



European Securities and
Markets Authority

Thematic Report

**EU CLO credit ratings – an overview of Credit Rating Agencies practices
and challenges**



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1 Executive Summary

1. Collateralised loan obligations (CLOs) are securities backed by portfolios of loans to highly leveraged businesses that are typically rated in the non-investment grade category (leveraged loans). These pools of loans are usually not static. They are actively managed by CLO managers who can trade these loans to maximise performance. CLO securities are split up into tranches of varying risk/return characteristics. CLO instruments are complex instruments due to these structural features and the level of risks attached to the underlying loans. Credit rating agencies (CRAs) assess the creditworthiness of the underlying loans and the tranches of the CLO securitisation structure.
2. Public authorities including the Financial Stability Board (FSB) have been focusing on the potential resurgence of risks in leveraged loans and have been working on the identification of vulnerabilities to financial stability. The main concerns on leveraged loans are i) the excessive level of financial leverage of some corporate issuers, ii) the weakening of underwriting criteria applied by lending entities (e.g. relaxation of covenants) and iii) the expected evolutions in the credit cycle.
3. As CLOs constitute the largest investors in leveraged loans and as some complex securitisations were at the core of the 2008 global financial crisis, public authorities have also turned their attention to CLOs in light of the growing risks from leveraged loans and the fast-growing CLO issuances since 2016.
4. In May 2019 the European Securities and Markets Authority (ESMA) launched a review of the arrangements that CRAs have adopted in order to assign and monitor credit ratings on CLO instruments that are issued and rated in the European Union (EU), including the United Kingdom (UK). ESMA's review focuses on the rating process and methodologies that CRAs follow in order to issue CLO credit ratings. This review forms part of ESMA's monitoring activities, whereby it closely assesses specific asset classes to ensure CRAs comply with the requirements of the CRA Regulation.
5. ESMA's review focuses on the three main rating agencies active in this structured finance asset class as they account for most of the market, namely Fitch Ratings, Moody's Investors Service, and S&P Global Ratings.
6. All three agencies have dedicated analytical teams for assigning and monitoring CLO credit ratings. CRAs have developed their own rating tools to enable their analysts to model the CLO cash-flow structure and to run multiple scenarios in order to assign credit ratings that reflect the ability of each CLO tranche to withstand pre-defined credit events and adverse market evolutions. Within the CLO rating process, data teams play a key role because they capture the characteristics of the deal, which then constitute the starting point for the CLO modelling.
7. Each of the CRAs apply global CLO rating methodologies – one approach for all regions – which typically rely on the corporate rating methodologies in order to determine the credit risk and recovery rates of the underlying portfolio. As with other structured finance

instruments, CLO credit ratings depend mainly on quantitative models simulating the CLO cash-flows and the different events that may affect the creditworthiness of the instrument.

8. This report presents the merits and risks of CRAs' practices in areas such as the rating process, the CLO rating methodologies and the specific aspects of CLO methodologies such as the calibration of the rating parameters, the sensitivity of CLO credit ratings to macroeconomic variables or to rating downgrades or defaults in the portfolio of underlying loans.
9. In reviewing CRAs' practices and methodologies for rating CLOs, ESMA makes a number of observations on risks. These observations relate to:

- a) The internal organisation of CRAs

The CLO rating process is segmented between a CLO analytical team and a corporate analytical team in all CRAs. The degree of segmentation of the rating process varies among CRAs, with some more fragmented than others in their split between leveraged loans analysts and CLO analysts. While ESMA does not expect CRAs to adopt a uniform internal organisation, a smooth and ongoing exchange of information between internal teams is key to ensure a holistic assessment of CLO creditworthiness. CRAs should ensure the capacity for the timely identification of all inherent risks to CLOs.

- b) The interactions with CLO issuers

CRAs mainly interact with CLO arrangers and managers in the rating process. They generally also provide market participants with tools to simulate the expected ratings for different CLO tranches. This means that in practice CLO arrangers and managers are able to identify which CRA may assign the best ratings for each CLO tranche. Given this, it is key that CRAs ensure the independence of their rating process from any influence from their commercial teams and/or arrangers.

- c) Model/third party dependencies leading to potential operational risks

CLO credit ratings are mainly the outcome of models and other rating tools, formalised in applications developed internally which process and analyse CLO data. These models and tools are typically developed by teams that are operationally separated from the rating analysts. The dependency on models and data provided by third parties, and the high automation of processes, present operational risks which need to be monitored by CRAs to avoid potential errors in credit ratings.

- d) Rating methodologies, modelling risks and commercial influence

CLO methodologies are underpinned by assumptions and modelling approaches that can impact credit ratings. ESMA highlights the importance of transparency to market participants on the limitations of methodological approaches. In addition, CRAs should ensure that evolutions in CLO methodologies are not influenced by commercial interests.

e) The thorough analysis of CLOs

The CLOs issued after the 2008 global financial crisis have evolved structurally, with higher level of protection for the most senior tranches. However, some recent evolutions in CLO instruments are a source of potential risk. In particular, ESMA notes that some recent evolutions in CLOs contracts have weakened investor protection by introducing more flexibility for CLO managers and by generally reducing transparency with the addition of unclear clauses, such as on the definitions of loans or tests. In light of this, it is key that CRAs continue to monitor market trends and to perform a thorough analysis of all developments in CLO contractual arrangements.

10. ESMA's report is based on information collected until March 2020. It was too early to assess the aggregated consequences of the Covid 19 outbreak since it will depend on the length of the health crisis and on the effects of the associated government interventions. In this context, ESMA highlights certain risks identified as particularly relevant for the medium term. CLO credit ratings can be very sensitive to methodological approaches and to the assumptions on which credit ratings are based. In this regard, the future developments regarding the Covid 19 outbreak will be an important test for CLO methodologies, notably by testing: i) the approaches and the assumptions for the modelling of default correlation among the pool of underlying loans; and ii) the sensitivity of CLO credit ratings to how default and recovery rates are calibrated. Moreover, the surge of covenant-lite loans prevents lenders and investors from early warning indicators on the deterioration of the creditworthiness of the leveraged loans. Future macroeconomic evolutions may also be a test for the expected recovery rates in CRA models for leveraged loans.
11. In light of this risk, ESMA expects CRAs to continue to perform regular stress-testing simulations and to provide market participants with granular information on the sensitivity of CLO credit ratings to key economic variables. Reverse stress-tests could also provide relevant information to market participants by showing what kind of scenarios and changes in the key parameters could lead to rating actions, including on the senior tranches.
12. ESMA will continue assessing risks to investors, markets and financial stability that CLOs, their credit ratings and associated rating processes, may pose.

2 Introduction

13. Since July 2011, ESMA has been directly supervising CRAs as part of its mission to safeguard the stability of the European Union's financial system by enhancing the protection of investors and promoting stable and orderly financial markets. In particular, Regulation (EC) 1060/2009 on credit rating agencies (the CRA Regulation)¹ aims to enhance the integrity, transparency, responsibility, good governance, and independence of CRAs.
14. In February 2019, ESMA announced in its supervisory Work Programme² that credit ratings of CLOs would be an area of focus for its supervisory actions. ESMA subsequently launched a review in May 2019 into the practices of the largest EU registered CRAs with regard to the validation and review of CLO methodologies as well as the CLO rating process, including not only the first issuance of CLO credit ratings but also their ongoing monitoring.
15. This CLO Thematic Report is based on information collected until March 2020. It summarises ESMA's observations on CRAs' practices for the issuance and monitoring of CLO credit ratings. It also identifies areas where ESMA expects supervised firms to enhance their practices further.
16. In this report, ESMA focuses exclusively on the credit rating aspect of CLOs. ESMA has covered other aspects of CLOs and the associated inherent risks in separate comprehensive reports.³
17. The focus of this report is on the following credit ratings and rating agencies:
 - EU CLOs defined as CLO instruments issued in the EU, including the UK⁴, and which are rated by CRA analysts located in the EU, including the UK; and
 - The three largest CRAs accounting for the vast majority of CLO credit ratings namely Fitch Ratings (Fitch), Moody's Investors Service (MIS), and S&P Global Ratings (S&P).
18. To prepare this report, ESMA organised meetings and collected documentation from the three largest CRAs. Moreover, ESMA had discussions with market participants including arranging banks, CLO arrangers, and CLO investors.

¹ [Regulation \(EC\) 1060/2009 of the European Parliament and of the Council of 16 September 2009 on credit rating agencies](#), Official Journal of the European Union (OJ L 302, 17.11.2009).

² ESMA80-199-273, [ESMA's Supervision 2018 Annual Report 2018 and 2019 Work Programme 2019](#), 19 February 2019, p.56.

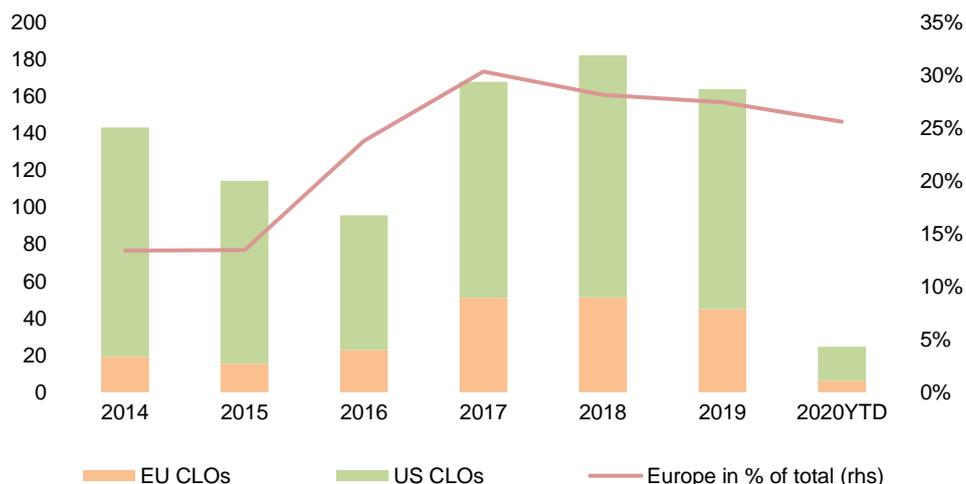
³ ESMA50-165-883, [ESMA Reports on Trends, Risks and Vulnerabilities](#), No.2, 10 December 2019, p.49 (hereinafter 'ESMA TRV September 2019').

⁴ Note that in the Brexit transition period, CRAs operating in the UK remain under the supervision of ESMA.

Why CLO credit ratings matter

19. As highlighted in the Capital Markets Union (CMU) Action Plan⁵, securitisation is an important channel for diversifying funding within the economy. Structured finance (SF) instruments help to transfer and share risks across market participants and across jurisdictions.
20. CLO instruments turn low-rated financial assets – mainly non-investment grade loans – into highly rated tranches by using credit enhancement (e.g. the CLO priority of payments implies that subordinated tranches absorb first losses protecting senior tranches) and diversification techniques (the pooling of loans adds diversification). The instruments are structured so that each tranche offers risk/reward characteristics to suit the specific needs of the different categories of investors, with the CLO credit ratings providing investors with an assessment of the credit risk of each tranche.
21. Like other structured finance products, CLO instruments are complex. The complexity is evidenced by the type of information needed to assess the risk of a typical CLO. This includes information about the expected performance of the underlying loans, the contractual basis of these loans (e.g. covenants), how diversified the loans are, and the tranches and the priority of payments between the different CLO tranches, the so-called ‘waterfall’. Since CLO managers dynamically trade on the portfolio of underlying loans, information on the rules a CLO manager must follow when adopting investment decisions and the expected performance of a particular manager are key to assess CLOs’ risks.
22. After a post-crisis period of subdued securitisation activity, the CLO asset class has grown rapidly in the United States of America (USA) and EU (see chart 1).

Chart 1. CLO issuance in the USA and EU



Note: CLO issuance, in USD bn and in % of total issuance, rhs.
Sources: JPMorgan, ESMA.

⁵ European Commission, [Capital Markets Union Action Plan](#), 30 September 2015.

As of Q1 2019, the outstanding global CLO market is estimated to amount to around USD 740bn globally, which implies that CLOs hold approximately 50% of the global leveraged loan market according to J.P. Morgan.

23. In the aftermath of the 2008 global financial crisis, in a period of persistently low interest rates, with limited availability of investments with higher yields, investors have shown a renewed appetite for riskier exposures and in particular leveraged loans. The growth in CLO issuance since 2016 can be explained by their relatively high expected returns with less perceived risk than many other financial assets with a similar level of credit rating.
24. The failure to assess risks masked by some complex securitisation structures was one of the triggers of the 2008 global financial crisis. Following this crisis, EU regulation was strengthened in order to address the threats to financial stability that the subprime crisis exposed, including the inherent risks to the 'originate to distribute' model.⁶ The EU regulatory framework was strengthened to enhance transparency on securitisation instruments (e.g. loan by loan reporting and the securitisation repositories), the prudential requirements for investors in securitisations were increased (e.g. higher capital requirements for banks) and EU rules prohibit the most complex structures (e.g. ban on resecuritisation deals). In the EU, only institutional investors are allowed to invest in structured finance instruments. Investors are required to perform a minimum due-diligence assessment, including stress-tests⁷, before investing in these instruments.
25. The mechanistic reliance on credit ratings should have reduced over the last few years with increased due diligence requirements for investors and added incentives to develop internal rating models. However, despite these efforts, credit ratings remain one of the main pillars of the framework that investors use for their CLO investment decision-making. Smaller banks may still use credit ratings for their prudential requirements if they are not able to opt for supervisory approaches based on internal models. Also, only larger institutional investors have the capability to gather and analyse the information needed to assess large numbers of CLOs. As a result, CRAs deliver an important service to investors by providing information and transparency on CLOs, in particular on their credit risk through credit ratings.
26. Capital markets' reliance on CLO credit ratings is also increased by business practices. For example, asset managers often have investment mandates that specify limits to institutional investments in terms of credit ratings. In short, CLO credit ratings are important signals of credit quality that are widely relied upon.

⁶ European Central Bank, *The Incentive Structure of the 'Originate to Distribute' model*, December 2008.

⁷ Article 5 of [Regulation \(EU\) 2017/2402 of the European Parliament and of the Council of 12 December 2017 laying down a general framework for securitisation and creating a specific framework for simple, transparent and standardised securitisation, and amending Directives 2009/65/EC, 2009/138/EC and 2011/61/EU and Regulation \(EC\) No 1060/2009 and \(EU\) No 648/2012, Official Journal of the European Union \(OJ L 347, 28.12.2017\).](#)

27. Banks, investment funds, pension funds and insurance companies all have built significant exposures over the latest years. Banks have the largest exposures, that tend to be focused in the senior, more highly-rated tranches.⁸ In the EU, investment funds - Undertakings for the Collective Investment in Transferable Securities (UCITS) and alternative investment funds - also have exposures.⁹ The extent of holdings and the breadth of financial institutions exposed illustrate the potential of CLOs to impact capital markets more widely. The increased diversity of the CLOs investor base including a larger share of non-banks introduces new channels for the transmission of risks in the financial system as well as more complexity for public authorities to identify where the risks are.
28. The accuracy of CLO credit ratings is key to the fair pricing of financial instruments and, thus, to sound decision-making on asset allocation. Accurate and timely CLO credit ratings contribute to early detection of financial risks and help to safeguard financial stability.

3 Introduction to CLO instruments and CLO credit ratings

3.1 CLO instruments and CLO underlying assets

29. CLOs belong to the category of SF instruments. As with other types of asset-backed securities, a special purpose vehicle (SPV) issues a number of securities (tranches) backed by a portfolio of loans to businesses. The manager of a CLO purchases a portfolio of loans at inception. The cash-flows generated by these underlying loans enable the CLO to repay investors in the different securities issued by the SPV. In comparison to most SF instruments, whose underlying assets are static over the lifetime of the transaction, a CLO manager can actively trade on the portfolio of loans. Specifically, the CLO manager can sell or buy new loans to optimise the risk/reward profile of the pool.¹⁰
30. Almost all EU CLOs are issued from SPVs established in Ireland or the Netherlands.¹¹
31. As of today, the EU CLO market is mainly made up of securities backed by portfolios of leveraged loans.¹² While there is no standardised definition, these 'leveraged loans' are mostly loans to non-investment grade companies or credit exposures to highly leveraged borrowers. These are typically borrowers with a ratio of total debt to earnings before interest, taxes, depreciation, and amortization (EBITDA) greater than 4.¹³ It notably includes loans to refinance leverage buyouts transactions (LBO) or mergers and acquisitions (M&A). CLO managers aim at picking up the difference of yields between the portfolio of loans and those of CLO securities, thus they are called 'arbitrage CLOs'.

⁸ Financial Stability Board, [Vulnerabilities associated with leveraged loans and collateralised loan obligations](#), December 2019.

⁹ ESMA TRV September 2019.

¹⁰ For a detailed description of CLO instruments, see Chapter 1 of the FSB Report (2019).

¹¹ <https://www.centralbank.ie/statistics/statistical-publications/behind-the-data/the-whos-who-of-irish-collateralised-loan-obligations>

¹² Before 2007-2008, CLO were mainly backed by a large number of smaller loans originated by commercial banks and sold to CLO to reduce prudential requirements, the so-called 'balance-sheet CLOs'.

¹³ See Section 5 of this report for the references to the ECB and FED definitions.

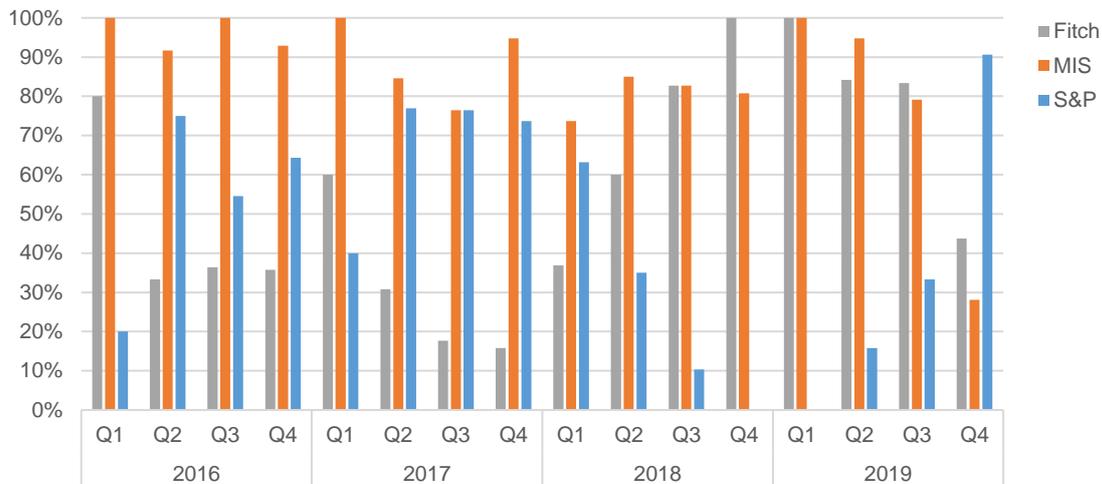
32. On average, an EU CLO is backed by around 100-150 leveraged loans that are mainly originated in the EU, though exposures to the USA can account for about 10 to 20% of the portfolio. Typically, according to the CLO contractual arrangements, loan portfolios must stay diversified in terms of geographical and industry exposures. CRAs publish an overview of CLOs' loan portfolio compositions and their evolution on a regular basis. These studies also show that CLOs are mainly exposed to the same entities. There is an important overlap in the composition of the CLO portfolios with the same leveraged loans being purchased by most of the CLO managers. This is partly explained in the EU by a narrow-leveraged loans market in comparison to the USA.
33. The CLO underlying loans have evolved towards less protections for the lenders with notably the majority of them being 'covenant-lite' (cov-lite). This category of loans refers to leveraged loans that have less protection for lenders through looser covenants and general documentation. Some of these loans could lack or have limited maintenance covenants meaning that the lender may not be informed in a timely way about the deterioration of the creditworthiness of the obligor. In terms of credit risk, it means less monitoring and actionable option for lenders. In addition, it may generate cliff edge effects since the deterioration of the creditworthiness is identified at a late stage when it is more difficult to remediate. The definition of 'covenant-lite' is not standardised but on average the share of cov-lite in leveraged loans in Europe is higher than 85% (see Annex I).

3.2 Key statistics on EU CLO credit ratings

34. Fitch, MIS and S&P are the main CRAs that are active on EU CLO credit ratings. The CRA Regulation requires that all SF tranches are rated by two different CRAs.¹⁴ CRAs compete to provide one of the two credit ratings for each EU CLO.
35. The coverage of rated CLO deals has evolved over the last few years (see chart 2). MIS became the main actor on EU CLO credit ratings since the reopening of the market and rated almost all new deals until mid-2019. Fitch, whose CLO methodology changed in 2017 and in January 2018, increased its share of rated CLO deals from 2018; and S&P, which changed its CLO methodology in July 2019, increased its share of rated CLO deals from the second half of 2019. These patterns suggest that changes in methodologies may be followed by changes in market share.

¹⁴ See Article 8c of the CRA Regulation.

Chart 2. Evolution of CRAs' coverage of CLO credit ratings (in % of new deals)



Sources: CRAs, ESMA

36. Looking beyond these three agencies, smaller CRAs have a limited and stable market share (e.g. ARC Ratings, Scope Ratings, Kroll Bond Rating Agency). These agencies face more difficulties to enter the market and to grow their market shares.
37. As of 1 January 2020, there are about 310 EU CLOs issuers with securities rated by the largest CRAs accounting for around 2,700 EU CLOs tranches.

4 CLO rating process, factors of resilience and risks

4.1 Initial assignment

CRAs internal organisation

38. Generally, when the CRAs' commercial team receives a credit rating request, an analytical team is instructed to process this request. As CRAs have been building expertise in CLOs, they established an analytical team completely dedicated to this asset class (the CLO team). These teams report to the Head of Structured Finance.
39. The EU CLO credit ratings are mainly assigned and monitored from the London offices of the CRAs, with the exception of one CRA which issues a marginal share of its credit ratings from continental Europe.
40. CLO analysts start by collecting all necessary information such as the characteristics of the underlying portfolio, the draft contractual arrangement (i.e. draft offering circular), and the cash-flow information. All of these elements come from different sources (e.g. internal databases, arrangers). All three CRAs rely on specialised data teams for the collection and computation of such information. These data teams may sometimes be shared with other structured finance teams and may rely partly on offshore teams.

41. Corporate analysts, who are in charge of issuing credit ratings on the borrowers of the underlying loans, play no direct role in the assignment of CLO credit ratings. Inputs from the corporate analysts and recovery rates are fed automatically into the tools used for the analytical assessment (unless new CLO credit ratings are being assigned in which case the initial inputs are fed in manually). Corporate analysts do not participate in the preparation of rating committee packages and typically do not participate in CLO rating committees. The degree of segmentation of the rating process varies among CRAs, some are more fragmented than others in their organisation of leveraged loans analysts, CLO analysts, and within the CLO team. A smooth and ongoing exchange of information between internal teams remains key to ensure a holistic assessment of CLO creditworthiness and to detect adverse trends that may impact CLO creditworthiness (e.g. specific industry risks, macroeconomic risks, and market practices).

The role of arrangers and their ability to compute indicative ratings

42. CRAs interact mostly with CLO arrangers (i.e. the investment banks that help to structure the securitisation with the support of a law firm) and less frequently with CLO managers (typically, for the purpose of obtaining clarifications on technical aspects, such as the targeted CLO structure).
43. Generally, arrangers adopt a similar structure across different CLO deals. This has contributed to the standardisation of CLOs deals in terms of transactions' structure, which further eases the assessment to be performed by the CRAs and ultimately by investors.
44. Arrangers are familiar with CRAs' methodologies so their proposed CLO structure generally reflects CRAs' methodological requirements for a targeted rating. Further, given the transparency of CRAs' methodologies, arrangers are able to derive indicative ratings on their own by using specific tools provided by the CRAs or their own models.
45. Generally, the final choice of the two CRAs is made by the CLO manager and the arranger. As they are able to compute precise simulations on indicative ratings, typically they can identify which rating agencies would assign the best credit ratings for the different CLO tranches.

Setting-up the CLO in internal systems and the preparation of rating committees

46. After the collection of the relevant information, CLO analysts proceed to the issuance of preliminary ratings. CRAs issue these preliminary ratings at the pricing of a deal before the underlying portfolio is fully constituted (during the 'ramp-up' period) by using assumptions on the future assets that the CLO manager will purchase.
47. Preliminary ratings are typically assigned around four weeks after a CRA receives a rating mandate. However, this timeframe is dependent on the workload of analysts and on the specifics of the new transactions.
48. Data and analytical teams replicate the cash-flow modelling in the CRA's IT applications (rating tools). In most cases, the CRA's rating tool is specific to CLOs and is different from the tools used for other SF ratings such as the Residential Mortgage Backed Security

(RMBS) or auto-loans. These tools are often in-house products built using standardised software such as Excel with macros (Visual Basic for Application).

49. The rating tools incorporate variables which reflect the parameters and characteristics of the loans to be purchased by the CLO manager. Since the modules of the IT applications are not hard-coded, analysts have the possibility to modify parameters directly in the rating tool to cater for new CLO specifics. Ultimately, the setting-up of the parameters of the rating tool has to be reviewed by other analytical experts or by a different analytical team of the CRA.
50. After the review of the analysts' input of the CLO parameters, CLO analysts run simulations using the cash-flow engine. Analysts run different scenarios and perform several tests in accordance with the CLO ratings methodology in order to assign credit ratings on different tranches. Notably, some of CRAs simulate break-even tests while another CRA estimates the expected loss, to ensure that a given CLO tranche will be able to withstand credit events, spreads, or recovery deterioration in ways that are in proportion to its rating.
51. Typically, two rating committees are convened to assign the preliminary ratings and ultimately to confirm them. At the effective date, the CLO portfolio is fully constituted and the CRA checks its composition. In addition, when the portfolio is fully ramped-up, the CRA also monitors the compliance with the covenants.

4.2 Rating monitoring and review

52. All credit ratings are monitored on an ongoing basis and discussed in a rating committee when required. Credit rating reviews are performed at least once per year or more frequently if any rating event occurs or when there are changes in the CLO structure. However, the process and frequency of CLO credit rating reviews vary from one CRA to another. For example, one CRA runs a monthly prioritisation exercise using specific prioritisation criteria, while a second CRA organises a weekly CLO group meeting to review CLO performance.
53. With the exception of one of the CRAs, the analyst who assigns the initial rating to the CLO is also responsible for monitoring it. The CLO analyst, where a credit event or a CLO structure change is deemed of sufficient importance and magnitude, convenes a rating committee.
54. Corporate rating analysts do not play any direct role in the monitoring or review of the CLO credit rating. Any evolutions in the underlying credit ratings are collected automatically by the rating tools. Two of the CRAs invite leveraged loan experts from the corporate team to regular meetings on CLO performance with the purpose of discussing trends in the leverage loans market.

55. CLO analysts gather information on CLO performance mainly from the collateral administrator¹⁵ or 'trustee', who provides detailed monthly reports. Trustees are well acquainted with the CRAs' methodologies and the eligibility criteria (e.g. spreads, levels, recovery rates). Therefore, in preparing the monthly reports, trustees compute a long list of indicators, including key monitoring tests (e.g. collateral quality tests, interest coverage tests, over-collateralisation tests¹⁶, portfolio profile tests, and reinvestment conditions).
56. CRAs are highly automated in the processing and reviewing of any changes in the monthly data reported by trustees. This implies that the data incorporated in the rating tools is updated monthly, based on the latest available information provided by the trustees, which might then trigger an alert to the CLO analyst where data has not been updated or a breach has been identified.
57. If there are breaches of the CRAs' criteria and tests, CLO analysts might trigger a review of the CLO credit ratings and convene a rating committee if necessary (particularly for significant breaches).
58. Most of the monitoring tests are performed automatically and rely on pre-defined quantitative thresholds. Therefore, there is a risk that some qualitative aspects and/or evolutions in the markets may be overlooked. In addition, CRAs mostly depend on the data reported by the trustees, although, CRAs do not perform detailed due diligence for the trustees, like they do for the CLO managers. In a situation where a trustee fails to adequately report key CLO performance data, there is a risk that a rating review may not be triggered in a timely way. However, CRAs underline that the CLO manager would then ask the trustee to correct its report.

5 Overview of the main CLO rating methodologies

A structured finance asset class with specific features

59. CRA methodologies take into account features specific to the CLO asset class, such as CLOs being actively managed vehicles. The CLO portfolio only becomes static at the end of the reinvestment period, which is typically four years after the closing of a transaction. The CRA methodologies address the dynamic nature of the underlying assets during most of the lifetime of a transaction by agreeing upon trading matrices proposed by arrangers/managers. These matrices provide the expected credit rating for CLOs based on the credit ratings of the underlying assets. These constrain the trading activities of CLO managers because the matrices set out a balance between how many higher rated or lower rated leveraged loans a CLO manager can expect to include in their portfolio to maintain a certain CLO credit rating.

¹⁵ For CLOs, there is a limited list of 5-6 collateral administrators.

¹⁶ Overcollateralisation and interest coverage tests assess respectively the principal value and the interest of the underlying loan relative to the principal value and the interest of the outstanding notes. If these tests fall below the compliance level, cash flows generated by the underlying loans (interest and principal payments) are diverted from the CLO subordinated tranches to pay in priority the CLO senior tranches.

60. CRA methodologies also take into account the fact that loans underlying CLOs are all underwritten by highly leveraged entities. Leveraged businesses have debt-to-EBITDA levels higher than 4 (please see ECB/FED definitions¹⁷). They may also operate on volatile markets that are more sensitive to macroeconomic changes such as sensitivity vis-à-vis the credit cycle, gross domestic product growth, and interest rates levels.
61. CRA methodologies also take into consideration the fact that underlying obligors across EU CLOs and EU CLO managers are relatively limited in number. The EU leveraged loan market is narrower than the USA market with only 200 to 300 issuers. This can lead to significant overlaps in EU leveraged loans backing EU CLOs, where the same obligors underlie multiple CLOs. As EU CLOs are exposed to similar issuers, it can lead CLO managers to implement similar trading strategies and thus lead to potential herding behaviour if the credit quality of the loans is affected.
62. CRA methodologies address the complex dynamics between the quality and price levels of leveraged loans and CLO creditworthiness. On one hand, CLO managers need to ensure that the conditions defined in the contractual arrangement are fulfilled, which involves trade-offs between the underlying assets' credit ratings, recovery rates and the spreads on these assets. On the other hand, leveraged loans are traded on financial markets. So in reaction to the evolution in asset characteristics, a CLO manager may be forced to change the composition of the loan portfolio in a way that meets pre-defined levels of risks, spreads, recovery and diversity, so as to keep the CLO credit rating unchanged.

Global methodologies

63. All three CRAs have developed CLO methodologies that are global. They do not apply specific methodological approaches for EU CLO instruments. This allows for comparability of CLO credit ratings irrespective of the geographical location, which addresses the fact that some assets are originated in different jurisdictions. The main local differences are captured through the credit ratings of the underlying corporate loans, and not by the CLO methodologies. National specificities are reflected in the CRA methodologies for corporates and through recovery ratings, which assess the share of the outstanding loan that an investor could recover if a default occurs on this loan. These recovery rates typically depend on the borrower and potential guarantee but also on national specificities such as differences in national bankruptcy regimes.

Corporate credit ratings

64. The portfolio of leveraged loans evolves over time as a CLO manager exercises their strategy within the limits set out in the CLO contractual arrangements. For the initial issuance of a CLO credit rating, CRAs adopt the assumption that CLO managers will use most of the available flexibility of the contractual arrangements. This means that CRAs

¹⁷ Federal Reserve System, [Frequently asked questions FAQ\) for Implementing March 2013 Interagency Guidance on Leveraged Lending](#), 7 November 2014 and European Central Bank, [Guidance on leveraged transactions](#), May 2017.

assume that managers choose as many lower-rated underlying ratings in their portfolios as this flexibility allows.

65. CLO credit ratings rely on corporate credit ratings (mainly internal and to a very limited extent from other CRAs) and credit estimates to assess the creditworthiness of the loans underlying the CLOs.
66. ESMA notes that approaches may differ across CRAs for the assessment of underlying assets. Some CRAs assess the creditworthiness of individual loans when the portfolio of the CLO is populated, while others use the CLO covenants and matrices of covenants to model the expected portfolio. In practice, the latter CRAs check on the CLO managers' compliance with covenants when the CLO is issued using mainly the trustee's report, with follow up checks only if in breach. Some CRAs model the expected portfolio to have a revolving portfolio of underlying assets, as is the market practice for CLO managers.
67. There have been some improvements in requirements and practices since the 2008 global financial crisis. Some CRAs have implemented limits to the share of underlying loans without assessments of creditworthiness, which allows the credit ratings of the CLOs to better reflect the level of risk in the portfolio at the point of issuance.
68. There are also limits with the approaches outlined in paragraph 66. As indicated in section 3.1, CRAs need a good coverage on the corporate sector to rate CLOs. This may constitute a difficulty for smaller CRAs as they need to have both a tool for rating CLOs as well as a large corporate credit ratings coverage. It should also be noted that corporate credit ratings are paid by the corporate rated entities and not by the CLO managers. Smaller CRAs could use credit ratings assigned by other CRAs but it may be more expensive. It was noted that some CRAs apply a conservative approach when using credit ratings from a different CRA in the assignment of a CLO credit rating (e.g. punitive notching when using credit ratings from a third party).
69. Leveraged loan markets have also seen recent evolutions in the calculations of certain key metrics for the assessment of CLO deals, such as EBITDA levels. The reporting entities are notably using accounting practices such as 'add-backs' which may reflect very optimistic assumptions in revenues forecasts.¹⁸ For instance, immaterial elements could be included in EBITDA for upcoming years. This can make the corporate credit ratings less accurate (please see the ESMA report on alternative performance measures of 20 Dec 2019).¹⁹

Data and model dependency

70. CRAs have developed CLO methodologies which typically model:
 - i) the credit risk of the pool of loans, and

¹⁸ It includes inter alia expected synergies in case of a merger between two companies.

¹⁹ ESMA, Press release: [EU Issuers need to improve their disclosure of alternative performance measures](#), 20 December 2019.

ii) the cash flows for the CLO tranches (involving the payment priorities, waterfall etc.)

71. CRAs typically have formalised models and other rating tools developed internally which process and analyse CLO data (internal applications). The way CLO structures are parametrised in CRA models and internal applications is key to the determination of CLO credit ratings.
72. Data teams are mainly responsible for processing the data required for modelling CLO deals. These data teams are typically outsourced to a separate external entity or performed by a separate team within the CRA. CLO analytical staff perform some non-exhaustive checks on the data provided by these data support functions.
73. ESMA notes that there are risks associated with CRA analysts becoming increasingly dependent on the output produced by internal applications to analyse, and perform checks on, the data. CRAs face many operational risks, as CLO credit ratings are highly dependent on the accuracy of the modelling of the CLO waterfall and on the adequacy of model quantitative parameters and inputs (such as default rate, recovery rate, and default correlation/diversification factor) from the data teams. ESMA sees a risk that analysts face growing difficulties to check if inputs are well defined, as the analytical tools become more complex and as the CRA analysts become less familiar with how the data have been processed by the internal applications used as analytical tools.
74. CRAs use very long historical series of default observations for back-testing and stress-testing of the models (back to the Great Depression of the 1920s and 1930s for some CRAs on corporates). But market circumstances were different in historical periods, for example in the 1920s structured finance instruments did not yet exist. ESMA cautions that although much data may be available for back-testing and stress-testing, in practice some of these data may not be fully applicable to modern corporates (see Section 6.1).
75. CRA methodologies also define stress-tests to methodological assumptions. These tests require that CLO tranches need to demonstrate resilience/robustness (in keeping their credit rating level) in light of the applied stresses. These stresses are representative of typical economic downturns and high default scenarios (see Section 6.2).
76. CRAs typically base their stress scenarios on previous periods of stress (e.g. some CRAs by comparing with Collateralised debt obligation (CDO) squared during the financial crisis). However, there are clear difficulties in measuring and predicting default correlation in stress periods as there are relatively few observations in crises and every crisis is different. Although this is a limitation for all CRA models, in ESMA's view, it is particularly relevant to CLOs due to the important role played by default correlation in determining expected losses for CLO tranches (see Section 6.3).

Qualitative assessment

77. CRA CLO methodologies also include qualitative factors.
78. CRAs undertake assessments of the quality of CLO managers. CRAs mainly look at a CLO manager's technical capacity (e.g. IT systems) and expertise (primarily the track-

record). This analytical approach ensures that the specifics of each deal are well reflected in the rating process.

79. The assessments of non-standard legal features present a major challenge for CLO analysts as these can have a large impact on the expected cash-flows. ESMA notes, for example, that the definition of some categories (such as turbo redemption features impacting the CLO waterfall and the allocation of cash-flows among CLO investors) of the underlying assets or certain clauses (e.g. excluding from the definition of cov-lite loans, loans if they are pari passu with another loan of the same borrower having a maintenance covenant) can be misleading for investors as the characteristics of the CLO are more difficult to understand.
80. Most CRA methodologies assess the percentage of cov-lite in the underlying loans at issuance and the flexibility given to CLO managers. As indicated in paragraph 33, ESMA notes that CLO managers often have high proportions of cov-lite loans.
81. The very large share of CLO underlying loans with this feature means that there is a greater likelihood that the difficulties of the obligor are only known at a late stage (in comparison to leveraged loans with stricter covenants). ESMA also observes different approaches here, with some CRAs adjusting recovery rates downwards for cov-lite loans, while other CRAs consider cov-lite loans as having similar recovery rates to leveraged loans with covenants.
82. CLO arrangers increasingly introduced flexibility in the CLO contract clauses in response to demand for more flexible CLOs from managers. In fact, ESMA notes that some CRAs publish analyses of these new contractual clauses on a regular basis. A careful assessment of contract clauses by CLO analysts is key to the quality of credit ratings.

6 EU CLO credit ratings: trends, factors of resilience and risks

83. Credit ratings must include a thorough analysis of all available information and avoid amplifying procyclical behaviours. Indeed, credit ratings should not underestimate risks in benign times and should not over-react to periods of stress in the financial markets (as was observed for structured finance ratings during the 2008 global financial crisis).
84. There are three necessary conditions to limit financial stability risks from CLO credit ratings:
 - CLO rating models should be adequately calibrated;
 - CRAs, investors and public authorities need to have granular information on the sensitivity of CLO credit ratings to key macro variables; and
 - Investors and public authorities should be clearly informed on the limits of rating models and the risks from potential tail events.

6.1 Back testing and (re)calibration of CLO models

85. CRAs focus on default rates when calibrating modelling parameters. Historically, CLO instruments have belonged to a low-default market segment. This is explained by the fact that CLOs are relatively recent products (since the 1990s) and they have benefitted from a favourable economic context after the 2008 global financial crisis. Since 2009 there have been accommodative monetary policies leading to flexible refinancing possibilities for the CLO underlying loans easing potential liquidity issues. In addition, CLOs had a very limited exposure to the real estate sector, which was the main root-cause of securitisation stresses in the 2008 global financial crisis. This has helped to re-finance CLOs and has limited default events on CLOs.
86. CRAs must have in place a function (the review function) that is responsible for reviewing any changes to methodologies and that is responsible for reviewing all methodologies at least annually. CRA methodologies and models also need to be validated before application. In particular, CRAs must validate historical robustness, discriminatory power, and the predictive power of methodologies (please see the CRA Guidelines on the Review of Methodologies²⁰ for more details).
87. With regard to the calibration of CLO methodologies and models and the role of the review function, ESMA observes that all three CRAs changed their methodologies in the years immediately after the 2008 global financial crisis. However, the timing of the recalibrations since the initial changes after the crisis has not been consistent across CRAs. One CRA changed its methodology in 2011, and since then has not recalibrated its models. Another CRA recalibrated its models as recently as 2019, without any recalibration being recommended by its review function in the preceding years. The third CRA refined its methodology in 2017 and 2018.

6.2 CLO credit ratings and sensitivity to macro variables / stress-testing exercises

88. CLO credit ratings depend on the models used by CRAs to assess the credit risk of the underlying portfolio of leveraged loans. These portfolio credit models rely on a range of information about the portfolios of leveraged loans: loan ratings, loan terms, asset types, sectors and countries. In particular, this information is fed into the credit model in the form of key input parameters, such as default probabilities of the loans, recovery rates and some measure(s) of default correlation for assets within loan pools.
89. From these inputs, the portfolio credit model generates expected losses and default rates for the underlying loans treated as a pool. By calculating the resulting cash-flows between the tranches, using the cash-flow model, rating agencies can then assess the likelihood of default by tranche and assign credit ratings accordingly.

²⁰ ESMA/2016/1575, [Final report – Guidelines on the validation and review of Credit Rating Agencies' methodologies](#), 15 November 2016.

90. Each input to the model could, in principle, be subject to a stress to assess its importance in the portfolio credit model and to identify how possible inaccuracies in the inputs could affect CLO credit ratings' accuracy.
91. Before the beginning of the Covid 19 outbreak, the focus of stress-tests carried out by CRAs was mainly in three areas:
 - Credit cycle and stressed default probabilities on leveraged loans;
 - Interest rates and refinancing risks for underlying obligors; and
 - Recovery rates on leveraged loans.

At individual rating level

92. Overall, CRA analysts stress the model inputs when assigning and reviewing CLO credit ratings. Using CRAs' rating tools and internal applications, they can apply shocks on the key inputs used to assign a CLO credit rating. They usually apply stresses on parameters such as credit risks, recovery rates, interest rates, or concentration risks.
93. These stresses allow CLO analysts to gauge the potential impact on the levels of credit ratings and determine the level of necessary cushion in credit ratings. The simulations also inform rating committee members about potential risks and the level of dependency of CLO credit ratings.
94. These shocks focus mainly on individual parameters. For instance, some CRAs test the consequences of an increase in interest rates by focusing only on the CLO structure. However, this test does not encompass potential effects on the underlying loans, which may be highly relevant for leveraged loans.

At CLO sector level

95. Beyond the stress-test applied on individual credit ratings, CRAs have published simulations on potential shocks on the CLO asset class. These aim at raising investors' awareness on specific risks and on the potential effects in a sector.²¹
96. ESMA notes that the content of these reports can help some market participants to better identify and quantify potential adverse evolutions.
97. At the same time, ESMA also observes that these reports are not published on a regular basis and often do not provide granularity on the results. Among other events, CRAs base the stressed assumptions on the experience of the 2008 global financial crisis, an idiosyncratic period characterised by an increase in mortgage defaults amid high leverage in the household sector. The 2008 global financial crisis was an extreme event that led to global recession and corporate defaults, however this period might not be the most appropriate benchmark for stressed assumptions for CLOs. Indeed, the crisis did not

²¹ S&P, Press release: [CLO Spotlight: To 'B-' Or Not To 'B-'? A CLO Scenario Analysis in Three Acts](#), 26 November 2019.

originate in the corporate sector, corporate loan underwriting standards were tighter and leverage in the corporate sector was below current levels. As a result, the stress-test applied may not reflect potential future tensions in financial markets of a different nature. In addition, stress-tests do not usually include stressed default correlations, which are key for the rating of the senior CLO tranches.

98. Finally, ESMA notes a methodological limitation of these stress-tests. Indeed, some CRAs set their rating assumptions, including default correlations, so that all AAA tranches can survive the worst expected crisis as defined by their fundamental credit views. This implies mechanically that stress-tests would conclude that AAA tranches could survive the worst crisis. CRAs do not perform reverse stress-testing on CLO credit ratings to predict what type of economic scenarios could lead to defaults of the most senior tranches.

6.3 CLO credit ratings, dependence of default rates in CLO portfolio and model risks

99. CLO rating methodologies take into account the credit risk of the individual loans as well as the loan portfolio diversification in assessing the credit risk of different CLO tranches. If a portfolio of underlying assets is well diversified, its losses are expected to be lower than a securitisation backed by a pool of more concentrated assets (e.g. from the same industry or sector). Diversification benefits are maximized when there is a low level of default correlation among the underlying leveraged loans.
100. Measures of default correlation (or diversification) of the pool of loans are key because they have a significant impact on the default probability of the highest-rated tranches. However, they are difficult to estimate accurately. The quality of correlation measures based on historical data is limited by the infrequency of defaults²² and the fact that each historical crisis is distinctive and at best a partial guide to future crises. Alternatively, it is possible to calibrate default correlation based on expert judgment or credit views expressed by CRAs, but this is necessarily limited by the ability of experts and credit reviews to predict the future stress periods that might arise.
101. The 2008 global financial crisis showed that CRAs underestimated default correlation for Mortgage-Backed Securities (MBS) and CDOs. When the USA housing market started to decline nationwide, default correlation increased, resulting in higher expected losses and a range of rating downgrades across MBSs and CDOs (Financial Crisis Inquiry Commission, 2011).²³
102. Given the uncertainties associated with default correlations, CRAs adopt various approaches to be cautious about tail-events – where defaults co-occur in the underlying pool of loans and tranches suffer losses. For example, some CRAs put additional

²² Nickerson, J. and Griffin, J. (2017), Debt correlations in the wake of the financial crisis: What are appropriate default correlations for structured products?, *Journal of Financial Economics*, 125(30), pp. 454-47.

²³ https://fcic-static.law.stanford.edu/cdn_media/fcic-reports/fcic_final_report_full.pdf

emphasis on the tail of the distribution of losses (for CRAs using simulations) or introduce add-ons to default probabilities (default probability stress factors).

103. While difficult, the estimation and modelling of default correlations remains important. Where default correlations are underestimated, credit ratings of CLO tranches may understate credit risk. As a result, in a situation where the defaults in the underlying loans co-occur beyond what is anticipated by the default correlation (or diversification) assumptions in the model, then some CLO credit ratings may no longer be reliable indicators of credit risk. These credit ratings may be subject to sudden downgrades in such a situation, in turn fuelling investor uncertainty and reducing market confidence. This mechanism could also lead to procyclical behaviour.

Model risk

104. More broadly, the accuracy of the CLO credit ratings depends on how well the models used by the rating agencies capture the underlying credit dynamics. One important way to assess model risk is to analyse how different portfolio credit risk models (for example Gaussian copula vs other types of copula) lead to different outcomes in terms of default probability. This kind of analysis permits an assessment of how and to what extent model characteristics might lead to rating inaccuracies (see box 1). It is therefore important that CRAs take into account alternative portfolio credit risk models and perform sensitivity analyses.

Box 1. Model risk in CRA portfolio credit risk models

Numerous academic research papers have analysed how approaches for modelling the individual risk and the correlation of the defaults can ultimately impact the credit ratings of structured finance products. For instance, Fender and Kiff (2005)²⁴ show how alternative modelling approaches may lead to differences in the rating outcome of securitisation tranches, when CRAs have different assumptions to model correlation between underlying assets. In this article, the authors compare the binomial expansion technique (BET) developed by MIS with the methodology based on Monte Carlo simulations applied by S&P or Fitch. They conclude that correlation assumptions have a large impact on expected loss estimates and potentially on tranche credit ratings. The authors also show that the different modelling approaches used by the CRAs can have idiosyncratic limitations. One example is from the BET developed by MIS, which approximates the behaviour of the actual pool of assets with a portfolio of hypothetical uncorrelated assets that follow a binomial distribution and whose number (the diversity score) is determined by how diverse the actual assets are spanning in different sectors. The use of diversity scores can underestimate senior tranche losses when default correlations increase, because diversity scores would need recalibration at a lower level to capture the higher correlations. More recently, MIS has introduced stress factors on the probability of default to better model losses. Relatedly, in the context of CDO, Coval

²⁴ Bank for International Settlements, Working Papers No 163 - [CDO rating methodology: Some thoughts on model risk and its implications](#), November 2004 (hereinafter 'BIS Working Paper No 163').

et al. (2009)²⁵ also analyse how changes in default correlation can lead to losses and downgrades for highest rated tranches.

Nickerson and Griffin (2017)²⁶ find that CRAs tend to underestimate default correlation for CLOs. The authors estimate that CRAs assume a default correlation of 3%, against a higher estimate of 12% based on a model that includes observable and unobservable risk factors. The authors conclude that credit risk is understated by 26% when comparing their estimates of default correlation with the assumptions used by CRAs.

More recently, Bouveret et al. (2019)²⁷ analyse the CRA modelling approaches of Monte-Carlo simulation for joint extreme events. The authors perform simulations on the consequences of correlated defaults on leveraged loans on expected losses and credit ratings. The simulations follow a modelling approach similar to that applied by S&P and Fitch for CLOs (the Gaussian copula) before considering alternative models (i.e. Clayton, Student copula). The outcome of these simulations describes how modelling approaches and different assumptions on default correlation can lead to potential differences in the credit rating of the different tranches. In addition, the article highlights some limitations of the modelling approaches used by the CRAs. The Gaussian copula modelling approach (applied by S&P and Fitch) has default dependence entirely characterised by the correlation coefficient, which implies that the occurrence of extreme events is underestimated as the probability of having simultaneous defaults in good, normal, or bad states is identical. In other words, the drawback is that the Gaussian copula is unable to model the co-occurrence of defaults under extreme conditions differently from non-extreme conditions. In contrast, by applying other copula models, such as the Student and Clayton copulas, it is possible to introduce a more complex dependence structure, where the likelihood of defaults happening together can change depending on the extremity of the situation (tail dependence).

Uncertainty regarding relevant variables

105. In addition, default correlations can change during the credit cycle.²⁸ For example, in periods of stress in the global economy, the correlation rate of defaults between individual loans increases as many industries, sectors or countries are affected simultaneously. For CLOs, it would mean that more leveraged loans would default together than what has been modelled (so that in practice the diversification effect would play less of a role in absorbing losses), and that higher CLO tranches could face losses. It is therefore

²⁵ Coval, J., Jurek, J. and Stafford, E. (2009), The Economics of Structured Finance, *Journal of Economic Perspectives*, 23(1), pp. 3-25.

²⁶ Nickerson, J. and Griffin, J. (2017), Debt correlations in the wake of the financial crisis: What are appropriate default correlations for structured products?, *Journal of Financial Economics*, 125(30), pp. 454-47.

²⁷ ESMA TRV September 2019, p.49 and following.

²⁸ Nickerson, J. and Griffin, J. (2017), Debt correlations in the wake of the financial crisis: What are appropriate default correlations for structured products?, *Journal of Financial Economics*, 125(30), pp. 454-47

important that all key relevant variables, including default correlation, are regularly subject to stress-tests and sensitivity analyses, to identify and explore the limits.

106. The points described in box 1 also underline the importance of CRA's transparency on their modelling approaches and on the limitations of their approaches.²⁹ Investors should be in a position to understand that ratings' methodologies are underpinned by assumptions and that different modelling approaches ultimately imply limits to the accuracy of credit ratings in different situations. This dependency is even stronger in extreme scenarios, such as in global crises.

7 Main supervisory concerns

Internal organisation of CRAs and interactions with issuers

107. ESMA observes that the CLO rating process is clearly segmented for all CRAs between a dedicated CLO analytical team and a corporate analytical team. The degree of segmentation of the rating process varies among CRAs, with some more fragmented than others in their split between leveraged loans analysts, CLO analysts, and within CLO analytical teams. While ESMA does not expect CRAs to adopt a uniform approach, it expects smooth and ongoing exchanges of information between internal teams. This is key to ensure a holistic assessment of CLO creditworthiness. Further, CRAs should ensure the capacity to identify all inherent risks of CLOs and to detect adverse trends that may impact on CLO creditworthiness (e.g. specify industry risk, macroeconomic risks, market practices) in a timely way.
108. CRAs mainly interact with CLO arrangers and managers in the rating process. They also provide market participants with tools to forecast the expected credit ratings for different CLO tranches. This enables CLO arrangers and managers to identify which CRA may assign the best credit ratings for each CLO tranche. Given this, it is key that CRAs ensure the independence of their rating process from any influence from their commercial teams and/or arrangers.³⁰
109. CLO managers often look for higher flexibility in CLO contractual arrangements so as to be able to actively manage the portfolio of underlying loans backing the transactions. Issuers generally agree with this increased level of flexibility in the arrangements. CRAs also play a leading role in contributing to shape the market and to develop best practices. In a context of high levels of issuance, such as those seen recently during the 2016-2019 period, ESMA emphasises the importance of CLO rating methodologies being transparent

²⁹ The relevant research articles: (1) Coval, J., Jurek, J. and Stafford, E. (2009), The Economics of Structured Finance, *Journal of Economic Perspectives*, 23(1), pp. 3-25; (2) Nickerson, J. and Griffin, J. (2017), Debt correlations in the wake of the financial crisis: What are appropriate default correlations for structured products?, *Journal of Financial Economics*, 125(30), pp. 454-47; and (3) Li, L. and Chen, C. (2018), The domino effect of credit defaults: test of asymmetric default correlation using realised default data, *Applied Economics*, 50(44), pp. 4803-4813.

³⁰ ESMA also notes potential risks posed by new market practices, such as 'Zig-zag' credit ratings of the CLO structure whereby not all CLO tranches are rated by the same CRA (e.g. senior tranches are rated by one agency and the rest by a different rating agency).

with regard to the framing of the criteria to assess this level of flexibility for CLO structures, which avoid potential bias in CLO credit ratings. CRA methodologies should continue defining clearly the expected constraints on the trading activities of CLO managers.

Model / Third-party dependencies and Operational risks

110. CLO credit ratings are mainly the outcome of models, and other rating tools, formalised in applications developed internally which process and analyse CLO data. These models and tools are typically developed by teams that are operationally separate from the rating analysts. This adds model dependency for CLO analysts, as the output of these models and tools form the basis for the credit ratings. ESMA notes that potential errors in key data inputs, as well as in CLO models and automated processes, may generate inaccuracies in CLO credit ratings.
111. ESMA also notes that CRAs are dependent on data computed by CLO trustees/collateral administrators. CLO analysts primarily use these data for their ongoing rating monitoring and surveillance.
112. The dependency on models and data provided by third parties, and the high automation of processes, presents operational risks to CRAs. ESMA expects CRAs to have sufficient controls and testing in place in order to mitigate such operational risks and to avoid errors in credit ratings.

CRA rating methodologies and modelling risks

113. ESMA reminds market participants that CLO ratings' methodologies are underpinned by assumptions and modelling approaches that can ultimately impact credit ratings. CRAs should be transparent on their modelling approaches and on the limitations of their approaches. This is key for investors to better understand CLO credit ratings, and it is even more important in extreme scenarios such as global crises.
114. Keeping in mind that the three largest CRAs compete to build their market shares in CLO credit ratings, ESMA will continue to monitor that CLO rating methodologies are "rigorous, systematic, continuous and subject to validation based on historical experience, including back-testing".³¹ CRAs should prevent commercial objectives influencing changes in their CLO methodologies, and leading to the risk of potential inflation in CLO credit ratings as there are signs that changes in methodologies may be followed by changes in market share.

³¹ Article 8(3) of the CRA Regulation.

Thorough analysis of CLOs³²

115. The structures of CLOs issued after the 2008 global financial crisis have evolved towards a higher level of protection for the most senior tranches through additional credit enhancement and more subordination.³³ However, ESMA notes that innovation in CLO contractual arrangements have weakened investor protection by way of introducing more flexibility for CLO managers and generally reducing transparency with unclear clauses, such as for the definition of the loans or tests.
116. In light of this, ESMA expects that CRAs continue to monitor market trends and perform a thorough analysis of all relevant CLO characteristics. It is also key that CRAs continue to publish research notes on the evolution of CLO contractual arrangements.

8 Potential impact of Covid 19 outbreak and next steps

117. This report is based on information collected until March 2020. It was too early to assess the impact of the latest economic and financial developments. The Covid 19 outbreak will impact all economies. However, the aggregated consequences will depend on the length of the health crisis and on the mitigating effects of the associated government interventions. In this context, ESMA identifies certain risks as particularly relevant for the medium term.
118. As explained above, CLO credit ratings can be very sensitive to methodological approaches and to the assumptions on which credit ratings are based. In this regard, the Covid 19 outbreak will be an important test of CLO methodologies, notably by testing: i) the approaches and the assumptions for the modelling of correlations of defaults for underlying loans; and ii) the sensitivity of CLO credit ratings to how default and recovery rates are calibrated.

Modelling assumptions, testing the limits of CLO credit ratings

119. With the Covid 19 outbreak, the credit quality of the CLO loan portfolio has started to deteriorate, with CRAs downgrading or issuing negative outlooks on some leveraged loans included in CLO portfolios. In addition to being a turnaround in the credit cycle, the evolution in credit quality is global and contemporaneous. All geographic areas are

³² The relevant legal basis is:

Article 8 (2) sets forth that “A credit rating agency shall adopt, implement and enforce adequate measures to ensure that the credit ratings it issues are based on a thorough analysis of all the information that is available to it and that is relevant to its analysis according to its rating methodologies.”

Article 8(5) sets forth that “A credit rating agency shall establish internal arrangements to monitor the impact of changes in macroeconomic or financial market conditions on credit ratings”

Point 3 of Part II of Section D of Annex 1, sets forth that “Where a credit rating agency issues credit ratings of structured finance instruments, it shall accompany the disclosure of methodologies, models and key rating assumptions with guidance which explains assumptions, parameters, limits and uncertainties surrounding the models and rating methodologies used in such credit ratings, including simulations of stress scenarios undertaken by the agencies when establishing the ratings. Such guidance shall be clear and easily comprehensible.”

³³ For a detailed description of CLO instruments, see Chapter 2 – section 2.2.3 of the FSB Report (2019).

impacted, including most countries where the CLO underlying loans are originated. Moreover, some economic sectors, to which CLOs are exposed, are also being affected.

120. Against this background, the geographic and sectoral diversification features, on which the credit ratings of the CLO senior tranches depend, will be tested. It is too early to assess the final outcome of the credit shock on EU CLOs, but the correlation of defaults in the underlying pool of leveraged loans may exceed the historical observations on which CRAs have calibrated their rating models. As a result, impacts on CLO credit ratings might be greater than originally anticipated.
121. Therefore, it is key that CRAs not only explain these risks to market participants but also that CRAs timely communicate their assessment of the potential impact on credit ratings.

Sensitivity of CLO credit ratings and accuracy of rating parameters

122. The sensitivity of CLO credit ratings to these adverse macroeconomic evolutions also depends on the inherent characteristics of the CLOs issued in recent years. Most of the underlying loans, as cov-lite, offer a lower degree of protection to the lenders than before. Lenders and investors are notably missing early warning indicators on the deterioration of the creditworthiness of the borrowers. This may consequently delay restructuring actions. The recovery rates expected for these leveraged loans in CRAs' models will be tested for the first time. Similarly, underlying loans that have benefited from optimistic accounting practices such as 'add-backs' will also be tested.
123. In this context, it is essential that CRAs continue to perform regular stress-testing simulations and to publicly provide market participants with granular information on the sensitivity of CLO credit ratings to key macroeconomic variables. These simulations should also include sensitivities of CLO credit ratings to changes in leveraged loans ratings. Reverse stress-tests could also provide relevant information to market participants by showing what kind of scenarios and changes in the key parameters could lead to rating actions, including on the senior tranches.
124. Following the publication of this report, ESMA will continue to monitor the developments in leveraged loans and CLO markets. It will also closely follow evolutions in credit ratings and rating practices. Additional analyses would be shared in ESMA's regular publications, such as the ESMA Reports on Trends, Risks and Vulnerabilities.

9 List of Abbreviations

CLO	Collateralised Loan Obligation
CRA	Credit Rating Agency
CRA Regulation	Regulation (EC) 1060/2009 of the European Parliament and of the Council of 16 September 2009 on credit rating agencies
BET	Binomial expansion technique
BIS	Bank for international Settlements
EBITDA	Earnings before interest, taxes, depreciation, and amortization
ECB	European Central Bank
ESMA	European Securities and Markets Authority
EU	European Union
FED	US Federal Reserve Bank
Fitch	Fitch Ratings
FSB	Financial Stability Board
IC tests	Interest coverage test
MIS	Moody's Investors Service
OC tests	Over-collateralisation tests
RMBS	Residential Mortgage Backed Security
S&P	S&P Global Ratings
SPV	Special Purpose Vehicle
UCITS	Undertakings for the Collective Investment in Transferable Securities
UK	United Kingdom
USA	United States of America

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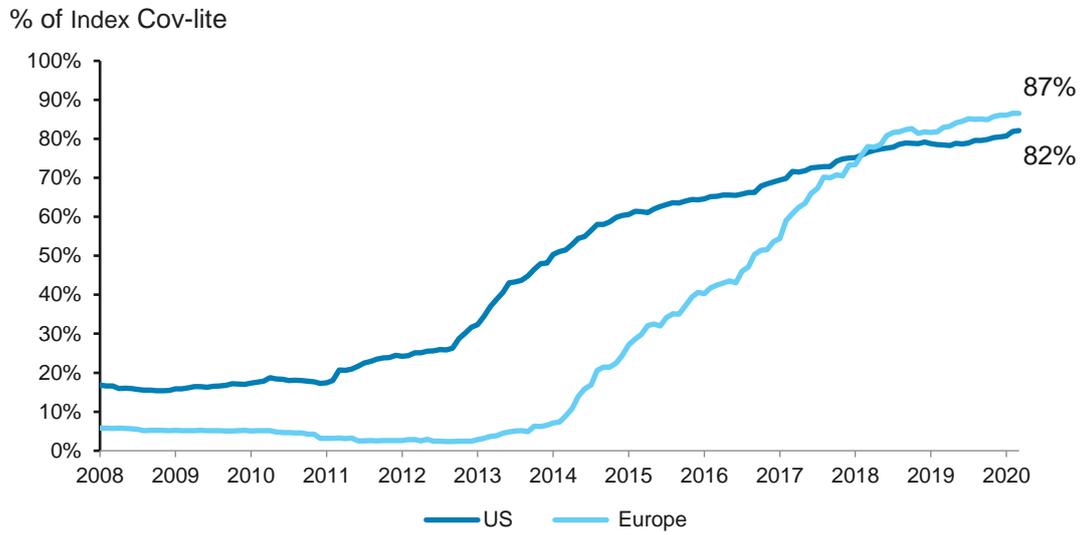
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Annex I – Trends in the share of Cov-Lite in CLO portfolio

Chart 3. Evolution of Cov-Lite, % of Loan Index



Source: Barclays Research