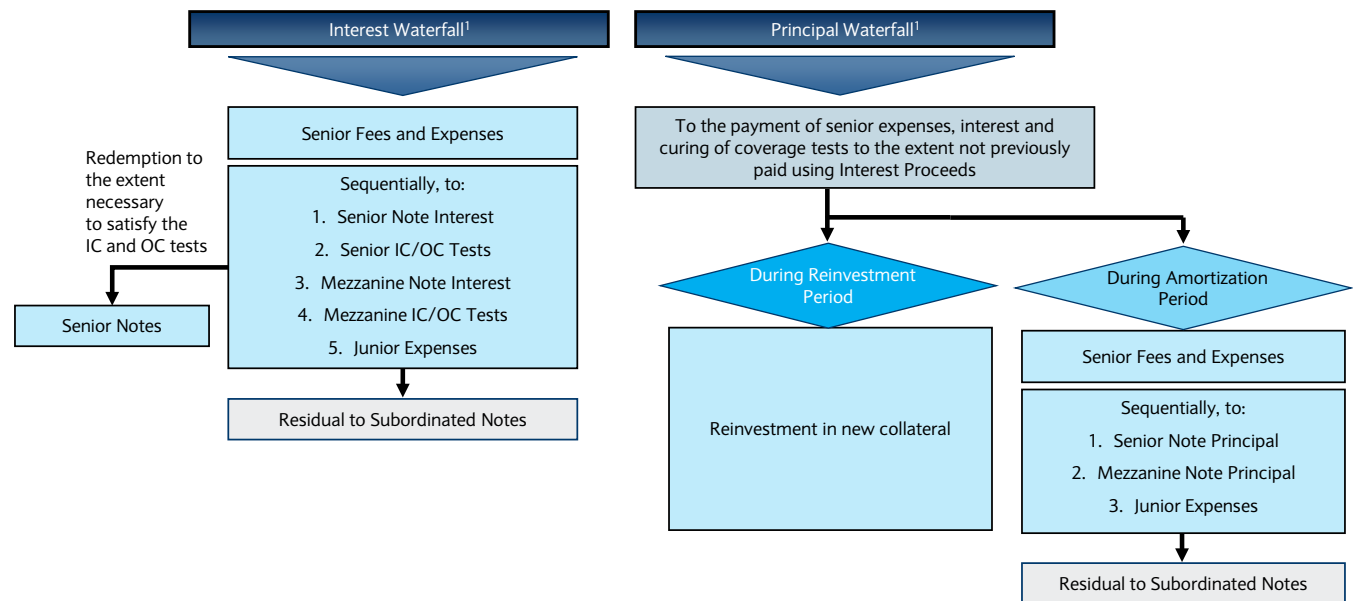
European CLO 1.0 secondary spread history



Source: Barclays Research

FIGURE 7

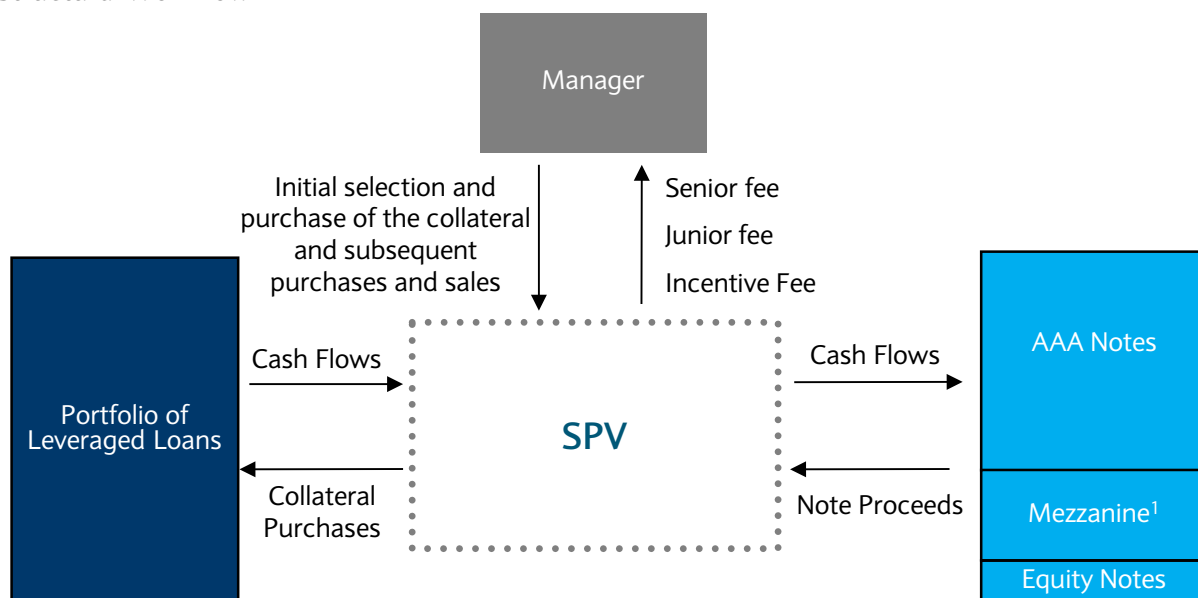
CLO Cash Flow Waterfall



Source: Barclays Research

FIGURE 8

CLO Structural Workflow



Source: Barclays Research

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