FSB FINANCIAL STABILITY BOARD

Vulnerabilities associated with leveraged loans and collateralised loan obligations

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Vulnerabilities associated with leveraged loans and collateralised loan obligations (CLOs)

Introduction and summary

The markets for leveraged loans and Collateralised Loan Obligations (CLOs) have grown significantly in recent years, with the majority of issuance activity concentrated in the US and to a lesser extent the European Union (EU). The securitisation of leveraged loans through CLO issuance, which had come to a halt almost entirely between 2009 and 2010, exceeded pre-crisis levels in 2014 and has remained strong since then. While most leveraged loans are originated by banks and banks have the largest exposure to the market, the role of non-bank financial institutions (NBFIs) in the leveraged loan and CLO markets has increased.

Recently, several authorities and international financial institutions, including FSB members, have expressed concerns about the rapid growth in the leveraged loan market and the lower credit quality of corporate debt more generally. This comes at a time when global macroeconomic conditions seem to be worsening and economic growth appears to be slowing.[1]

This report assesses the vulnerabilities and potential financial stability implications of developments in the leveraged loan and CLO markets. Complementing analyses conducted by FSB member authorities, it provides a global perspective by combining available data and analyses for individual jurisdictions. As part of this assessment, the report also makes reference to areas where a lack of available data impairs the ability to provide a comprehensive assessment of the financial stability risks associated with leveraged loan and CLO markets.

The main conclusions from the analysis are as follows:

- **A number of factors suggest that vulnerabilities in the leveraged loan and CLO markets have grown since the global financial crisis.** The degree of borrowers' leverage has increased and, although loans tend to have lower credit ratings, there is some evidence that certain changes to loan documentation that weaken creditor protection are not fully priced in by market participants and investors. This has the potential to not only increase default rates and decrease recovery rates for leveraged loans, but also to exacerbate investor reactions to shocks. Furthermore, changes to the composition of creditors (i.e. a shift from banks to a range of non-banks) may have increased the complexity and opacity of the leveraged loan and CLO markets, potentially introducing new risks and avenues for shock transmission. As a result, these markets may be more vulnerable to macroeconomic shocks than in the past, and stress in leveraged loan markets could disrupt other markets.
- **Available data indicates that banks have the largest direct exposures to leveraged loans and CLOs. These exposures are concentrated among a limited number of large global banks and have a significant cross-border dimension.** Their exposures

[1] See for example: BIS Quarterly Review, *The rise of leveraged loans: a risky resurgence?*, September 2018; Bank of England *Financial Stability Report*, November 2018 and July 2019; European Central Bank *Financial Stability Review*, May 2018 and July 2019; Board of Governors of the Federal Reserve System, *Financial Stability Report*, November 2018, Office of Financial Research, *Annual Report to Congress*, 2018; International Monetary Fund, *Global Financial Stability Report*, October 2018; and the OECD *Business and Finance Outlook*, 2019.

could increase further in stress as a result of revolving credit facilities being drawn down by leveraged borrowers and banks being unable to syndicate loans they intended to distribute, which could adversely affect bank capital and liquidity. Banks are also exposed through the financing of non-bank investors in leveraged loans and CLOs. Moreover, the banks most active in these markets play a significant role in other financial markets. While banks are more resilient to these risks due to higher levels of capital and liquidity as the result of post-crisis reforms, the degree of bank resilience against downturns may be difficult to judge, considering the changes in risk characteristics in leveraged loan and CLO markets.

- **A number of non-bank investors are also exposed to leveraged loan and CLO markets**. These include investment funds, insurance companies, pension funds, broker-dealers and holding companies. Investments in these relatively illiquid instruments by open-ended investment funds could involve liquidity transformation. While redemptions from such funds have not caused strains on liquidity in these markets to date, their exposures could nonetheless add to the risk of procyclical behaviour in times of stress. Insurers represent the largest non-bank holders of CLOs, and their exposures include lower-rated tranches. Stress episodes could therefore have negative implications for insurers, pension funds and other non-banks with CLO exposures.
- **A comprehensive assessment of the system-wide implications of the exposures of financial institutions to leveraged loans and CLOs is challenging.** First, there remain important data gaps. Using supervisory and market data, the direct holders of roughly 79% of leveraged loans and 86% of CLOs were identified in this report. Little is known, in particular, about the direct exposures of certain non-bank investors to these markets, including their holdings of lower-rated CLO tranches. Moreover, limited information on indirect linkages between banks and non-banks makes it difficult to assess possible risks from spillovers and interconnectedness, and their systemic implications. Second, the propagation of adverse developments across the financial sector would depend on the behaviour of the holders of leveraged loans and CLOs in stressed scenarios. This behaviour, in turn, depends on factors such as sources of funding, investment horizons and risk management practices, some of which may encourage shedding of exposures under stressed market conditions that potentially amplify strains. At the same time, more resilient CLO structures might act as a mitigating factor. The magnitude of the stress itself would depend on macroeconomic conditions, and could be compounded during an economic downturn when alternative sources of credit are limited.
- **More work is needed to close remaining data gaps and assess in a comprehensive manner the possible financial stability implications associated with leveraged loans and CLOs.** Supervisory authorities across all jurisdictions in scope have put banks' leveraged lending activity under increased scrutiny and have launched a series of data collections. The closing of data gaps, particularly for the highly heterogeneous non-banking sector, as well as information sharing and cooperation between supervisors and market authorities on a cross-border basis is needed to assess exposures and possible transmission channels of shocks associated with leveraged loans and CLOs. The FSB will consider whether there is scope to close data gaps, will continue to analyse the

financial stability risks and will discuss the regulatory and supervisory implications associated with leveraged loans and CLOs.

The rest of the report is structured in three sections. The first section provides an overview of the leveraged loan and CLO markets, and describes recent developments in these markets. The second section discusses the potential vulnerabilities inherent in leveraged lending and the securitisation of these loans, while the third section assesses the possible financial stability implications. The Annexes provide additional information on the definition of leveraged loans (Annex A); the ratings, waterfall and lifecycle of a CLO (Annex B); and the vulnerabilities of highly leveraged corporates (Annex C).

1. Leveraged loan and CLO markets: an overview

Leveraged finance involves lending to corporate borrowers with high levels of debt, low credit ratings, or high spreads. It comprises both leveraged loans[2] and high-yield bonds. Leveraged loans are mainly used for leveraged buy-outs (LBOs),[3] mergers and acquisitions (M&A), recapitalisation or refinancing of debt.[4] In contrast to high-yield bonds, leveraged loans are usually secured with a first lien against the corporates' assets and are characterised by a floating interest rate. Because most high-yield bonds are unsecured, they are generally junior to leveraged loans within the borrower's capital structure.

CLOs are asset-backed securities issued by a special purpose vehicle (SPV). The SPV acquires a portfolio of leveraged loans (typically syndicated loans originated by banks),[5] which it finances through the issuance of securities in the form of bonds (senior and mezzanine tranches) and equity. As codified in the CLO agreements ("indentures"), these securities are collateralised by the underlying loan portfolio. Payments received from portfolio assets are pooled and flow, in order, to senior, mezzanine, and equity tranches; this is known as the "waterfall". Except for the most junior security representing the residual interest ("equity"), almost all CLO securities are structured as floating rate notes ("notes") and receive ratings.[6] CLOs differ from many other securitisation structures, in that they are actively managed by a CLO manager. To promote diversification, CLOs are structured with specific investment limitations that the CLO manager

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2 See Section 1.1 for criteria used to identify a leveraged loan.

3 Typically, LBOs are sponsored by private equity (PE) firms that purchase the issuer by investing a comparatively small amount of equity and financing the remainder with debt. These deals tend to be complex and risky.

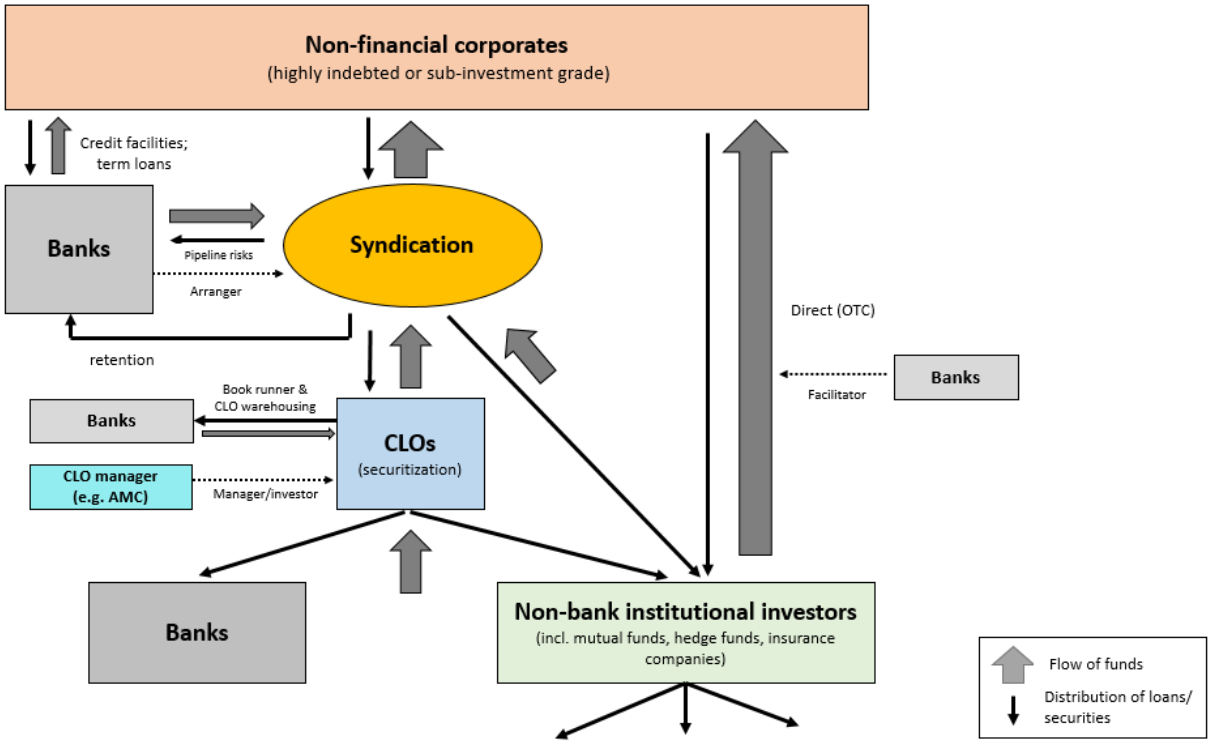
4 See International Monetary Fund, *Global Financial Stability Report*, April 2019, 20.

5 CLOs which purchase broadly syndicated loans comprise approximately 90% of US CLOs, with middle market loan CLOs comprising the remaining 10%. In limited cases, CLOs hold tranches of other CLOs (repackaged CLOs). Although less common, CLO portfolios may include various other assets such as second lien loans or unsecured debt, such as high-yield bonds. However, as a result of post-crisis regulatory changes, the inclusion of corporate bonds or tranches issued by other CLOs has become uncommon in the US. The Volcker Rule places significant restrictions on banks' activities relating to certain "covered funds". CLOs avoid falling under the "covered fund" restrictions by relying on the Volcker Rule's "loan securitization exclusion", which excludes funds backed by certain assets (most importantly, loans) from the definition of "covered fund". However, this exclusion is generally not available to funds holding securities (including corporate bonds).

6 Most often, notes pay a fixed spread over a reference rate such as London Interbank Offered Rate (LIBOR) or Euro Interbank Offered Rate (Euribor).

must adhere to, such as issuer and industry concentrations, which are intended to protect investors from potential losses through risk diversification.[7]

Graph 1: Schematic of the leveraged loan and CLO markets



Banks perform a variety of functions in the leveraged loan and CLO markets (**Graph 1**). Leveraged loans are first structured, arranged, and underwritten by one or several banks, known as arrangers.[8] In the case of syndicated loans, the leveraged loans are then sold (or syndicated) to other banks or institutional investors. The underwriting and syndication process serves as a risk sharing tool, to avoid overly high exposure to a single debtor. Syndication also allows banks to arrange significantly larger loans than they would be able to do bilaterally. In a typical syndication, banks provide funds structured as revolving credit facilities or "revolvers"[9] and usually retain only a portion of the term loans (amortising loans known as "Term Loan As"). Banks distribute most of the remaining share to other banks and non-bank institutional investors (non-amortising loans with a bullet payment at maturity, or "Term Loan B, C, and Ds"; so-called "institutional loans");[10] the nature of such non-bank investors is discussed in Section 3. While

[7] See Annex B for more details on CLOs and concentration.

[8] See S&P Global Market Intelligence Leveraged Loan Primer (2017).

[9] Billett, M. T., Elkamhi, R., Popov, L., & Pungaliya, R. S. (2016), *Bank skin in the game and loan contract design: evidence from covenant-lite loans*, Journal of Financial and Quantitative Analysis, 51(3), 839-873.

[10] An amortising term loan ("A" term loans, or TLAs) has a repayment schedule with a maturity of up to six years. These loans are normally syndicated to banks along with revolving credits as part of a larger syndication. An institutional term loan ("B", "C" or "D") is a loan facility for non-bank institutional investors that is typically structured as bullet loans, with maturities longer than those of TLAs. Banks retain small amounts of institutional term loans.

non-banks also originate loans, they generally do not provide revolvers[11] so corporates borrowing from non-banks still rely on banks for revolvers. In primary CLO markets, banks offer CLO structuring and distribution services to CLO managers, as well as financing of the underlying loans during the so-called "warehouse period"[12] until the CLO can issue debt to investors.

Banks and non-banks, including publicly offered and private investment funds, insurance companies, pension funds, sovereign wealth funds and other non-bank institutional investors, invest in CLOs.

1.1 The size of the leveraged loan market

There is no commonly agreed definition for leveraged loans. However, criteria used by regulators[13] and data providers[14] to classify a loan as "leveraged" typically include:

(i) high indebtedness of the borrowing corporate (e.g. gross debt to earnings before interest, tax, depreciation and amortisation (EBITDA) ratio 4x or higher);

(ii) below investment grade credit rating for the loan (or borrower) (i.e. below BBB);

(iii) loan purpose is to finance an acquisition (e.g. management buy-out (MBO) or leveraged buy-out (LBO));

(iv) presence of a private equity sponsor in the transaction (e.g. financing of borrowers owned by financial sponsors); or

(v) high loan spread at issuance (e.g. +125 basis points).

Differences in the criteria and thresholds applied by data providers to identify a leveraged loan lead to different estimates of the size and other characteristics of the market, even within the same jurisdiction. Estimates for the size of the global leveraged loan market range from US$1.4 trillion to US$3.2 trillion as of December 2018, depending on which types of lending are counted. The respective contributions of these various credit stocks to the US$3.2 trillion estimate at the top of the range are as follows:

- The total stock of institutional loans is estimated to be US$1.87 trillion. This includes large institutional loans, estimated to be US$1.47 trillion,[15] and smaller and less liquid loans, estimated to be approximately US$0.4 trillion.
- There is a further US$0.43 trillion in amortising leveraged loans (Term Loan As).[16]

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[11] See Euromoney (2018): *Are CLO managers getting away with murder?*, November, for evidence that non-banks may have started more recently to provide bank-like revolving facilities in leveraged loan markets.

[12] See Annex B for a description of the typical lifecycle of a CLO.

[13] Regulatory authorities in Europe and the US have introduced guidance in 2017 and 2013 respectively, proposing different definitions of leveraged loans. See Table A.2 in Annex A for a summary of those definitions.

[14] See Table A.1 in Annex A for more details on definitions of leveraged loans by data providers.

[15] S&P US leveraged loan index. Highly leveraged non-bank financial intermediaries are included: roughly 5% of this index is made up of financial intermediaries or insurance companies.

[16] Based on Bloomberg data. This size estimate of Term Loan As and institutional loans is in line with other publications, for example Patalano, R. and C. Roulet, 2019. *"Structural Developments in Global Financial Intermediation: The rise of debt*

- The value of revolvers that are included in syndicated leveraged loan packages is estimated to be US$881 billion, approximately half of which is undrawn.[17]

As a percentage of credit outstanding, this amounts to 8% of developed economy non-financial corporate credit.[18] The private debt market[19] is not included in these figures given its opacity; however, estimates vary between US$700 billion and US$900 billion in committed funds globally, with around 40% of the total not yet deployed.[20]

1.2 Recent developments in the leveraged loan and CLO markets

Against a backdrop of increasing levels of high-yield corporate debt, institutional leveraged loan issuance has grown rapidly since 2014, primarily in the US and the EU.[21] Leveraged loans provide banks and non-bank investors with exposure to higher yields in a low interest rate environment. The increase in outstanding leveraged loan volumes over the past five years has been partially offset by a decrease in high-yield bonds outstanding. In the recent past, expectations of higher interest rates may have shifted lender preferences to floating rate products. Additional evidence, consistent with the hypothesis that interest rate expectations affect leveraged loan issuance, can be seen in a reversal of this trend over the last six months, as the US Federal Reserve has reversed course in setting policy rates. In 2018 the US institutional leveraged loans outstanding and high-yield bond markets were comparable in size at around US$1.2 trillion, while in Europe the high-yield bond market was still significantly larger than the leveraged loan market (**Graph 2, left panel**).

Leveraged loan issuance varies across economic sectors. Among non-financial sectors, the largest leveraged loan issuances in 2017 and 2018 were in the consumer cyclicals, industrials and technology sectors; banks were mostly exposed through revolvers to the consumer cyclicals, energy and industrial sectors.[22]

Over time, the investor base has shifted from a bank-dominated paradigm to a more diverse set of investors that also includes a number of non-banks such as institutional investors and finance companies. As a result, the share of Term Loan A's and revolvers available on the primary

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and non-bank credit intermediation", OECD, Working Paper (forthcoming), which estimates the size of leveraged loans outstanding, excluding revolving credit facilities, at US$2.4 trillion.

17 Bloomberg.

18 Calculations based on BIS data - US$3.2 trillion leveraged loans compared to US$42 trillion non-financial corporate credit in advanced economies.

19 For the purposes of this report, the definition of private debt includes leveraged loans, which have not been syndicated broadly, and which have been extended to borrowers with debt capacity levels that are insufficient to meet the requirements for broad syndication.

20 Non-bank lending accounts for around one third of this (US$300 billion). In Europe the market size of non-bank middle market lending was estimated at around €60 billion at end-2016, compared to a total size around €120 billion. (Results of a bottom-up exercise conducted by Ares Management using different data sources).

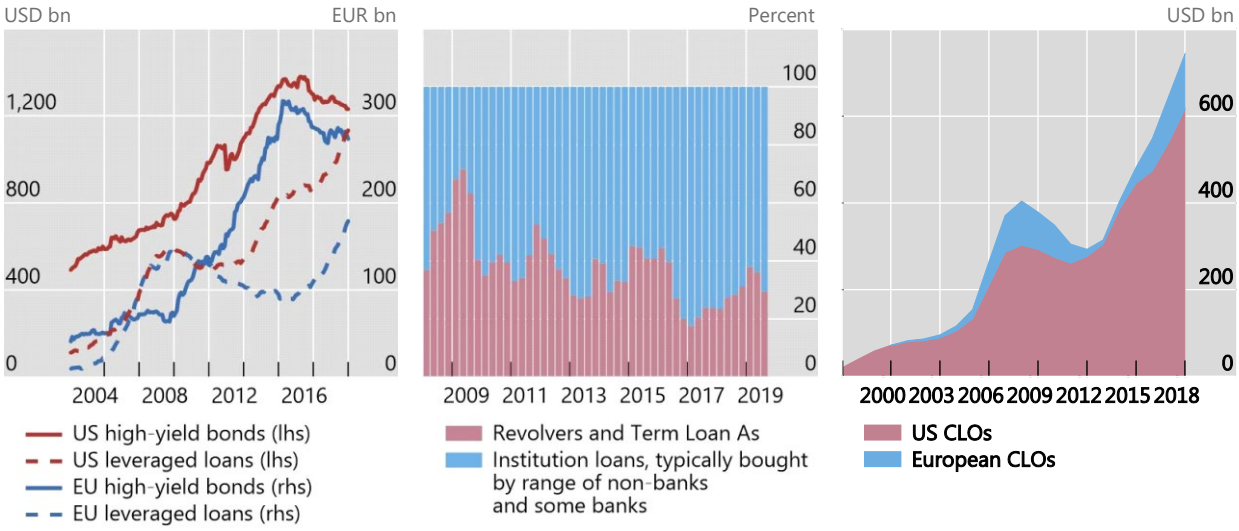
21 The FSB has estimated that roughly 96% of global leveraged loans outstanding as at October 2018 are in the US and the EU. See *FSB Global Monitoring Report on Non-Bank Financial Intermediation 2018*, p74. However, the percentage in the rest of the world could be underestimated due to data limitations.

22 Patalano, R. and C. Roulet, 2019. *"Structural Developments in Global Financial Intermediation: The rise of debt and non-bank credit intermediation"*, OECD, Working Paper (forthcoming). Other data sources such as S&P also show large issuance by corporates in the healthcare sector. Bank exposures are assumed to include the primary revolvers.

market, which tend to result in bank exposures, has decreased since the financial crisis. In contrast, the share of institutional leveraged loans, typically purchased by non-banks, has increased (**Graph 2, middle panel**). While allowing for risk sharing among a more diverse set of market participants may improve overall resiliency, this shift may also change incentives,[23] increase the complexity and opacity of the leveraged loan and CLO markets, and introduce the potential for new avenues for risk transmission.

The rapid growth in leveraged lending since 2015 is mirrored in the growth of CLOs. The amount of CLOs outstanding has doubled compared to pre-crisis levels reaching US$740 billion at the end of 2018, nearly half of outstanding institutional leveraged loans (**Graph 2, right panel**).

Leveraged loans, high-yield bonds and growth in CLOs — Graph 2



Sources: Federal Reserve Y-9C Reports; Bloomberg Finance L.P.; LCD, an offering of S&P Global Market Intelligence, and BoE calculations. ECB calculations using AFME and SIFMA data.

2. Vulnerabilities in leveraged loans and CLO markets

This section discusses the potential vulnerabilities associated with leveraged lending and the securitisation of leveraged loans, while the ways in which these vulnerabilities can impact the holders of loans and CLOs are discussed in Section 3.

2.1 Leveraged loan market

2.1.1 Weakness in lender protections

Since the global financial crisis, market standard leveraged loan terms have moved toward less stringent lender protections through looser covenants and general documentation

[23] Billett, et al. (2016) *supra* note 9.

weaknesses; i.e. greater borrower flexibility. At the most basic level, lender protections in "covenant-lite" loans lack maintenance covenants and resemble those of high-yield bonds more closely than those of traditional bank loans.[24] Covenant-lite loans were rare prior to the crisis, but the share of issuance of these loans has increased since 2009 (**Graph 3, left panel**).

The growth of covenant-lite loans has been ascribed to a number of developments in the market. First, deals have experienced looser covenants, likely driven by high availability of funding and competition for loan mandates by arrangers. Second, there have been changes in the end-investor base (fewer banks, more CLOs) and a consequent increase in creditor coordination costs. While spreads between covenant-lite and covenant-heavy loans have tightened, research indicates that this is consistent with these changes that, as a result, reduce the value of covenants.[25] Decreased participation by banks in leveraged loan deals (as measured by the proportion of deal amount held) has also led to a corresponding decline in the economic incentives for bank monitoring of borrowers' financial performance.[26] Third, private equity sponsored deals may have also facilitated looser covenants. This is because looser covenants can allow borrowers to build up higher amounts of leverage, and in an environment where credit is available on terms more favourable to borrowers, private equity investors may have an incentive to leverage their returns by shifting risk to creditors while retaining their claim on a borrower's growth after fixed costs are satisfied.[27] In the absence of maintenance covenants, a borrower faces a lower risk of a financial covenant breach (which amounts to a default) and of being forced into a debt renegotiation. This benefit to borrowers comes at a cost to lenders: if a borrower ultimately defaults, its lender - not having the ability to intervene early off of the back of a financial covenant breach - may be left with lower recoveries. There is some evidence that covenant-lite loans have had lower recovery rates than non-covenant-lite loans historically; going forward, at least one of the credit rating agencies (CRAs) also expects lower recovery rates for covenant-lite loans.[28]

Furthermore, for some loans, lender protections through covenants that seek to "ring fence" secured assets (including restrictions on whether companies may sell assets, pay dividends, or merge with/acquire another company/business) have been watered down. More specifically, loan documentation changes have increased the ability of borrowers to erode creditor protections relating to "ring fencing" assets, which may limit the pool of secured assets available for enforcement following a default. In addition, over 95% of loan documents now include

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[24] Both maintenance covenants and incurrence covenants measure borrower credit strength based on company-level metrics (e.g. leverage, interest coverage, etc.), but are monitored differently: compliance with maintenance covenants is assessed at regular intervals (usually at quarter-end), while compliance with incurrence covenants is assessed before the borrower takes on additional debt or engages in other potentially credit-negative activities.

[25] Becker, B., & Ivashina, V. (2016). *Covenant-light contracts and creditor coordination*. Riksbank Research Paper Series, (149), 17-1.

[26] Billett, et al., *supra* note 9.

[27] See for example *Private equity firms take dividends as downturn looms*, Reuters 2019.

[28] S&P data, based on a limited sample, shows that US first lien covenant-lite institutional loans had a median average recovery rate of 63.5% over 2015-2017 compared to 84.1% for non-covenant-lite institutional syndicated loans. The rating agency expects average future recovery rates of around 66% for covenant-lite compared to 75.5% for non-covenant-lite loans. See *Lenders blinded by cov-lite? Highlighting data on loan covenants and ultimate recovery rates*, S&P, April, 2018.

deductibles (or "baskets") and/or "carve-outs" that permit borrowers additional capacity to conduct activities that would otherwise be prohibited under the "ring fencing" covenants.[29]

Alongside looser covenants, there is evidence that headline debt-to-EBITDA may be understated. The rationale for M&A and private equity buyouts often includes synergies or operational improvements, and it is standard practice to recognise these as adjustments (add-backs) to EBITDA, which is used to measure compliance with incurrence covenants. These add-backs, however, are uncertain, both in magnitude and timing, and may overstate EBITDA and thus understate debt-to-EBITDA. There is also evidence that incurrence covenants have become less restrictive to borrowers.[30]

Transactions with EBITDA adjustments have increased (**Graph 3, right panel**). Market estimates indicate that incurrence covenants in current[31] deals are subject to EBITDA adjustments of 15-30%.[32] In addition, CRAs recently noted that the size of add-backs is increasing and the associated cost savings/synergies are often not realised two years into the loan term.[33] Thus, actual levels of debt-to-EBITDA ratios may be higher than covenants would otherwise imply. Indeed, research finds that adjusting only for deductibles related to indebtedness adds on average 2.3 times EBITDA multiples, an increase of roughly 50% with respect to the commonly cited four times multiple of leveraged loans.[34]

Moreover, concerns have been raised as to the extent to which the potential implications of add-backs, deductibles,[35] and carve-outs are understood by leveraged loan investors. The opacity of these contractual characteristics and the imbalance of expertise between sponsors and investors may mean that further innovations in loan documentation could produce mispricing in the leveraged loan market.

In addition to the impact of changes in covenants, recovery rates could be lower due to changes in the financing structure of corporates. There is evidence of less subordinated debt on the balance sheets of borrowers to absorb losses before senior loans.[36] When a corporate defaults, subordinated debt holders receive payments only after senior creditors are paid back. Holding overall leverage fixed, with less subordinated debt to absorb losses, senior creditors face below-

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[29] For example, a US$50 million deductible on a lien restriction would permit the borrower to repledge up to US$50 million of pledged collateral without triggering the lien restriction.

[30] For example, leverage ratio covenants may restrict new debt issuance by limiting the corporate's ratio of debt-to-EBITDA. Similarly, investments covenants may restrict the corporate's use of free cash flow for investment purposes. See also Statistics from Covenant Review.

[31] Unless otherwise indicated, discussion of "current" levels is based on year-end 2018 data.

[32] Based on statistics from Covenant Review.

[33] See for example: Moody's, *Research: Announcement: EMEA spec-grade firms are making higher earnings adjustments to attract investors*, June 27, 2018; S&P *When The Cycle Turns: The Continued Attack Of The EBITDA Add-Back*, September, 2019; Bank of England *Financial Stability Report*, November 2018.

[34] Ivashina, V., & Vallee, B. (2019). *Weak credit covenants*.

[35] Ivashina, V., & Vallee, B. (2019). *Weak credit covenants*. Following an instance in which a court ruled in favour of a borrower that used deductibles included in loan covenants to restructure its debts, the authors find that share prices of borrowers with similarly weakened covenants increased in the wake of the ruling. This finding is consistent with their hypothesis that the court removed a degree of ambiguity surrounding the use of such deductibles, and the value to borrowers of the optionality produced by deductibles.

[36] *Convergence of loan and high-yield bond markets state for lower recoveries in the next downturn*, Moody's, 16 August 2018.

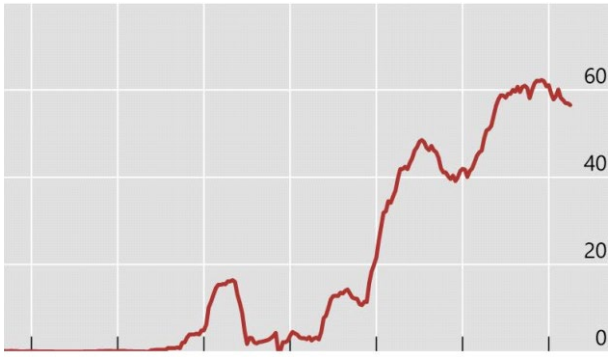
average recovery rates.[37] Historically, the recovery rate is estimated to be 53% for loan-only issuers, compared to 79% for issuers with bonds subordinated to loans in their capital structure.[38]

Institutional leveraged loan market: covenant-lite share and transactions with EBITDA adjustments

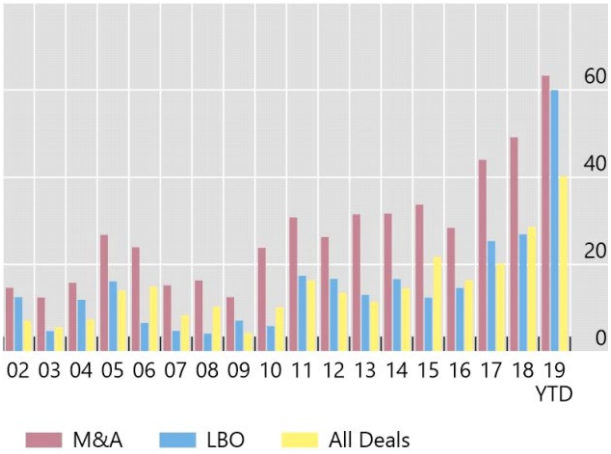
In per cent

Graph 3

Global covenant-lite share of issuance, 12-month rolling average[1]



Transactions with EBITDA adjustments, share of total



1 Revolving credit facilities and amortising term loans included, the share of covenant-lite on institutional loans is higher, at around 80-85%.

Sources: LCD, an offering of S&P Global Market Intelligence, and BoE calculations

2.1.2 Increased leverage and lower ratings

High-yield corporate debt, including leveraged loans, has increased over the past five years, while the credit quality of leveraged loans has deteriorated. This deterioration has occurred across various dimensions, including a higher share of debt issued by borrowers with higher debt-to-EBITDA ratios, loan structures with less subordinated debt, and lower loan ratings.

Looser covenants may have contributed to the observed higher debt levels, as they prohibit creditors from stepping early into the restructuring process and encourage excessive debt built-up. Shareholders have incentives to increase debt in order to increase the tax shield, and with it the value of the company.[39] The additional debt can introduce fragility and impose negative externalities on the economy.[40]

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37 *Convergence of loan and high-yield bond markets sets stage for lower recoveries in next downturn*, Moody's, 16 August 2018.

38 See Fitch US Leveraged Loan Default Insight, March 28, 2019.

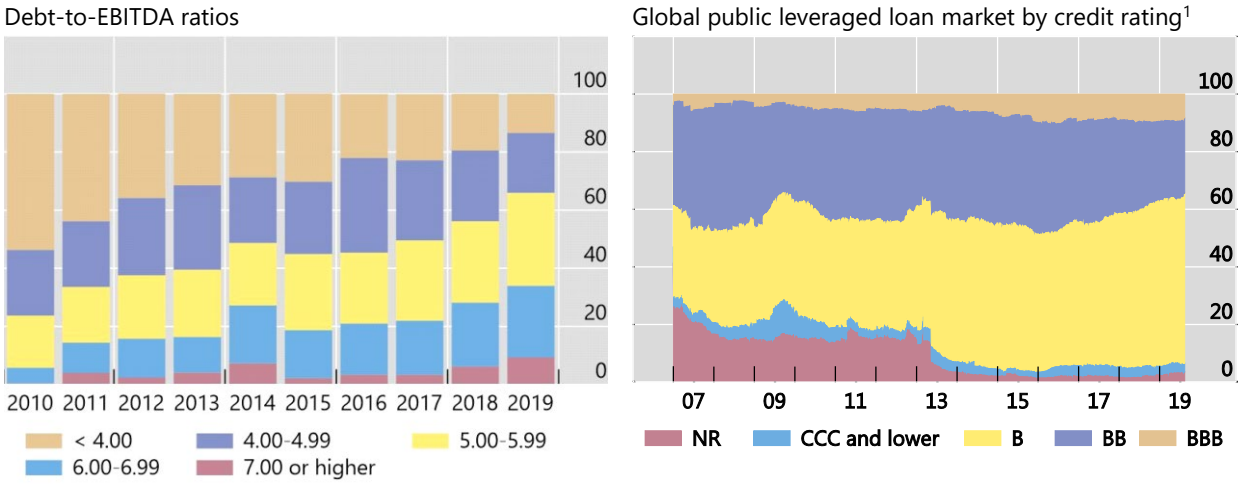
39 Modigliani, F., & Miller, M. H. (1958). *The cost of capital, corporation finance and the theory of investment*. The American, 1, 3.

40 See for example Fisher, Irving (1933) *The Debt-Deflation Theory of Great Depressions*. Econometrica 1, no. 4 pg. 337–57, and Hart, Albert, Gailord. *Debts and Recovery, 1929-1937. New York: Twentieth Century Fund, 1938.* For a modern formal treatment; Bianchi, Javier (2010) *Credit Externalities: Macroeconomic Effects and Policy Implications*. American Economic Review 100, no. 2 pg. 398–402, and Jeanne, Olivier, and Anton Korinek (2018) *Managing Credit Booms and Busts: A Pigouvian Taxation Approach*. Journal of Monetary Economics.

Decreasing credit quality is reflected in the higher share of global syndicated leveraged loans with debt-to-EBITDA ratios greater than six (**Graph 4, left panel**)[41] and the rising share of single-B or lower credit ratings of outstanding institutional leveraged loans (**Graph 4, right panel**) since 2015.

Debt-to-EBITDA ratios and credit ratings of leveraged loans

In per cent — Graph 4



[1] Based on JPMorgan Leverage Loan Index.

Sources: S&P Global Market Intelligence; Bloomberg; FSB calculations.

More heavily indebted corporates, such as those with higher debt-to-EBITDA ratios, tend to be more vulnerable during economic downturns, since they are more likely to encounter financial distress and be faced with rating downgrades,[42] forced deleveraging, or default. Such corporates are likely to reduce investment and employment, which could further exacerbate an economic downturn. Historical data suggest that corporates with higher leverage are downgraded at a faster rate than corporates with lower leverage when the macroeconomic outlook deteriorates - and as downgrades increase, so do defaults. Structurally higher non-financial corporate leverage tends to increase the prices of publicly traded debt and equity securities when times are good and tends to have the opposite effect during downturns and, as such, can amplify financial markets shocks. These macro elements, while not specific to the leveraged loan and CLO markets, could have a significant amplification effect if a shock materialises.[43]

[41] As discussed earlier, the reported EBIDTA is higher than in the absence of add-backs.

[42] See Annex C for more details.

[43] Bank of England, *Financial Stability Report and Stress Test Results* (November 2018).

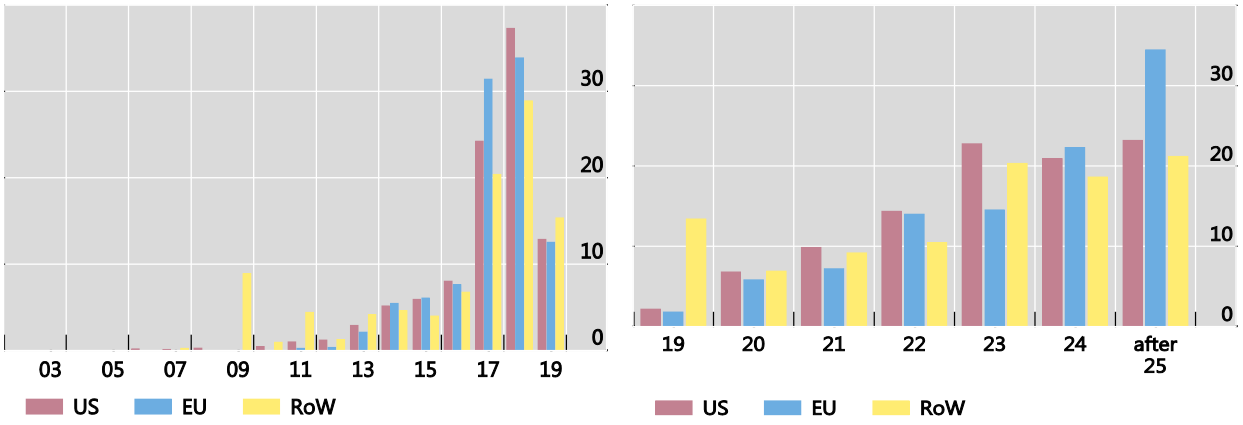
2.1.3 Refinancing risks

As floating rate instruments, leveraged loans have a counter-cyclical feature: during a recession borrowers are likely to face lower debt service expenses because of lower policy rates. However, during recessions, leveraged borrowers may be unable to refinance maturing debt.[44]

The risks associated with rolling over outstanding loans seem to be low in the short term. Corporates have taken advantage of favourable market conditions to refinance the stock of existing debt, pushing out maturities. Around 75% of the current leveraged loan stock is accounted for by loans issued or refinanced since 2017 (**Graph 5, left panel**).[45] Less than 20% of the leveraged loans currently outstanding are scheduled to mature before 2021 (**Graph 5, right panel**), though 50% to 60% of the leveraged loans outstanding in the US and EU will mature between 2022 and 2024.

Leveraged loans issued in a given vintage and maturing amounts

In percent — Graph 5



RoW = Rest of World

Source: Bloomberg and ECB calculations.

2.1.4 Elevated asset prices

Credit spreads on leveraged loans (adjusted for leverage levels) have declined since the global financial crisis, despite borrowers' weakened creditor protections in loan agreements and reduced subordination levels for loans in borrowers' capital structures. This decrease could be a reflection of investors' growing risk appetite, declining default expectations, or a manifestation of reaching-for-yield incentives. Spreads in the fourth quarter of 2018 spiked due to a temporary market dislocation (see Graph C.1 in Annex C), but resumed their decline in the first quarter of 2019. In

[44] The relationship between the level of high-yield bond spread and the number of cases of new business bankruptcy filings (Chapter 11) in the US illustrates the impact of the crisis of 2008; when a spike in the refinancing rate led to higher defaults amongst this class.

[45] ECB calculations, based on Bloomberg data.

the second quarter of 2019 spreads increased again, suggesting a downward revision in investors' economic outlook, heightened risk aversion, or diminished incentives to reach for yield.

2.2 CLO market

2.2.1 Concentration risk and default correlations

The rating of CLO tranches depends, in part, on the correlation of defaults within a collateral pool. CLOs typically include a covenant that limits the degree of concentration within the loan portfolio.[46] EU CLOs tend to have a higher degree of concentration than US CLOs.[47] It is challenging for investors to precisely estimate default correlation, and recent academic work suggests that CRAs may have underestimated default correlation.[48] Furthermore, a recent simulation exercise by ESMA shows that the ratings of senior and mezzanine tranches are sensitive to assumptions about default correlations.[49]

Even though within a CLO the concentration to a specific sector is limited, CLOs in the aggregate might be exposed to credit concentration risk as a result of exposure to the same borrowers or loans to the same sector. It is estimated that 90% of US CLOs have exposure to at least one of the top 50 borrowers and more than 80% of US CLOs have exposures to the top five borrowers.[50] This overlap could induce correlations in interest coverage or overcollateralisation tests (see below) and in losses to equity/junior noteholders across CLOs in a stress event.

Certain structures such as CLO combination notes, which blend rated CLO tranches with riskier unrated equity into rated (commonly investment grade) notes (i.e. securitisation of a securitisation), may increase the complexity and opacity of the system. This is because, under such structures, it becomes increasingly difficult to trace the end-investor and to properly assess the risks that they will be exposed to should an issuer fail to meet its debt obligations.

2.2.2 Lower collateral quality

CLOs purchase primarily single-B loans, likely due to their attractive spreads. However, these higher returns likely mean that the collateral quality underlying CLOs is lower than that of the leveraged loan market as a whole and, as such, CLOs are exposed to greater credit risk (**Graph 6, left panel)**.

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46 Moody's, *Moody's Global Approach to Rating Collateralized Loan Obligations*, CLOs & Structured Credit March 2019.

47 This can be seen in lower value of Moody's diversity score (a representation of the share of independent assets in CLO portfolios, with a high value indicating a more diverse portfolio), with a median of 52 for EU CLOs against 79 for US CLOs.

48 Nickerson, J. and Griffin, J.M. (2017). *Debt correlations in the wake of the financial crisis: What are appropriate default correlations for structured products?* Journal of Financial Economics. Also see Qi, H., Shi, J. and Xie Y.A. (2019), *Default correlation: rating, industry ripple effect, and business cycle* using data from 1970 to 2014 to estimate a default correlation of 10% over five year for B-rated bonds and 19% for C-rated bonds. Using data on US corporates over 1992-2013, Li L., and Chen, C. (2018) *The domino effect of credit defaults: test of asymmetric default correlations using realised default data* report higher values, with a five-year default correlation among corporates with low credit quality (lower than BB) as high as 38%, and the default correlation can almost double during crisis periods.

49 European Securities and Markets Authority (2019), *"Leveraged loans, CLOs – trends and risks"*, in ESMA's report on *Trends, Risks and Vulnerabilities No.2, September*.

50 JPMorgan, *CLO Credit Concentration Risk: A Guide*, Global Credit Research, 15 March 2019.

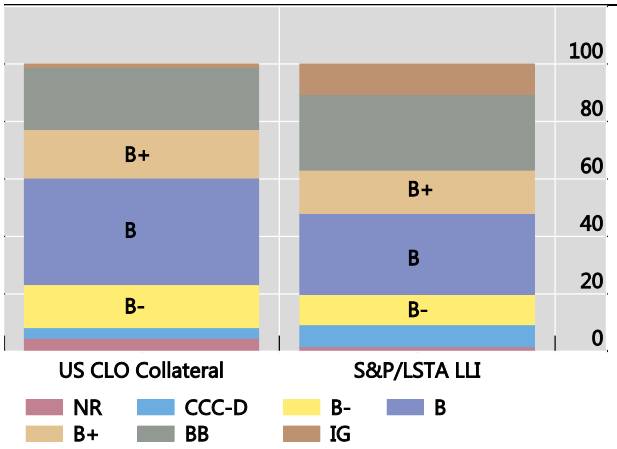
2.2.3 Resilience of CLO structures

CLOs issued after the financial crisis (commonly referred to as "CLOs 2.0") have changed, with higher levels of credit enhancement and subordination to better protect senior tranche holders from losses (**Graph 6, right panel**).[51]

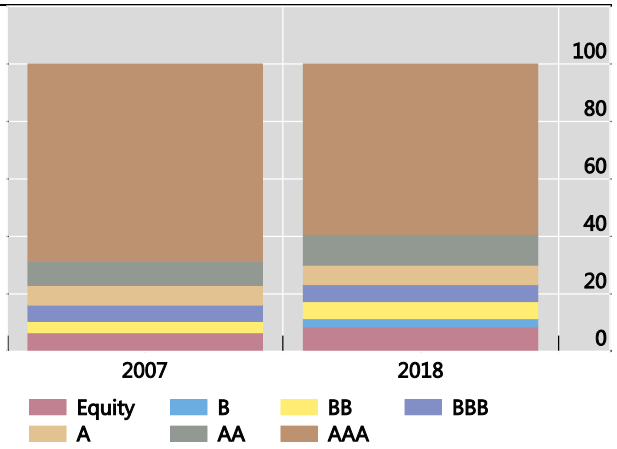
CLO – collateral ratings and comparison of pre- and post-crisis structure

In percent Graph 6

Breakdown by rating of the collateral in US CLOs and in global leveraged loan markets



Changes in the subordinated structure before and after the financial crisis



Source: S&P and the Loan Syndications and Trading Association (LSTA), ECB calculations based on Bloomberg, Moody's and Credit Suisse data.

Test triggers embedded in post-crisis CLO structures are designed to protect senior noteholders from losses through various channels. The two most common tests assess the par value of loan collateral relative to the par value of notes outstanding (overcollateralisation) and the loan interest received from collateral assets relative to interest payable on notes outstanding (interest coverage). If test levels fall below their trigger levels, cash flows from loan interest and principal payments are diverted away from equity and mezzanine tranches, and these cash flows are used to pay down the liabilities in order of seniority in an effort to deleverage the CLO and bring tests back into compliance. Furthermore, a CLO manager would be pushed into liquidating assets of the CLO as a result of market value swings only in extreme circumstances.[52]

Some analyses point to an increased resilience of current CLO structures. Analysis of a sample of global CLOs,[53] for instance, suggests that, assuming a default rate scenario similar to that seen in the financial crisis, potential stressed losses to investors holding AAA-rated CLO tranches have declined since the crisis and that investors in AAA-tranches may be better compensated for

[51] This partly reflects post-crisis action by CRAs, which increased subordination requirements following a reassessment of their rating methodologies.

[52] Almost all post-crisis CLOs - so-called CLO 2.0 - are insulated from market value swings, whereas before the financial crisis around 2% of CLOs had market value triggers. See Table B.1 in Annex B for more detail on tests triggers of CLOs pre- and post-crisis.

[53] Bank of England, *Financial Stability Report* (July, 2019) pg. 28.

the risks they are taking.[54] When recovery rates are adjusted downwards to account for weaker creditor protections, simulation results show that investors in the equity and B/BB-rated tranches face significant losses on their holdings. However, tranches rated BBB and above would not lose principal, as they are supported by higher levels of subordination in CLO structures compared to the financial crisis.[55] Reverse stress tests from the same sample show that a historically unprecedented loan market shock with an annual default rate more than twice that experienced during the crisis would be required to bring about losses on AAA-rated CLO tranches.

Other scenario analyses[56] suggest that, while AAA-tranches appear better protected in the post-crisis CLO structures, their comparative performance in the current credit cycle remains uncertain, as the higher tranche collateralisation may be offset by weaker underlying collateral, potentially lower recovery rates, and higher correlation of default rates within the pool. Moreover, while CLO 2.0 structures show substantial improvements over pre-crisis structures, some features of these structures could nevertheless put pressure on the market under certain severe scenarios. These include loans generally carried at par value unless the loan is in default, deferring interest, rated CCC or lower (and the cap on CCC-rated loans has been exceeded), or was purchased at a very low price and continues to trade a discount. As such, in the event of more significant downgrades to CCC, CLO managers may have incentives to liquidate CCC-rated loans to avoid failing overcollateralisation tests and diverting cash flows from junior and equity tranches towards more senior tranches. This liquidation may spread volatility to the leveraged loan markets and lead to lower demand for leveraged loans.

2.2.4 The regulatory treatment of securitisations

Since the financial crisis, regulators have sought to increase the alignment of securitisers' incentives with those of investors in asset-backed securities by implementing a minimum risk retention requirement. The US, the EU and more recently Japan have introduced risk retention rules post-crisis that apply to CLOs and other asset-backed securities. These requirements mandate that a CLO manager retains a portion of the issued securities, either in the equity tranche or across all tranches, to ensure that it has a strong economic interest in the performance of the CLO's assets. The risk retention rule in the US as applied to open-market CLOs[57] was, however, successfully challenged in court, and since April 2018 open-market CLOs (which form the

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[54] While this analysis focuses on cash flows, CLO holders could also face price swings and credit rating downgrades even in the absence of credit losses.

[55] Reverse stress tests by Bank of England staff. Other work draws similar conclusions about the robustness of AAA-rated senior CLO tranches, see Using a stylised CLO model and a Gaussian copula method: European Securities and Markets Authority (2019), "*Leveraged loans, CLOs – trends and risks*", in ESMA's report on Trends, Risks and Vulnerabilities No.2, September. See also ECB, *"CLOs: a financial stability perspective*", Box 4 in the Financial Stability Review (May 2019), that uses a stress scenarios more severe than the early 2000 and financial crisis episodes.

[56] ECB, *"CLOs: a financial stability perspective"*, Box 4 in the Financial Stability Review (May 2019), that uses a stress scenarios more severe than the early 2000 and financial crisis episodes.

[57] In contrast to balance sheet CLOs that securitise loans already held by a single institution or its affiliates in portfolio, open market CLOs securitise assets purchased on the secondary market, in accordance with investment guidelines. Under the US risk retention rules, an "open market CLO" is defined as a CLO whose assets consist of senior, secured, syndicated loans acquired by such CLO directly from the sellers in open market transactions and of servicing assets; that is managed by a CLO manager; and that holds less than 50% of its assets, by aggregate outstanding principal amount, in loans that are either syndicated by lead arrangers that are affiliates of the CLO or the CLO manager, or are originated by originators that are affiliates of the CLO or the CLO manager.

majority of CLOs) no longer have to comply with the 5% requirement of the Credit Risk Retention Rule.[58] The key regulatory frameworks related to CLOs are summarised in Annex B.

CLOs do not qualify as simple, transparent and comparable (STC) securitisations, reflecting their high structural and asset quality risk. The structural risk partially reflects that the CLO performance is highly dependent on the quality of the CLO manager, while asset risk reflects the low credit quality of underlying assets.[59] As such, under the Basel III framework CLOs are assigned higher risk weights than STC securitisations. These risk weights increase significantly for lower rated tranches, in particular non-senior ones, which explains why banks have limited their CLO purchases to mostly AAA-rated senior tranches.

3. Financial stability implications of developments in leveraged loan and CLO markets

This section focusses on financial intermediaries' exposures to leveraged loans and CLOs, and how vulnerabilities that arise from their activities may amplify shocks arising – or may transmit shocks to – those markets. Some vulnerabilities could also induce procyclical behaviour by intermediaries – i.e. the tendency to take actions that amplify market movements (e.g. selling assets in declining markets or hoarding liquidity when market demand for liquidity is high).

Adverse shocks to the leveraged loan and CLO markets could impact lenders directly — through their holdings of leveraged loans and CLOs — and indirectly — through exposures to entities investing or participating in those markets. Shocks to these markets could also impact financial markets more broadly, via different transmission channels.

Box 1 lists the different risks that holders of leveraged loans and CLO market could face, given the vulnerabilities discussed in Section 2. In addition to these risks, intermediation chains between these entities and other market participants provide avenues for contagion between financial institutions.

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[58] Because managers of open-market CLOs cause their managed CLOs to purchase loans in the open market from unaffiliated third parties, CLO managers do not hold those loans on their balance sheets prior to their purchase by the CLO. Accordingly, the court held that managers of open-market CLOs are not "securitizers" within the meaning of section 15G of the U.S. Securities Exchange Act of 1934 because they do not "transfer, sell or convey" loans to the CLO, and thus, they cannot be required to "retain" a portion of the credit risk of those assets. For more information see *Loan Syndications & Trading Ass'n v. SEC*, 882 F.3d 220 (D.C. Cir. 2018).

[59] See *"Revisions to the securitisation framework"*, BCBS.

Box 1: Risks faced by entities exposed to leveraged loans and CLOs

Credit risk

- Lenders, including investor banks and non-banks, are exposed to credit risk. In the event of default, or the increased prospects of default, there could be a significant impact on bank capital adequacy ratios, increasing the risk of a capital shortfall. This is further increased if banks face increased draw-downs on the revolving credit facilities.[60]
- The credit risk is low for AAA-rated CLOs exposures, which make up most of banks' CLO exposures.

Market risk

- Mark-to-market losses on CLO positions and unsold loans in the underwriting pipeline could impact entities subject to mark-to-market accounting, raising the possibility of a sizeable deterioration of their capital positions.

Liquidity risk

- Banks may face draw-downs on revolving credit facilities, particularly when leveraged borrowers are under stress, decreasing liquidity buffers and regulatory liquidity ratios.
- Banks may be left holding unsold leveraged loans (pipeline exposure) for long periods after a transaction's closing, if investor interest in those loans dries up. This will not only increase the risk of their loan books, but also deplete part of their liquidity buffer to finance unsold loans.
- Banks may face delays in repayment on warehouse facilities extended to CLO issuers and may ultimately be forced to absorb loans residing in such facilities.
- Some open-ended investment funds may also face liquidity risk as a result of maturity mismatches stemming from long settlement cycles of leveraged loans vis-a-vis the provision of daily liquidity to their investors (for more details see Section 3.2). More generally, daily redemptions promised by some investment vehicles could conflict with the relatively illiquid nature of leveraged loans.

Currency risk

- Entities are exposed to currency risk if they invest in CLOs denominated in a currency other than the one of their funding base.

Reputational risk

- Banks and non-banks with high exposure to leveraged loans could face liquidity and funding risks during periods of stress if other market participants anticipate that they will incur substantial losses on their leveraged loan holdings.

The breakdown of types of holders of leveraged loans and CLOs is shown in **Graph 7**. Data on exposures of entities that invest in leveraged loan and CLO markets are incomplete and hence do not provide a comprehensive picture of the risks borne by different types of investors.[61] Roughly 21% of the estimated outstanding leveraged loans and 14% of CLOs are unaccounted for (US$683 billion and US$106 billion respectively). Based on available data and subject to caution due to the size of the unknown categories, globally banks are the largest holders of leveraged loans and AAA-rated CLOs. After CLOs – estimated to hold half of institutional leveraged loans – investment funds are the largest known non-bank holder of leveraged loans. Insurers are the largest non-bank holders of CLOs.

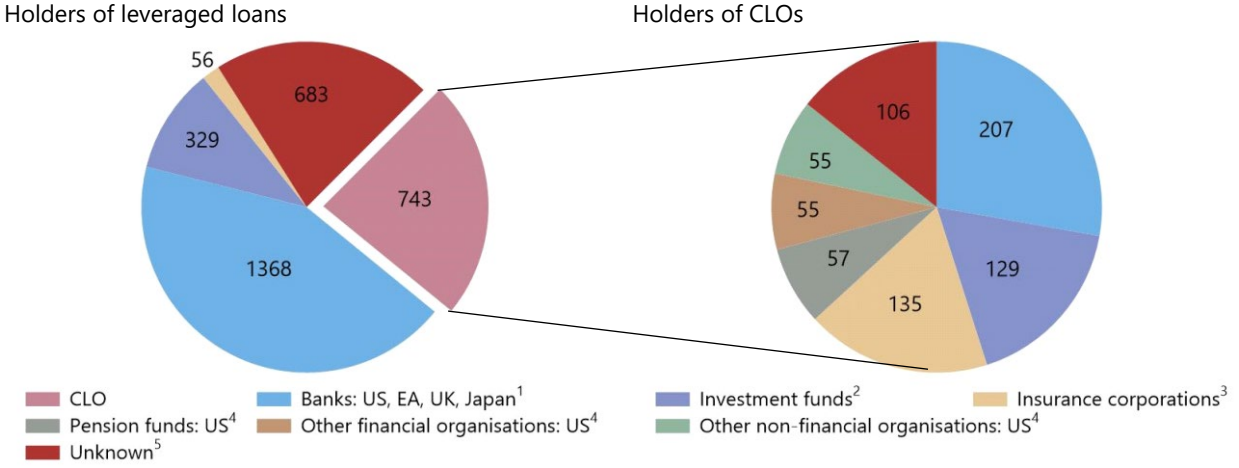
[60] The cumulative five year default rate for US leveraged loans amounted to around 25% in the early 2000 recession and 20% for the financial crisis.

[61] While the size of the leveraged loan market is estimated using market data, different data sources (including supervisory data) are used to identify the holders of leveraged loans. Given the different definitions used by supervisors and market data providers, this means that a one-to-one mapping of size to holders is challenging.

Vulnerabilities are discussed hereafter by financial intermediary type: banks, investment funds, insurance companies and other non-bank financial intermediaries. The nature of the vulnerabilities varies by entity type given their different business models (see Box 1).

Holders of leveraged loans and CLOs, as at December 2018

In billions of US dollars Graph 7



[1] Holdings data for: banks based on supervisory data from the US, EA, UK and Japan as of end 2018. Leveraged loan exposure shown include undrawn facilities, while pipeline exposure and CLO warehouse facilities are excluded. [2] Data for investment funds based analysis of supervisory and commercial data by European Securities and Markets Authority (ESMA) staff and review of data from Moody's, Morningstar and Datascope by U.S. Securities and Exchange Commission (SEC) staff. [3] Insurers corporation data based on European Insurance and Occupational Pensions Authority (EIOPA) and National Association Of Insurance Commissioners (NAIC). [4] CLO holdings of US pension funds, US other financial organisations and US other non-financial organisations are estimated, based on Treasury International Capital (TIC) data shares as at 2017. [5] "Unknown" estimate based on US$3179 billion estimate of leveraged loans and US$743 billion in CLOs as at December 2018, as shown in Section 1, assuming CLOs are entirely invested in Leveraged loans – thus the estimate of unknown leveraged loans could be larger, if CLOs are actually holding other asset types. Numbers rounded.

3.1 Global banks

3.1.1 Exposures to leveraged loans and CLOs

As at December 2018, banks have the largest direct exposure to leveraged loans and CLOs. This is not surprising, as banks fulfil various roles in, and are a critical component for the functioning of, these markets. Both public and supervisory data[62] indicate that banks' exposure to leveraged loans and CLOs is highly concentrated in a limited number of global systemically important banks (G-SIBs). [63]

[62] This represents a comprehensive measure of 59 banks' exposure in the US, EA, JP and UK that also includes the undrawn portion of loan facilities approved but not yet drawn, as well as exposures from CLO holdings, warehousing and the underwriting pipeline. Note that the supervisory definition of leveraged loans in the above jurisdictions is more comprehensive than the market definitions which have limitations on the extent to which investment grade, and/or bilateral lending including smaller sized leveraged loans are captured, as detailed in Section 1. This could result in the supervisory definitions including, for example, some amount of exposure to investment grade corporates which would not be included in the US$3.2 trillion estimate described in Section 1.

[63] Fitch (2019), *Leveraged Loans and CLOs in Financial Institutions*.

- According to supervisory data, as of end 2018 banks in the Euro Area (EA), Japan (JP), UK and US are estimated to have direct exposures of around US$1.368 trillion to leveraged loans through credit facilities, typically in the form of drawn and undrawn revolvers. Of this amount, US$760 billion is held by US banks, US$348 billion by EA banks, US$140 billion by JP banks and the remaining US$120 billion by UK banks. Generally banks are exposed to leveraged loans with maturities shorter than the market average, because the credit facilities and TLAs they retain have shorter maturities than institutional leveraged loans.[64] Whilst revolvers still typically contain a springing maintenance covenant that is activated once a certain amount is drawn, documentation weaknesses and the prevalence of add-backs similar to those that have occurred with loans mean these might be less effective than had been the case during previous cycles.[65] However, bank credit risk exposure is difficult to assess, as most of the revolving credit facilities that banks retain are not externally rated. Another reason for the difficulty of assessing credit risk is that draws tend to increase in economic downturns.[66]
- As the main arrangers of syndicated loans, banks also have pipeline exposures to leveraged loans amounting to US$102 billion as of end-2018.[67] US banks' exposure amounted to US$65 billion,[68] EA banks' to US$18 billion, UK banks' to US$15 billion, and Japanese banks' to US$4 billion. These pipeline exposures can vary notably over time based on banks' originate-to-distribute model, and hence the figures represent only a snapshot of this dynamic market.
- Banks' direct exposure to third-party CLOs totalled US$207 billion, or 28% of CLOs outstanding, as of end-2018. The largest portion was held by Japanese banks (US$107 billion, 99% AAA-rated) and US banks (US$85 billion, 77% AAA-rated). The rating of the CLO tranches held by EA banks (US$13 billion) is not publicly disclosed, while just over half of UK banks' holdings (US$1.2 billion) are AAA-rated.
- Banks also provide funding to CLO sponsors via warehousing facilities, estimated at US$28 billion as of end-2018. These facilities were mainly in the US (US$21 billion), with EA, UK and JP banks amounting to roughly US$4 billion, US$2.3 billion, and US$0.9 billion respectively. In addition to the CLO warehouse lines being modest in size, CLO managers or third parties are the ones that typically take the first-loss risk during this stage of the CLO lifecycle.

These exposures are generally concentrated among a limited number of banks. These banks' exposures to leveraged loans and CLOs, on a fully drawn basis, are significant relative to their capital adequacy ratios. The average ratio of exposure to common equity tier 1 (CET1) across a subset of G-SIBs and other banks (see footnote 62) in major jurisdictions amounts to roughly

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64 Available evidence suggests that bank exposure to leveraged loans is almost fully in the form of first lien loans, reflecting the market practice post-crisis where the use of second lien has decreased markedly for loans rated higher than CCC.

65 Berlin, M., Nini, G., & Yu, E. (2019). *Concentration of control rights in leveraged loan syndicates*. FRB of Philadelphia Working Paper No.19-41.

66 While certain facilities may include clauses under which undrawn portions may be revocable or credit limits can be cut based on status of the borrower, banks might not invoke adverse clauses even when they exist, and borrowers could increase drawdowns ahead of the downgrade of the credit line.

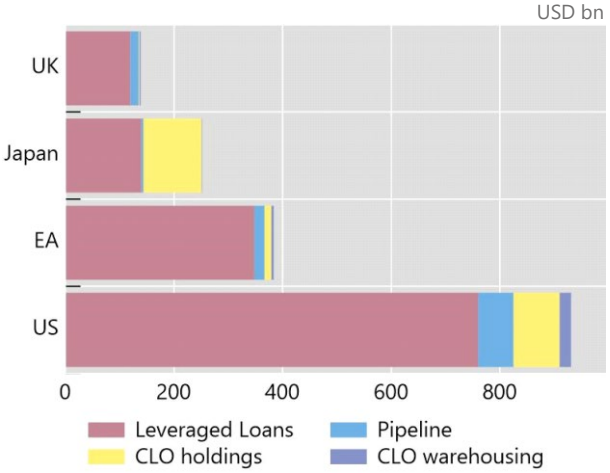
67 This figure increases when including lending to corporates through bilateral or club arrangements.

68 Pipeline risk in US banks has decreased significantly since the crisis, see LTSA.

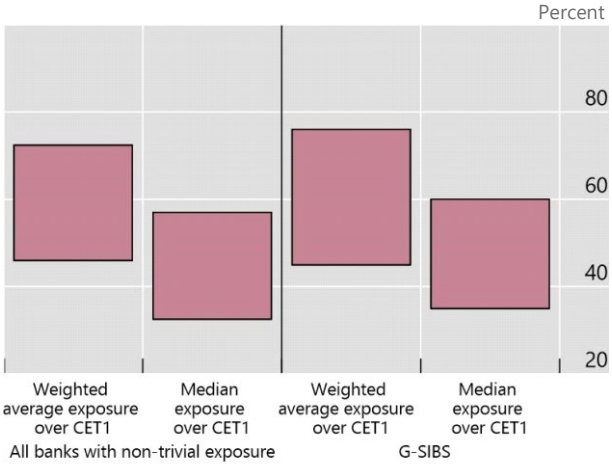
60%, with the median ratio around 46%. For G-SIBs, these exposures are at similar levels **(Graph 8, right panel).**

Bank leveraged loan and CLO exposures, amounts and share of CET 1 Graph 8

Direct exposure



Average and median banking sector exposures to leveraged loans and CLOs, as share of bank CET1, across major jurisdictions



Notes: The levels reported refer to exposures relative to Common Equity Tier 1 (CET1) capital computed as the sum of drawn and undrawn bank facilities, and of CLO holdings.

Source: Supervisory data covering US, EA, UK and JP banks, see Footnote 62 for detail.

3.1.2 Risks faced by banks

Banks are primarily exposed to credit risk arising from large direct holdings of leveraged loans and, to a lesser extent, CLOs. The impact on banks' capital and liquidity positions will depend to a large extent on the severity of a downturn and on whether banks have anticipated and prepared for such developments.[69] Banks also have indirect exposure to the leveraged loan and CLO markets as a result of their credit and funding facilities to other investors in these markets.

Banks' credit risk exposures are difficult to assess, as most of the revolving credit facilities that banks retain are not externally rated and drawdowns may increase substantially during economic downturns. While credit risk related to CLO holdings is limited given that banks typically hold AAA-rated tranches, banks also face the risk that changes in valuation of these holdings will have regulatory capital implications in the event of severe stress in underlying loan markets.[70]

[69] All else equal, banks' capital ratios ratios would decrease when accounting provisions increase. Under the Basel framework, accounting provisions are used to determine the amount of expected losses under both the Internal Ratings Based and Standardised approaches. Following the global financial crisis, both the International Accounting Standards Board (IASB) and the US Financial Accounting Standards Board (FASB) adopted provisioning standards that require the use of expected credit loss (ECL) models rather than incurred loss models that often resulted in provisions that were "too little, too late". IASB's International Financial Reporting Standard (IFRS) 9 took effect on 1 January 2018 and FASB's standard on current expected credit losses (CECL) is currently scheduled to take effect between 2020 and 2022. In the case of banks applying IFRS 9, the increase in ECL-based provisioning would be amplified by potential movements of certain leveraged loans from Stage 1 to Stage 2, i.e. from provisions computed based on 12-month probability of defaults (PDs) to lifetime PDs.

[70] Fitch (2019), *supra* note 63.

Because banks serve as leveraged loan underwriters, they are also exposed to market risk from loans in their pipeline that have been originated but not yet sold, especially in a scenario of a rapid sell-off in credit markets. Banks holding large unhedged CLO tranches or having a large underwriting pipeline that are marked-to-market could suffer valuation losses which would negatively impact their capital levels.[71]

Banks that provide credit facilities to financial intermediaries that invest in leveraged loans or CLOs are also indirectly exposed to these markets.[72] The opacity of information about these activities can limit the ability to understand the potential risk to banks of these linkages.

Liquidity risks (as described in Box 1 above) are three-fold. First, banks that provide liquidity to borrowers under revolvers can face sudden withdrawals, and may lack liquidity to meet payment obligations. Second, banks expect to be able to dispose of leveraged loans they originate in the open market. Should the demand for such assets dry up, banks would face the liquidity consequences of holding such loans for an extended period. Third, in stress, warehouse facilities could also generate delays in repayment and reduce bank liquidity. The financial crisis showed that credit line drawdowns can increase significantly in the presence of liquidity shocks,[73] since corporates often rely on these pre-arranged credit lines for their investment spending.[74] In turn, large drawdowns can increase liquidity risks for banks and result in credit crunches.[75]

Banks that are highly active in syndicating leveraged loans are moreover exposed to significant reputational risk, which in turn may also lead to increased liquidity and funding risks.

3.1.3 Resilience of banks

Although banks' exposures to leveraged loans and CLOs are sizable, their risk management and measurement practices have improved since the financial crisis, and their capital and liquidity positions have been strengthened.[76] Regulators in the US and the UK have stress-tested banks in their respective jurisdictions with exposure to leveraged loans and CLOs.[77] Such stress tests suggest that these banks' credit risk exposures are manageable and that banks would be able to withstand material losses on their loan portfolios, even when loans include fewer creditor

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71 Publicly available data shows that a majority of the CLO tranches are accounted for under available-for-sale classification in certain jurisdictions. Under FASB's rules, debt securities classified as available-for-sale securities are reported at fair value, with unrealised gains and losses excluded from earnings and reported in a separate component of shareholders' equity.

72 Vasvari, Florin. August 2019. *What have cheap bank loans done to private equity funds?* London Business School Review.

73 See Ivashina, Victoria and David S. Scharfstein. (2010). *Bank Lending during the Financial Crisis of 2008.* Journal of Financial Economics Vol. 97(3), pp. 319-338. See also Campello, Murillo, Erasmo Giambona, John R. Graham, and Campbell R. Harvey. (2012). *Access to Liquidity and Corporate Investment in Europe during the Financial Crisis.* Review of Finance Vol. 16(2), pp. 323-346.

74 See Holmstrom, Bengt and Jean Tirole. (2000). *Liquidity and Risk Management.* Journal of Money, Credit and Banking Vol. 32(3), pp. 295-319.

75 Antoniades, Adonis (2014). *Liquidity Risk and the Credit Crunch of 2007-2008: Evidence from Micro-level data on mortgage loan applications* BIS Working Paper No 473.

76 FSB *Implementation and Effects of the G20 Financial Regulatory Reforms* 5th Annual Report, 2019.

77 See Federal Reserve (2019), *Dodd-Frank Act Stress Tests (DFAST)* and Bank of England, *Financial Stability Report*, November 2018.

protections.[78] However there are inherent difficulties in modelling what the impact of a severe yet plausible scenario could be on complex debt products that have been originated under loose credit conditions. Furthermore, the cross-border dimension of the risks may not be fully covered by the stress tests, as interconnectedness is challenging to assess for individual jurisdictions. Beyond stress tests, other supervisory measures include a comprehensive assessment of banks' resilience to leveraged loans markets, including a strengthening of the risk management framework both before and after underwriting.[79]

The Basel III liquidity framework – particularly the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR) – incorporates protections against draws on credit lines. Nevertheless, the LCR may not fully capture liquidity risk because it does not differentiate between undrawn revolving facilities issued to high-yield and investment grade borrowers. Banks generally may make this distinction when carrying out their own liquidity stress tests as part of their risk management practices. According to the results of these stress tests - where they have been conducted - banks assess that the credit, market and liquidity risks arising from their involvement in the leveraged loan market are unlikely to have an outsized impact on their ability to lend in a market downturn.

In summary, direct exposure to leveraged loan and CLO markets is highly concentrated in a limited number of G-SIBs. Furthermore, banks also have indirect exposure to these markets as a result of extending credit to intermediaries that invest in these markets. While the overall resilience of banks has improved, concentration and indirect exposures could still make adverse developments in the leveraged loan and CLO impactful. Further, some of the practices that shift risks outside of the banking system, may create conflicting incentives. Contract terms in leveraged loan agreements and placement documents typically limit the direct risks to originators that resell loans. And, as noted in Section 1, while banks originate leveraged loans, institutional investors now play a larger role in purchasing syndicated loan packages. These factors might weaken incentives for banks to conduct due diligence and apply strict standards in good times to some extent, contributing to procyclicality in the provision of credit. These factors point to vulnerabilities to the broader financial system that could be triggered by adverse conditions.

3.2 Investment funds

3.2.1 Exposures to leveraged loans and CLOs

Investment funds in the US and the EU have gradually increased their share of the leveraged loan market over time, but these exposures tend to be small in terms of fund assets. Many funds that hold CLOs and leveraged loans invest a substantial share of assets outside of these markets. The

[78] Stress test scenarios include price paths and market liquidity comparable to those witnessed during the financial crisis, and in the 2018 UK stress test, pipeline exposures to leveraged loans reduced the aggregate CET1 ratio by 0.2%. Bank of England *Financial Stability Report,* November 2018.

[79] See, for example ECB Banking Supervision, *ECB guidance on leveraged transactions*, May 2017; which sets out, inter-alia, the supervisory expectations regarding definition, credit approval, syndication, IT systems, monitoring, reporting requirements and management information systems.

ratings of CLO holdings held by US registered investment funds are typically A-rated tranches, while those held by EU investment funds are not known.

- US registered investment funds[80] held approximately US$216 billion in leveraged loans and US$63 billion in CLOs as at December 2018.[81] These holdings represent approximately 12% and 8% of outstanding institutional leveraged loans and CLOs, respectively, but represent less than 1% of US registered investment fund total net assets. US registered investment funds' holdings of junior CLO tranches are limited and concentrated in a small number of closed-end funds; since mid-2017, these holdings have been declining.[82]
- As of December 2018, approximately 45 open-end funds had more than 80% of their assets invested in leveraged loans, representing approximately US$100 billion in total assets. Most of these funds are relatively small.[83] The remainder of US registered investment funds holding leveraged loans are either closed-end funds or open-end funds that do not have concentrated positions in leveraged loans.
- US registered investment funds' exposures to lower-rated CLO tranches is small and largely confined to closed-end funds that do not offer to redeem shares and do not engage in liquidity transformation.[84] While a number of open-end funds hold senior CLO tranches, these holdings are generally a small component of a broader fixed-income portfolio.
- In the EU, as at December 2018 Undertakings Collective Investment in Transferable Securities (UCITS)[85] held US$8 billion in leveraged loans and US$43 billion in CLOs, or 0.4% and 6% of outstanding institutional leveraged loans and CLOs, respectively as at December 2018. Combined, these holdings represent less than 1% of UCITS total net assets. EU Alternative Investment Funds (AIFs)[86] held US$103 billion in leveraged loans and US$22 billion in CLOs, or 5% and 3% of outstanding institutional leveraged loans and CLOs respectively. Combined, these holdings represent less than 1.5% of AIF total net assets.[87]

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80 In the US, registered investment funds include open-end (including exchange-traded funds (ETFs)) and closed-end funds.

81 Based on SEC staff review of fund holdings data provided by Morningstar, as of end-2018, in aggregate, open-end funds held US$58.4 billion in CLOs and US$172.2 billion in leveraged loans; closed-end funds held US$2.8 billion in CLOs and US$24.7 billion in leveraged loans; and ETFs held US$1.7 billion in CLOs and US$18 billion in leveraged loans. These holdings have declined since the end of 2018, and leveraged loans as of mid-2019 stood at approximately US$160 billion.

82 SEC staff review of fund holdings data provided by Morningstar.

83 Based on SEC staff review of fund holdings data provided by Morningstar. Five of these funds had more than US$10 billion in leveraged loans, while the remainder had median investments in leveraged loans of US$650 million. Of the US$100 billion in total fund assets, approximately US$10 billion were held by ETFs.

84 SEC staff review of data provided by Morningstar (fund holdings), Moody's (CLO tranches), and Datascope (CLO tranche ratings).

85 UCITS are funds targeted mainly at retail investors and are subject to diversification requirements and restriction on eligible assets they can invest in.

86 AIFs include hedge funds, private equity funds, real estate funds and a wide range of other types of institutional funds. AIFs are typically targeted at professional investors, and have no restrictions on assets they can invest in.

87 Most of the funds are classified under "Other AIFs", which implies that they do not belong to the other AIFMD types (such as hedge funds or private equity funds).

- Most UCITS with exposure to leveraged loans and CLOs invest in a diversified portfolio (i.e. CLOs and loans account for a small share of their investments), but there are a few smaller funds that invest almost exclusively in CLOs.

3.2.2 Liquidity risks faced by investment funds

Open-end investment funds holding most of their assets in leveraged loans may engage in liquidity transformation, offering investors redemption terms that are shorter than the time it may take to sell those holdings and for those sales to settle. Liquidity transformation could represent a vulnerability in stressed conditions if funds hold concentrated positions in leveraged loans, are of significant size, do not effectively manage their liquidity risks, and redemptions are significantly elevated. Even if at fund level liquidity risks may be adequately managed, if these funds in the aggregate experienced large-scale redemptions resulting in a need to sell leveraged loans, they could act procyclically and these sales could produce disruptive price impacts in the leveraged loan market.

During late 2018, liquidity in leveraged loan markets declined, with bid-ask spreads rising from 0.8% to 1.3% of notional value. In this period of reduced market liquidity, open-end funds, including Exchange Traded Funds (EFTs),[88] were able to meet the higher levels of redemptions without severe dislocations to market functioning. That said, a future stress episode with larger redemptions amid weaker economic fundamentals could lead to greater strains.

In the US, potential risks from registered investment funds' liquidity transformation would be largely limited to open-end funds' direct holdings of leveraged loans.[89] Potential risks arising from liquidity transformation are mitigated at the fund level because of certain structural features, including regulatory requirements for managing their liquidity risk and limiting the use of leverage.[90]

In the EU, UCITS are subject to detailed eligible assets and risk diversification requirements laid down in the UCITS Directive and its implementing acts. UCITS managers must ensure they meet the regulatory requirements set out therein before making investments and ensure compliance on an ongoing basis. In particular, these requirements aim to ensure sufficient portfolio liquidity, reliable valuation, and adequate (liquidity) risk management. In aggregate, EU AIFs with the highest exposures to CLOs and leveraged loans have a potential liquidity mismatch at the short-end: within a day, investors can redeem up to 13% of net asset value (NAV) while only 1% of the portfolio can be liquidated within a day. The aggregate liquidity mismatch stems from a few

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88 ETFs are open-ended funds that do not sell or redeem individual shares. ETF shares may be purchased and redeemed directly from the ETF only by authorised participants in blocks called "creation units". The potential risks from liquidity transformation would be largely limited to direct leveraged loan holdings of ETFs that redeem in cash. Loan ETFs lost a third of their assets during late 2018, and like other open-ended funds during that period, ETFs were able to meet redemptions.

89 Closed-end funds do not offer to redeem shares and do not engage in liquidity transformation. Investors seeking to sell closed-end fund shares would instead trade with other investors at prices established in the secondary market. Because US registered funds' exposures to risky CLO tranches is small and largely confined to closed-end funds, it is unlikely that problems in the CLO markets could be exacerbated by liquidity transformation in registered closed-end investment funds.

90 Structural features include requirements to establish a written liquidity risk management programme; reasonably designed to assess, manage, and periodically review the fund's liquidity risk, including under reasonably foreseeable stressed conditions; and generally, to maintain a minimum amount of highly liquid assets; and to limit purchases of illiquid assets to 15% of the fund's net assets. Funds are not required to classify leveraged loans as illiquid.

funds which offer daily liquidity, while around 70% offer redemptions no more frequently than every three months.

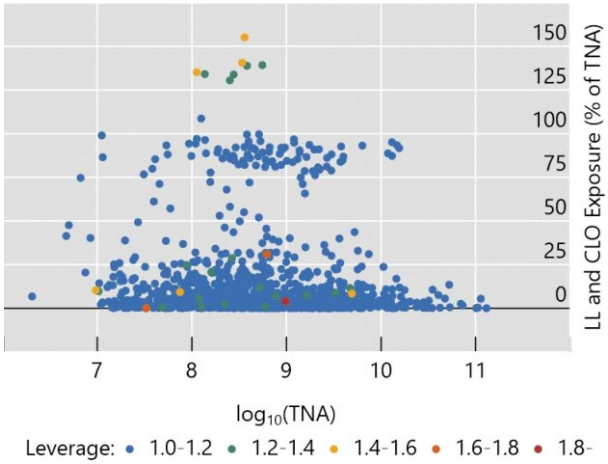
3.2.3 Funds' leverage

Significant leverage could exacerbate the vulnerabilities associated with liquidity transformation. However, US and EU regulations place significant restrictions on the use of financial leverage by US registered investment funds and UCITS respectively, and available data suggests that investment funds' use of leverage in both jurisdictions is indeed limited. Investment funds could obtain leverage in two ways – on balance sheet or synthetically through the use of derivatives.

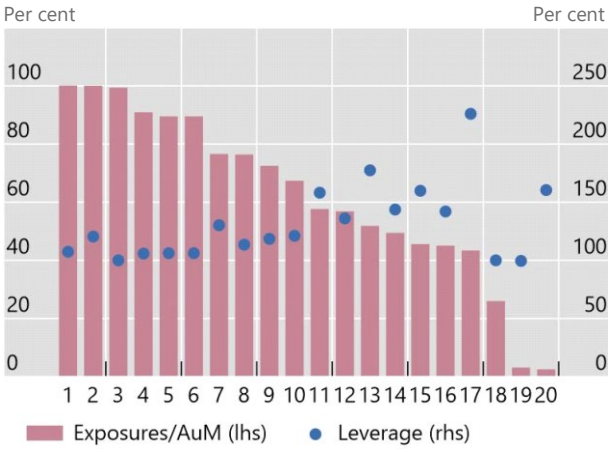
US registered investment funds' balance sheet leverage is typically restricted to less than 33% of total assets. Only eight US registered investment funds with leverage on their balance sheets reported high concentrations in leveraged loans and CLOs (i.e. holdings of CLOs and leveraged loans that exceed the fund NAV) (**Graph 9, left panel**).[91] All eight of these were closed-end funds that do not offer redeemable securities and do not engage in liquidity transformation.

Leverage of US and European investment funds — Graph 9

US registered investment funds' exposure to leveraged loans and CLOs, balance-sheet leverage[1]



AIFs' exposure to leveraged loans and CLOs and leverage[2]



TNA = Total net assets [1] As of year-end 2018; excludes funds with no LL or CLO exposure. [2] Gross exposures to leveraged loans and CDO/CLOs in % of AuM and leverage defined as AuM to NAV. Data for the top 20 AIFs with the largest exposures to leveraged loans and CDO/CLOs in absolute amounts.

Sources: SEC staff review of data provided by Morningstar, Datascope, and Moody's; Alternative Investment Fund Managers Directive (AIFMD) database; National Component Authorities; ESMA.

Several open-end funds with moderate leverage on their balance sheets report non-trivial holdings of leveraged loans and CLOs. Among these funds, the maximum reported holding of leveraged loans and CLOs is 31% of NAV. For the larger open-end funds with leverage on their

[91] SEC staff review of data provided by Morningstar (fund holdings), Moody's (CLO tranches), and Datascope (CLO tranche ratings). Synthetic leverage obtained via total return swaps, credit default swaps (CDS), or other investments in levered securities is excluded.

balance sheets (those with more than $1 billion in NAV), holdings of leveraged loans and CLOs are even lower (less than 15% of NAV).[92]

In the EU, UCITS face limits on both balance sheet leverage (10% borrowing on a temporary basis)[93] and synthetic leverage (limited to 100% of NAV under the commitment approach, where gross exposures are adjusted for hedging and netting). EU AIFs face no regulatory limits on leverage. AIFs exposed to leveraged loans and CLOs employ some leverage: as of end-2017, the average leverage for the top 20 AIFs by exposure (measured by their assets under management (AUM) to NAV) stood at 130%, ranging from 100% up to 200% for a few funds. Preliminary data for 2018 indicates that average leverage increased to 150% (**Graph 9, right panel**).

3.3 Insurance companies

3.3.1 Exposures to leveraged loans and CLOs

Measured as a percentage of their assets, the exposure of insurers to leveraged loans and CLOs is small, although exposures have grown in recent years and some insurers have concentrated exposures. Total exposures of insurance companies to leveraged loans and CLOs amounted to US$56 billion and US$135 billion respectively in December 2018. Available data indicates that insurers hold lower-rated tranches than banks.

- US insurance companies held approximately US$54 billion in leveraged loans (of which almost 80% was non-investment grade)[94] and US$122 billion of CLOs[95] (79% of which was A-rated or above) as of end 2018. This represents approximately 3% of outstanding institutional leveraged loans and 16% of outstanding CLOs. The majority of CLO exposure is held by life insurance companies. CLOs represent a small proportion of total assets, according to Moody's (2019),[96] the top 15 US life insurers have exposure from 1% to 15% of their investments in CLOs with varying subordination levels. In aggregate, US insurer bank loan and CLO holdings represented approximately 11.6% and 20.4% of their total adjusted capital (TAC) respectively, at the end of 2018, however, some had much higher exposures in CLOs relative to TAC.
- While EU insurer disclosures of leveraged loans are limited, one CRA suggests EU insurer holdings are comparable to US insurer holdings as a proportion of assets and capital.[97] EU insurers had overall exposures to CLOs and collateralised mortgage obligations (CMOs) of US$5.1 billion at end-2018 (less than 0.15% of total investment

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92 SEC staff review of data provided by Morningstar (fund holdings), Moody's (CLO tranches), and Datascope (CLO tranche ratings).

93 See European Securities and Markets Authority, *Article 83*.

94 NAIC (2019) *U.S. Insurer Bank Loan Exposure as of Year-End 2018*, June. These are based on by property/casualty, life/accident/health, health, title and fraternal companies. This figure may not capture all the activities of an insurance company group. These investments are identified as 'bank loans'; 78% of these loans are non-investment grade and mostly single-B rated.

95 NAIC (2019) *U.S. Insurers' Exposure to Collateralized Loan Obligations (CLOs) as of Year-End 2018,* June.

96 Moody's, *US insurers increase CLO holdings, though exposure remains modest,* June 2019.

97 Fitch (2019), *supra* note 63.

assets).[98] These exposures are concentrated, with 80% of them held by 10 insurers at end-2017.[99] Around 55% of CLO tranches held are rated AAA-AA, 15% are rated A, and around 25% are rated below investment grade or not rated. Between Q1 2016 and Q4 2018, the share of non-investment grade rated CLOs and CMOs as a percentage of insurer holdings doubled in size. At the end of 2018, EU insurers held approximatively €63.6 million in CLO equity tranches, representing 0.2% of the total CLOs holdings reported by these insurers. In the EU, insurers' aggregate holdings of collateralised securities represented approximately 7.1% of aggregate capital (assets less liabilities).[100]

- Japanese insurers held a small amount of leveraged loans and US$7.4 billion in CLOs as of December 2018 (representing about 0.2% of their assets under management). Roughly half of the CLOs held by Japanese insurers are AAA-rated.

3.3.2 Risk faced by insurance companies

While CLOs and leveraged loans represent a relatively small exposure for most insurers, lower-quality CLO or leveraged loan investments could nonetheless contribute to a deterioration of regulatory capital ratios in an economic downturn. Unlike the capital treatment of banks, which is largely uniform globally and follows the Basel standards, the capital rules for insurers differ across jurisdictions and may therefore have different behavioural implications. The impact of lower asset prices on US insurers' capital ratios is likely to be subdued because US insurers need not mark their CLO and leveraged loan holdings to market. By contrast, although the majority EU insurers' aggregate CLO holdings are investment grade, Solvency II requirements employ mark-to-market accounting for these assets, potentially increasing the risk of forced asset sales in a downturn.

3.4 Other non-bank financial intermediaries

Supervisory and market data show that 79% of the overall estimated leveraged loans exposure and 63% of the CLO exposure is accounted for by banks, investment funds and insurance companies. In addition to these holders, it is estimated that US pension funds held US$57.2 billion of CLOs, and that other US financial organisations (including broker dealers and holding companies) and other US non-financial organisations held US$55.1 billion of CLOs respectively in December 2018.[101] Adding these estimates to other known CLO holders results in 85% of the total CLO exposure accounted for. However, little is known about the exposures of certain other non-bank financial intermediaries. Moreover, the holders of the riskiest CLO tranches are largely unknown.

Anecdotal evidence suggests that pension funds, hedge funds, private debt funds, family offices and sovereign wealth funds are among the buyers of the riskier mezzanine and equity tranches, although this has not been confirmed with data. The identities, and the capacity of these entities to withstand market volatility and losses, remains unknown. A comprehensive analysis of the

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98 EIOPA (2019), *Financial Stability Report*, June. Disaggregated CLO and CMO data were not available.

99 Fitch (2019), *supra* note 63.

100 Fitch (2019), *supra* note 63.

101 Based on the ratio of domestic holdings of Cayman-issued US CLO securities in December 2017. See FEDS Notes (2019), *Who Owns U.S. CLO Securities*, July.

vulnerabilities related to leveraged loans and CLOs would require further information on these entities' exposures.

3.5 Macro and systemic implications and linkages among financial intermediaries

While the growth of leveraged loan and CLO markets has increased financing opportunities for corporates, which may promote investment, highly leveraged corporates are more vulnerable to external shocks than less leveraged ones.

Adverse macroeconomic shocks can propagate across the financial system via different channels. For example, increased leverage in some segments of the non-financial corporate sector could amplify market sell-offs. As documented in Annex C, high non-financial corporate leverage is associated with a higher probability of downgrades, higher credit spreads, as well as more volatile debt and equity markets. Analysis in Annex C also shows that structurally higher non-financial corporate leverage has a procyclical effect on debt and equity prices of publicly listed corporates and, as such, can amplify financial market shocks. Thus, highly leveraged corporates may amplify the pass-through of financial shocks to the real economy and exacerbate a slowdown in economic growth. There is indeed evidence that corporates with higher debt levels and a higher share of short-term debt reduce investment more than less leveraged corporates when faced with tighter financial conditions.[102]

Similar to other markets, the leveraged loan and CLO markets include direct and indirect forms of interconnectedness, both within and across borders. Direct interconnectedness arises from links in the intermediation chain, from origination and distribution of leveraged loans to securitisation by CLO managers, as illustrated in the schematic representation of the leveraged loans and CLO markets (Graph 1). Other specific examples of direct links are the funding that banks provide to private equity sponsors as capital call facilities and to CLO managers as CLO warehousing facilities. Through these direct links, shocks to the leveraged loan and CLO markets could transmit risks to financial intermediaries not directly exposed to such markets. The transmission and amplification of risks could impact markets more broadly, to the extent that financial intermediaries have cross-border exposures to these markets.

Indirect interconnectedness can arise in the form of common exposures of banks and non-banks to leveraged loans and CLOs, and could provide an avenue for contagion among financial institutions. For instance if some financial intermediaries under stress sold their leveraged loan and CLO holdings, and demanded more liquidity than other market participants are willing to supply, these sales could put downward pressure on leveraged loan and CLO prices. To the extent that other financial intermediaries mark their holdings of leveraged loans and CLOs to market, price pressure could place them under strain, potentially resulting in further sales, or a reduction in their capacity to intermediate transactions or extend credit to leveraged borrowers. Moreover, the credit risk in leveraged loans stemming from exposure to the same obligor is shared among the bank syndicate and with a wide range of investors, including CLOs that redistribute risk across tranches. While participation in these markets by a diverse set of market participants

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[102] Kalemli-Özcan, S, L Laeven, and D Moreno (2018) *Debt overhang, rollover risk, and corporate investment: Evidence from the European crisis.*, CEPR Discussion Paper 12881. See also Bernanke, Ben, Mark Gertler, and Simon Gilchrist (1994), *The Financial Accelerator and the Flight to Quality.* Working Paper. National Bureau of Economic Research, July.

promotes risk sharing, it could also contribute to the propagation of losses which, in turn could result in systemic risk.

Shocks arising from outside of the leveraged loan and CLO markets that place intermediaries under financial strain, could impair the supply of capital to leveraged borrowers or cause other intermediaries in the market to become unable to offload exposures to leveraged borrowers.

The analyses of the macro implications and interconnectedness in this report is not conclusive. The FSB will consider whether there is scope to close data gaps, will continue to analyse the financial stability risks and will discuss the regulatory and supervisory implications associated with leveraged loans and CLOs.

Annex A: Definitions of leveraged loans

Table A.1 – Definitions of leveraged loans by data provider

Data provider	Definition
Bloomberg	Loans meeting one or more of the following criterion are considered leveraged a. US loans (i) rated BB+ or lower; (ii) unrated loans where the borrowing entity has a non-investment grade rating; (iii) primary use of proceeds is leveraged buy-out (LBO), management buy-out (MBO), recapitalisation, or secondary buy-out; (iv) an equity sponsor is present; (v) If neither the loan nor the borrower are rated and the US loan has a margin at signing of LIBOR +175 basis points (bps) or higher and is secured by a lien. b. Non-US loans (i) primary use of proceeds is LBO, MBO, recapitalisation, or secondary buyout; (ii) an equity sponsor is present; (iii) margin at signing of LIBOR/EURIBOR +250 bps or higher and a leverage multiple greater than 4.5x.
Refinitiv	Margins (including transactions with drawn spread of at least LIBOR+175 bps for US syndications and at least LIBOR+250 bps for European syndications), ratings (considering transactions for issuers with senior debt ratings of BB+/Ba1 or lower) and price-earning sponsor-backed financings (transactions whereby a private equity sponsor maintains an ownership position allowing them to influence the management of the company via buy-outs or levering of issuer).
S&P	The loan is rated BB+ or lower or The loan is not rated or rated BBB- or higher but has a spread of LIBOR +125 bps or higher and is secured by a first or second lien.[103]

[103] Although loans are currently priced against LIBOR, it is anticipated that they will eventually transition to alternative reference rates.

Table A.2 – Definitions of leveraged loans according to US and ECB guidance

Authority	Definition
US Federal Reserve, Federal Deposit Insurance Corporation (FDIC), and Office of the Comptroller of the Currency (OCC) - the Interagency Guidance on Leveraged Lending [104]	If any of these criteria are met: • The proceeds are used for buy-outs, acquisitions, or capital distributions. • A transaction where the borrower's Total Debt – to – EBITDA ratio exceeds 4X, or Senior Debt – to – EBITDA ratio exceeds 3X. • When the borrower is recognised in the debt markets as a highly leveraged corporates, which is characterised by a high debt-to-net-worth ratio. • Transactions when the borrower's post-financing leverage, as measured by its leverage ratios, significantly exceeds industry norms or historical levels.
ECB Guidance on leveraged lending[105]	Loan and credit exposures to highly leveraged borrowers (leverage ratio: >4.0 times total debt over EBITDA) as well as all leveraged buy-out and related financing of borrowers which are owned by financial sponsors. Total debt refers to total committed debt including drawn and undrawn facilities (i.e. revolving credit facilities). Cash should not be netted against debt. EBITDA should be computed by credit institutions and any enhancements to should be duly justified and documented on a case-by-case basis. The following exclusions apply: Investment grade borrowers; asset-type financing (i.e. real-estate, project-, object- and commodities-financing); <€5 million consolidated exposure; small and medium enterprises (SMEs) (except for financial sponsor-owned SMEs).

[104] See *Interagency Guidance on Leveraged Lending*, November 13, 2014.

[105] See *Guidance on leveraged transactions*, May 2017.

Annex B: The ratings, waterfall and lifecycle of a CLO

Lifecycle

CLOs follow a standardised lifecycle composed of: a warehouse period, where initial financing is provided by the banks and loan purchases are initiated; a ramp-up period, during which the manager assembles the portfolio; a non-call period, during which the issued securities are non-callable; a reinvestment period; and an amortisation period. During the reinvestment period, the portfolio is actively managed[106] and underlying assets may change significantly due to the replacement of expiring assets. This is a significant difference with other types of securitisations, which increases upside potential, but also exposes investors to greater downside risk. Investment management decisions concerning the underlying portfolio are at the discretion of the manager, but subject to limitations specified in the indenture.[107]

The interim financing of a CLO during the warehouse period is typically provided by the banks, which are repaid with proceeds from the sale of the CLO notes into the capital markets (i.e. closing). The closing of the CLO occurs several weeks after the characteristics of the tranches have been set and agreed to between the underwriter and investors (i.e. pricing). The settlement of the notes at closing marks the beginning of the existence of the rated CLO. This is the beginning of the ramp-up period during which the purchase of the remaining initial portfolio occurs. The effective date (usually three to four months after closing) occurs when the CLO is fully ramped-up and satisfies the portfolio eligibility criteria.

Once a CLO is set up, typically there is a period of time during which the CLO manager is restricted from redeeming or refinancing the issued liabilities (i.e. the non-call period). Therefore investors have some initial protection against refinancing of a CLO. The non-call period tends to be in place for two to three years.

After the non-call period, the CLO manager (typically at the direction of the equity investors) can redeem the liabilities by liquidating the portfolio, or refinance some or all of the liabilities. Refinancing provides flexibility if prevailing interest rate spreads decrease, which is of particular benefit to equity investors that otherwise would have negative carry during the remaining term of their investment.

During the reinvestment period, the CLO manager seeks to maintain the portfolio's asset quality and aggregate par value. The manager purchases new loans using principal proceeds from the underlying loans (either from principal repayments or from proceeds on selling loans currently in the CLO). Since the crisis, the reinvestment period typically lasts for four to five years.

The final stage of a CLO's lifecycle is the amortisation period. During this period, the CLO manager typically must apply principal payments on the loans to the repayment of outstanding notes and can reinvest principle only in limited circumstances. The amortisation period lasts until the legal maturity of the CLO.

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[106] CLOs may be actively managed by a CLO manager according to its investment strategy, or have a fixed (i.e. not actively managed) pool of assets. The majority of CLOs are actively managed according to Morgan Stanley, "Primer on Collateralized Loan Obligations (CLOs)", 3 February 2017.

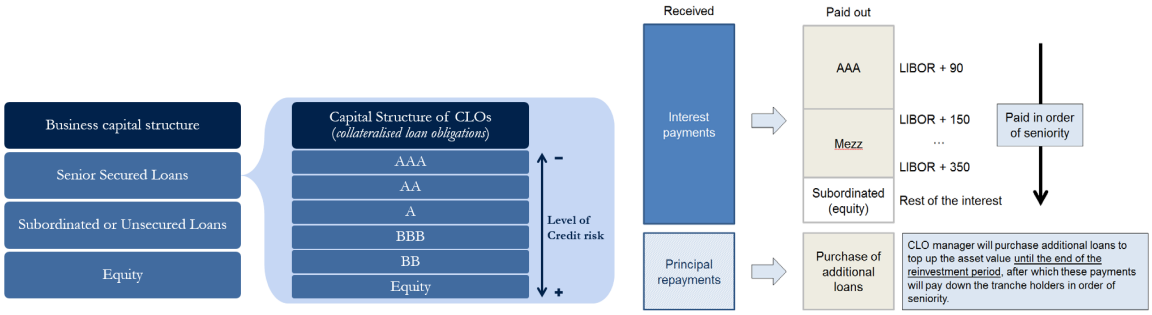
[107] See Fitch, July 2019. *CLOs and Corporate CDOs Rating Criteria*.

Ratings

In addition to a tranche's seniority (or place in the waterfall), credit rating agencies consider the quality of the underlying loan portfolio and issue a credit rating for each tranche that reflects the expected risk/return profile of the underlying pool of loans, the CLO structure, and the tranche's seniority within that structure.[108] A major factor in a note's rating is the degree of overcollateralisation provided by junior tranches (the "attachment point" or subordination level). In addition, features of the CLO structure such as investment criteria, concentration limits,[109] collateral quality tests, and coverage tests,[110] influence default probabilities and hence, credit ratings. Ratings range from AAA (the most senior tranches) to unrated (the most junior, equity tranche) (**Graph B.1, left panel**).[111]

As the actual CLO collateral is generally not fully identified until after the rating is issued,[112] and because the collateral may be traded during the life of the CLO, evaluation of the underlying collateral is complex and may be based on hypothetical portfolios which are modelled under a variety of stress scenarios.

Graph B.1 Capital structure of the CLO and simple illustration of how a typical CLO distributes cash flows in a given period



Sources: Banque de France and Bank of England

Waterfall

The waterfall controls how cash flows received from assets in the CLO's portfolio are directed. A simplified waterfall is shown in **Graph B.1, right panel**. Although the specifics differ across deals, typically cash flows are first directed to cover taxes and government fees, followed by (in

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[108] As the actual CLO collateral is generally not fully identified until after a rating is issued and because the collateral may be traded during the life of the CLO, ratings may be based on hypothetical portfolios modelled under a variety of stress scenarios. See for example, Fitch, *The Ratings Process* at 17.

[109] See for example See Fitch, July 2018. CLOs and Corporate CDOs Rating Criteria.

[110] See, for example, Fitch, *The Ratings Process* at 17.

[111] All but the most subordinated tranches (i.e., the equity), are typically rated by at least one credit rating agency, with the most senior tranche often receiving an additional rating from a second credit rating agency. In the US this rating is typically provided by Moody's or S&P. In the EU Credit Rating Agencies (CRA3) Regulation requires two ratings on structured financial instruments. Rating agencies are remunerated by the CLO issuer.

[112] CRAs review ratings after their initial assignment. See for example, Fitch, *The Ratings Process* at 17.

sequence): administrative expenses, senior management fees,[113] claims of the various classes of notes (in order of seniority, i.e. first the senior tranches, then the mezzanine tranches), and subordinated management fees. Any remaining cash flows accrue to equity. In addition to codifying the priority of payments, the waterfall codifies conditions under which payments can be made: payments to junior tranches are conditional on passing tests (e.g. "overcollateralisation" and "interest-coverage") designed to protect senior tranches.

Test and triggers in post-crisis CLOs

The tests and triggers embedded in post-crisis CLO structures are designed to protect senior noteholders from losses through various channels. The two most common tests assess the amount of collateral (i.e. overcollateralisation) and the size of the interest payments on the collateral. If these quantities fall below certain levels, all excess cash flows are diverted from the equity tranche holder and more junior noteholders and used to pay down the senior-most tranche (usually AAA) to deleverage the CLO and return these quantities to normal levels. In a stress event, it is these tests and triggers that lead to early unwinding of the CLO and protect senior tranche holders from losing money.

Table B.1 Tests and triggers in a typical CLO (pre / post-crisis)

Test / trigger	How it works	Standard in all CLOs? (pre / post crisis)	Typical threshold	Impact of failing
Overcollateralisation (OC) test	Ratio of total asset value to total principal of all tranches senior to each tranche.	Yes / Yes	105-120% (higher for senior)	Cash flows used to pay down tranches in order of decreasing seniority
Interest coverage (IC) test	Ratio of total interest from assets to interest due on all tranches senior to each tranche.	Yes / Yes	105-120% (higher for senior)	
Interest diversion test	Same as the OC test for the junior mezzanine tranche, with a more conservative threshold.	Most / Yes	Higher than relevant OC test	Cash flows for equity tranche used to buy collateral or pay down tranches.
Event of default (EOD) test	OC test for the senior tranche.	Most / Yes	102.5%	Typically cash flows used to pay down tranches. Majority of senior tranche could trigger liquidation of collateral in theory.
Market value overcollateralisation (MVOC) test	OC tests where collateral is carried at market value.	Yes / No	Same as OC test	Full liquidation of collateral.
CCC-rated limit	Limit to CCC-rated collateral.	Yes / Yes	5-7.5%	Collateral value above threshold marked down for OC tests.

Source: Bank of England.

[113] While senior management fees are positioned near the top of the payment waterfall, subordinated management fees are positioned near the bottom. Thus, subordinated management fees have the character of performance-based compensation.

Concentration limits and coverage tests

In the case of a managed CLO, underlying assets may change significantly due to their replacement during the reinvestment period. Since changes in underlying asset quality create a risk of losses to CLO investors, current structures include various conditions that restrict a CLO manager's ability to shift risks among tranches, such as:

- "concentration limits" including, inter alia, a required minimum percentage of first lien assets and an upper limit on the percentage of loans with ratings of "Caa/CCC" or lower; and
- "coverage tests" including an overcollateralisation test and an interest coverage test, which establishes a threshold for interest payment capacity based on the interest income from the underlying loans.

If these conditions are not met, the CLO manager cannot reinvest in new loans that would further violate such conditions. When coverage tests are out of compliance, the cash flows generated from the underlying assets are used to redeem the principal of the senior tranches instead of paying the subordinated tranches. If, however, these conditions are met, principal proceeds may be reinvested in new collateral instead of being used to amortise senior notes.

Details on credit risk retention rules (see Table B.2)

In the US, the Credit Risk Retention Rule[114] took effect in December 2016 and initially applied to both "balance sheet" and "open-market" CLOs.[115] The rule was successfully challenged in court, and since April 2018 open-market CLOs no longer have to comply with the 5% requirement of the Credit Risk Retention Rule.[116] Balance sheet CLOs continue to be subject to the rule, which generally only impacts middle-market CLO managers and other non-bank financial institutions (as mentioned above, middle market CLO's are 10% of the outstanding US CLO market). Bank balance sheet CLOs have effectively disappeared after the financial crisis as they became uneconomical due to more stringent bank regulatory capital requirements.

In the EU, the 2014 Capital Requirements Regulation (CRR) introduced a retention requirement of 5% for the originating bank.[117] In addition, the Credit Rating Agencies Regulation requires that CLOs are rated by at least two CRAs.[118] Finally, the EU Securitisation Regulation requires (i) due diligence for EU investors purchasing CLOs; (ii) transparency and disclosure through reporting templates set up by ESMA; and (iii) that the risk retention requirement also applies to non-EU CLO originators that market CLOs to EU investors.[119]

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[114] US regulatory agencies adopted the Credit Risk Retention Rule in December 2014, requiring that sponsors of certain asset-backed securities retain at least 5% of the credit risk in the underlying assets of covered securitisations. For more information, see *Federal Register* Vol. 79, No 247.

[115] A CLO is considered to be a balance-sheet CLO if the loans are originated and held on the balance sheet of a single institution or a group of originating banks. On the other hand, the market considers a CLO to be an open-market CLO if the assets are acquired on the secondary market by a CLO manager.

[116] See Loan Syndications & Trading Ass'n v. SEC supra note 58.

[117] See *EBA Interactive single rulebook*.

[118] See https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009R1060 and ARTICLE 8C - DOUBLE CREDIT RATING OF STRUCTURED FINANCE INSTRUMENTS.

[119] See https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32017R2402.

In Japan, the Financial Services Agency (JFSA) introduced risk retention rules with quantitative criteria in March 2019. The rule requires financial institutions holding securitised products to confirm that the originator retains more than 5% of the risks associated with the products. Alternatively, Japanese banks need to demonstrate that the underlying assets of the CLOs are reviewed using appropriate credit underwriting criteria and have enough investor protections or would need to apply risk weights that are three times higher than the original risk weights.

Table B.2 - CLO regulatory frameworks in key jurisdictions

		EU Securitisation Regulation (Sec Reg) (roughly 17% of outstanding CLOs)	**US (roughly 83% of outstanding CLOs)**	**Japan (investors only)**
Direct regulatory requirements on originators/sponsors	Risk retention (RR)	Originator, sponsor or original lender must retain 5% net economic interest. The 5% retention rules have been applicable in the EU since 2011, and were transposed into the EU Securitisation Regulation.	Direct requirement for securitisation sponsors to retain 5% risk took effect in December 2016. In April 2018, a successful court challenge to the rule led to the invalidation of the rule as it applies to open-market CLOs.	
Direct regulatory requirements on investors	Prudential requirements	Actively managed CLOs are ineligible for the Simple, Transparent and Standardised (STS) label and EU bank investors.	The US regulatory framework prevents banks from using external ratings, requiring the use of supervisory formula approaches that rely on standardised or modelled inputs. US regulators apply a risk weight floor of 20%, higher than the EU.	Banks are required to demonstrate that the underlying assets of the CLOs are appropriately reviewed otherwise need to apply risk weights that are three times higher than its original risk weights.
	Investor requirements	The Sec Reg requires institutional investors verify that originators/sponsors: • Comply with risk retention requirements (EU investors cannot hold US CLOs which do not comply with RR); • Have sound and well-defined underwriting criteria; and • Do due diligence on risk factors of the securitisation and underlying assets.	US risk retention requirements apply directly to sponsors and not investors, and US risk retention requirements for open-market CLOs ceased to apply in April 2018. US CLOs sold to investors in non-US jurisdictions would still be subject to any applicable risk retention requirements in those jurisdictions. Many US investors in CLOs are regulated entities subject to various federal and state requirements. For example, insurance companies are subject to capital requirements. In addition, investment funds in the US are managed by advisers that owe a fiduciary duty to each fund, and registered investment funds, including those that invest in CLOs, are subject	Japan Risk Retention rule requires financial institutions to verify that originators retain risks associated with securitised products no less than 5%. Alternatively, banks need to either: • demonstrate that the underlying assets of securitised products are formed appropriately; or • apply risk weights that are three times

			to laws and regulations addressing (among other things) liquidity, borrowing, disclosure and reporting.	higher than original risk weights.
Credit Rating Agency (CRA) Regulation		The 2009 CRA Regulation introduced a common approach to regulation and supervision of CRAs to improve rating quality for FS and investor protection.	The Dodd-Frank Act mitigated regulatory reliance on CRA ratings for securitisation.	The revision of the Financial Instruments and Exchange Act in 2009 introduced a registration system for CRAs supervised by JFSA.

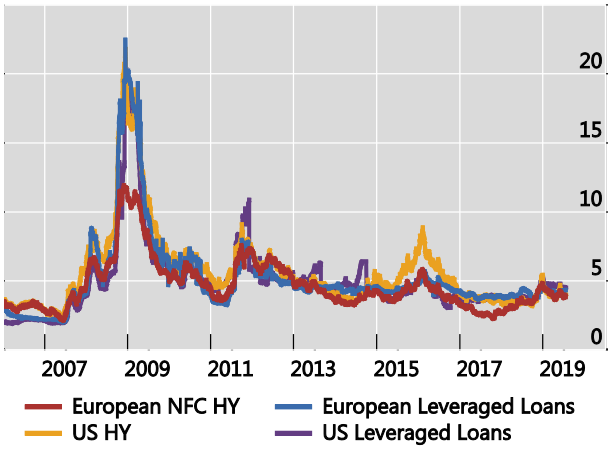
Annex C: Vulnerabilities of highly leveraged corporates

Many borrowers in leveraged loan markets are not required to publicly disclose financial information, which means that there often is no publicly available data on the equity, enterprise values or financial metrics. This makes an analysis of how shocks could be transmitted to leveraged loan markets, in particular via the equity channel, more difficult. However, significantly more data are available for high-yield bonds and the corporates issuing them, many of which are listed. These data can, in turn, be used as a proxy for analysis given the correlation between spreads and defaults in the respective markets (**Graph C.1**). Using data from high-yield bond markets and high-yield corporates with publicly available financial information, it can be demonstrated how higher levels of corporate leverage can amplify risks to financial stability.

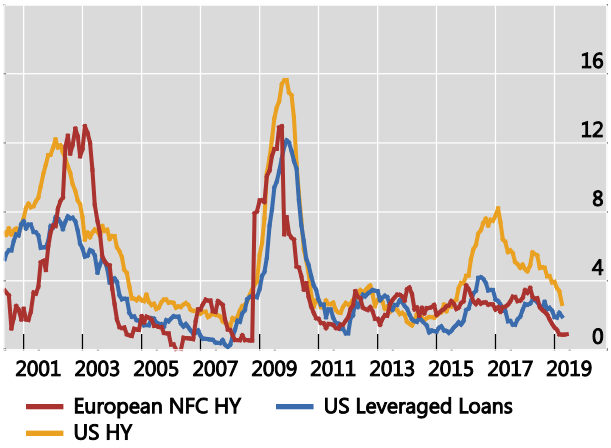
Relationship between spreads and defaults in the high-yield and leveraged loan markets

In percent — Graph C.1

European and US HY and LL spreads[1]



European HY and US HY and LL default rates (trailing 12 months)



[1] For leveraged loans, the spreads shown are discount spreads for the S&P/ Loan Syndications and Trading Association(LSTA) European Leveraged Loan 40 and S&P/LSTA US Leveraged Loan 100 Indices; for HY bonds, asset swap spreads for the iBoxx EUR HY Core Non-Financials ex Crossover and option adjusted spreads for BofAML US High Yield Master II index.

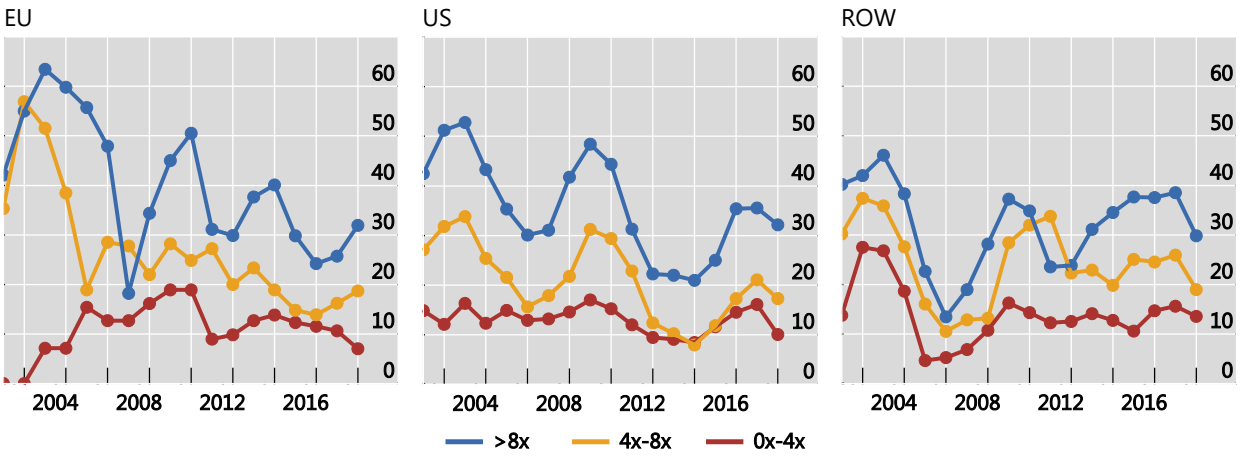
Sources: Refinitiv; Moody's.

A worsening of the macroeconomic scenario could lead to a higher rate of downgrades – particularly of highly leveraged corporates – and more defaults. Analysis suggests that bonds issued by highly leveraged corporates are not necessarily downgraded during times of good economic growth, but are downgraded at a higher rate once macroeconomic conditions deteriorate. Historical data also show a correlation between the level of corporate leverage and downgrades, since both increase during periods of economic downturn (Graph C.2).

High yield corporate leverage and downgrades: Correlation

In percent

Graph C.2



Note: The downgrade rates shown are cumulative over three years and capture "hard" downgrades that bring the rating at least one full step lower, for example from BB to B or lower. Leverage is computed as Gross Debt / EBITDA.

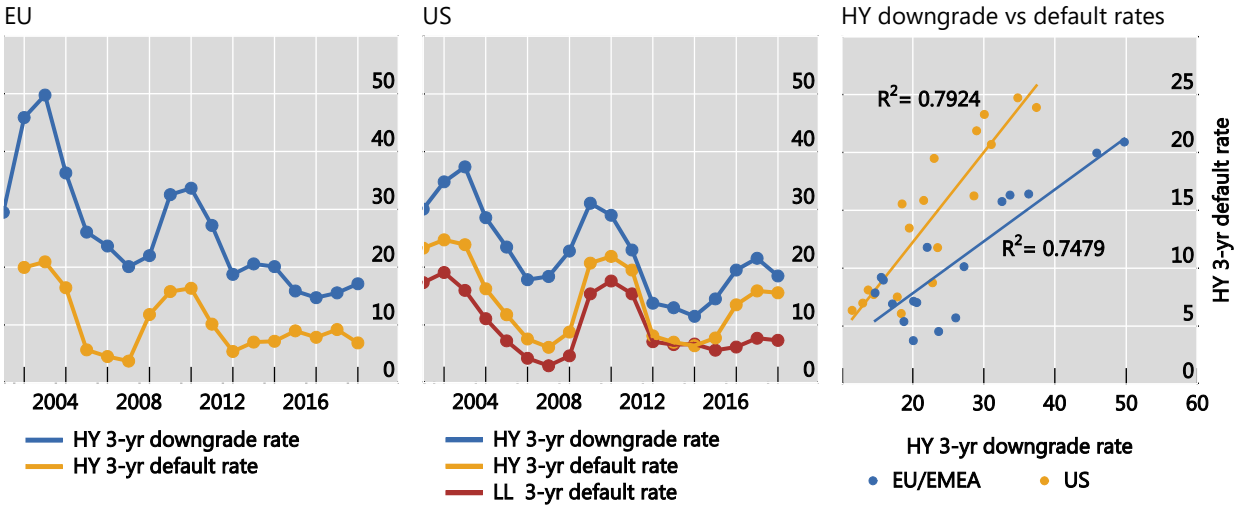
Sources: ECB calculations; Capital IQ.

Furthermore, in the US and the EU, high-yield downgrades and high-yield default rates tend to move together and increase during economic recessions (Graph C.3).

High yield corporate downgrades and defaults (3-yr cumulative rates)

In percent

Graph C.3



Sources: ECB calculations; Capital IQ; Moody's.

Highly leveraged corporates are more vulnerable than less leveraged ones to external shocks, of which broad based demand side shocks arising from a slowdown in the economic growth are particularly important. This higher vulnerability is reflected in the strong link between higher corporate leverage and a higher downgrade rate during downturns (channel A, table C.1), as well as in the higher cost of debt and equity for more leveraged corporates. Such vulnerabilities are less evident during periods of strong growth when the differentiation between more and less vulnerable corporates is small. These vulnerabilities could, however, translate into channels of propagation of potential systemic risk during downturns when the risk premium the market requires on financial instruments issued by more leveraged corporates increases sharply. These channels (b, c and d in table C.1) are discussed next.

Table C.1. Additional risk amplification mechanisms

Driver	Channel of systemic impact	
	A. Financial Market	B. Macroeconomic
Higher HY NFC corporate leverage	a) Higher downgrade rate b) Higher credit spreads c) Higher correlation between bond and equity prices d) More volatile HY bond and equity prices	Lower CAPEX/investments by highly leveraged corporates, in particular during downturns

Both financial theory and data suggests that more leveraged corporates have higher financing costs and more volatile equity and bond prices.[120] The graphs below show that more leveraged corporates pay higher unsecured funding costs (Graph C.4), exhibit higher equity and bond price volatility (Graph C.5) and bond and equity price correlation (Graph C.6) relative to less leveraged corporates.

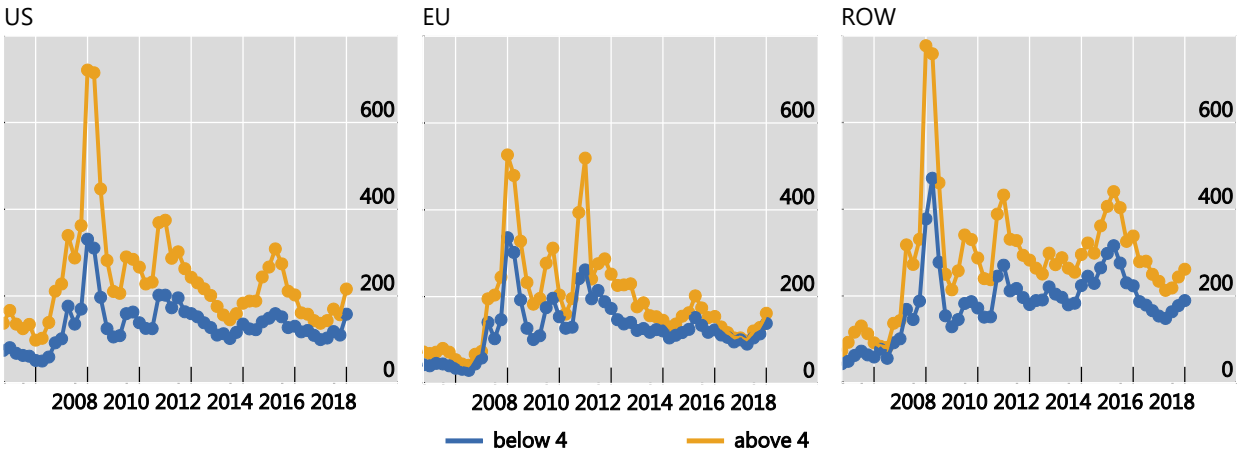
In addition, structurally higher non-financial corporate leverage has a procyclical effect on debt and equity prices of publicly listed corporates and, as such, can amplify financial markets shocks. A higher share of debt relative to equity, or relative to a company's earnings power (EBITDA), increases returns on equity during periods of positive economic growth when earnings are positive and decreases them during downturns, when earnings become negative. The increase/decrease in returns on equity is more pronounced for corporates with higher debt to EBITDA ratios. Higher equity returns tend to attract more investors and therefore higher equity and debt valuations during periods of positive economic growth and ultimately a compression of credit spreads for more leveraged corporates relative to less leveraged ones,

[120] Modigliani and Miller Proposition 2 shows that a corporate's cost of equity increases with increasing leverage. Moreover, from an option pricing theory perspective, bond holders are short a put option on company's assets, with a strike price equal to the debt level; they receive a risk free rate plus yield, the equivalent of the put option price. As such, when the corporate value declines towards the strike price, as in the case in highly leveraged corporates during periods of economic downturn, the put value increases significantly, decreasing the corporate's bond price and increasing its price volatility.

and the opposite effect during downturns. Graphs C.4, C.5 and C.6 provide some evidence of procyclicality with respect to market prices, given the higher amplitude of the changes in the levels, volatility and correlation of debt and equity prices of more leveraged corporates compared to less leveraged ones.

Five-year corporate CDS spreads, by leverage buckets[1]

Graph C.4



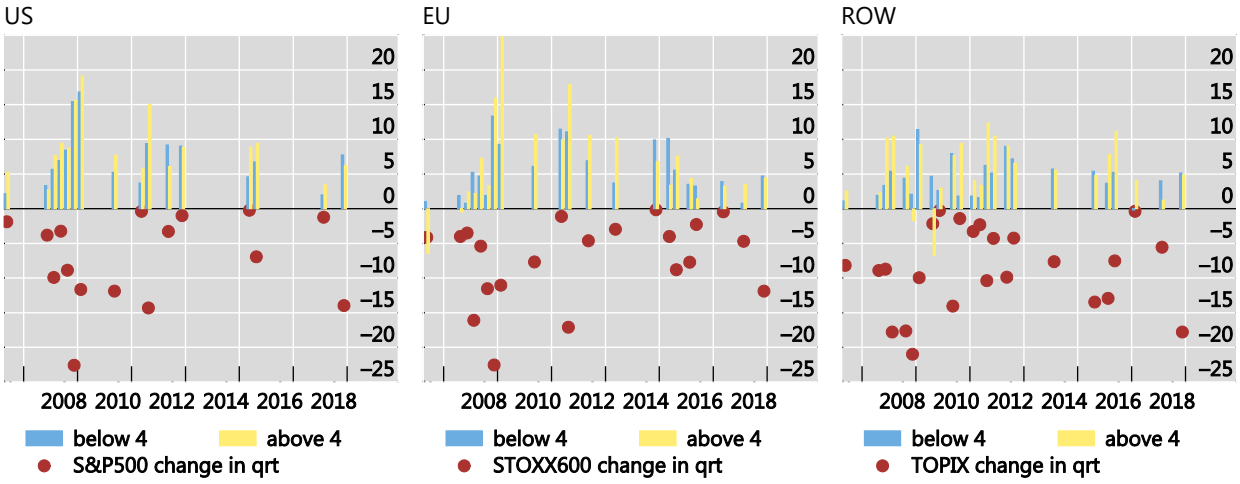
Note: Chart shows quarter end median 5-year CDS spreads of corporates within a certain leverage bucket, for a sample of representative US/European/RoW corporates. The definition of leverage used in the computation of the leveraged buckets is Gross Debt / EBITDA.

Sources: ECB calculations; Bloomberg; Capital IQ.

Correlation between bond and equity non-financial corporate (NFC) prices during quarters with negative equity returns, by NFC leverage buckets[1]

In percent

Graph C.5



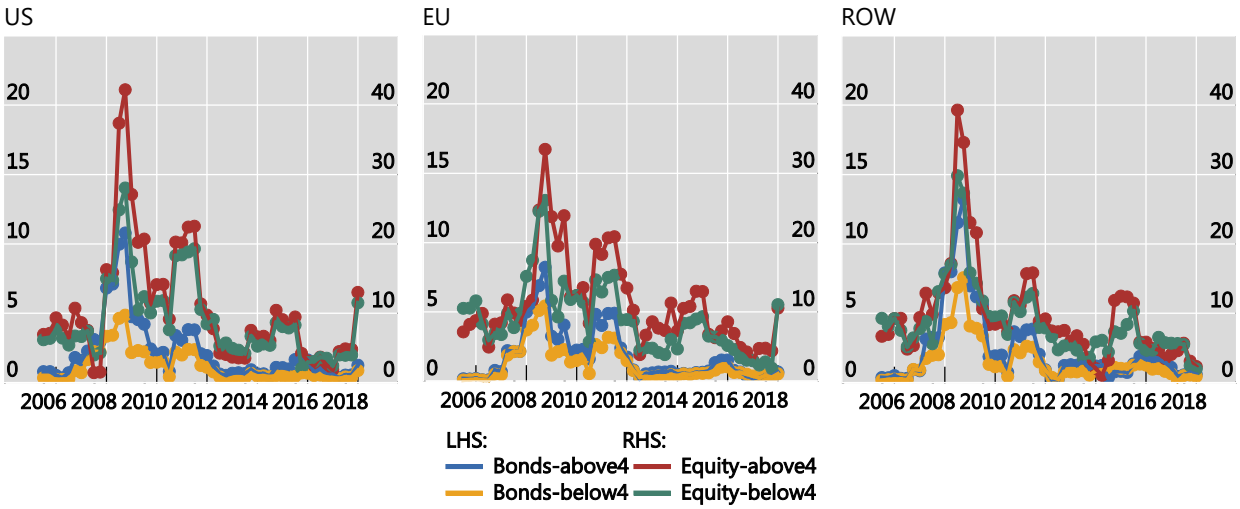
[1] Chart shows sensitivities of debt prices to changes in equity prices derived from linear regressions on quarter end prices, for a sample of representative US/European/RoW corporates.

Sources: ECB calculations; Bloomberg; Capital IQ.

The higher the return on equity, the higher are the retained earnings and corporates' resources for investment. Higher corporate leverage increases returns on equity and may support higher investment during periods of strong economic growth. At the same time, higher leverage levels may decrease investments during downturns, as companies conserve cash to service debt payments.

Debt and equity prices, price correlation and volatility of more vs less leveraged corporates[1]

In percent — Graph C.6



[1] More leveraged = Gross Debt/EBITDA greater than 4; less leveraged corporates = Gross Debt/EBITDA less than 4. Chart shows standard deviation over the last 4 quarters, of quarter end changes in the median equity and bond prices of corporates in a sample of representative US/European/RoW corporates.

Sources: ECB calculations; Bloomberg; Capital IQ.