Recommendations for a Framework Assessing Leverage in Investment Funds

Final Report

The Board
OF THE
INTERNATIONAL ORGANIZATION OF SECURITIES COMMISSIONS

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Foreword

Drawing on established national and regional regimes for measuring, collecting and analysing information related to leverage in funds, IOSCO has developed a two-step framework – the "Leverage Framework" – to facilitate more meaningful monitoring of leverage in funds for financial stability purposes in a consistent manner across jurisdictions.

The Leverage Framework provides a holistic approach to capture significant leverage-related risks of a fund (or group of funds) to give regulators the tools to assess these risks for financial stability purposes.

The Leverage Framework embeds proportionality, by acknowledging that not all funds need to be captured for financial stability monitoring purposes given the immense diversity in funds' structures, types and strategies as well as domestic legal and regulatory frameworks governing these investment vehicles. Some funds, for example, are prohibited from using leverage. More generally, under this Leverage Framework, funds that do not pose systemic risks due to their leverage would be excluded, such as funds capped in terms of leverage and/or limited in size.

The Leverage Framework achieves overarching consistency through a 2-step analysis while offering a set of tools for each step that can be adjusted to the needs of a jurisdiction and the characteristics of funds:

- Step 1 offers regulators a means of efficiently identifying those funds that are more likely to pose risks to the financial system, using at least one notional exposure metric including debt and synthetic leverage. Furthermore, information on directionality of positions is captured through the collection of data broken down by asset class, and long and short exposures. This enables identification of a subset of investment funds that can be taken forward for further risk-based analysis.

- The Step 2 risk-based analysis of the subset of funds identified in Step 1 involves relevant and risk-based adjusted metrics that can be employed by regulators – either in combination or on a standalone basis – depending on the characteristics of a fund.

Under Step 1, IOSCO recommends that regulators use Gross Notional Exposure (GNE) or adjusted Gross Notional Exposure (adjusted GNE). These metrics have been selected as baseline analytical tools. Given that they tend to overstate fund leverage, within the subset of funds identified based on their application, they are likely to capture funds through the Step 1 filtering process that may not give rise to financial stability risks. Consequently, because the application of either GNE or adjusted GNE will in any event capture those funds of potential interest for financial stability monitoring purposes, regulators may evaluate gross notional exposure using either metric. Moreover, in the process of refining its Step 1 analysis, a regulator may also complement GNE or adjusted GNE metrics with netting and hedging assumptions as relevant. Additional data points may also be used as a regulator sees fit. At a global level, IOSCO will then aggregate GNE and adjusted GNE inputs based on information available to it. This will allow IOSCO to monitor trends in leverage on a global basis.

For Step 2, IOSCO recognises that there are no one-size-fits all risk-based metrics regulators could apply in a relevant manner across identified funds. For instance, a standardised market risk metric will prove ineffective in assessing the potential losses of different funds in a relevant manner. In turn, this will make the monitoring of leverage-related risks for financial stability

purposes ineffective. A market risk metric, for example, such as VAR, stressed VAR or stress scenarios, will need to be adjusted to a fund´s characteristics, taking into consideration the investment strategy, the underlying asset class volatility and liquidity, portfolio diversification, the market footprint of a fund and/or its redemption terms. Regulators may select one or more risk-based metrics and adjust the parameters and calibrations of the latter to the characteristics of funds considered. They may ultimately find it useful or necessary to engage actively with an identified fund and/or its responsible entity. Regulators may take actions as they deem appropriate in accordance with their assessment of leverage-related risks.

IOSCO shall, incrementally over time, and based on the data available to it, publish an annual report reflecting leverage trends within the asset management industry at a global level. The first report (that will develop over time and be expanded to include more jurisdictions) is scheduled to be published in 2021.

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Chapter 1 – Introduction

The use of leverage by investment funds raises potential risks to both investors and financial markets: while leverage may amplify investment fund returns, it can also amplify losses. The use of leverage may also, in certain circumstances, impair the proper functioning of markets via different contagion channels. Securities regulators, in accordance with their respective mandates, therefore, have an interest in monitoring the use of leverage by funds.

Recognising such concerns, on January 12, 2017, the Financial Stability Board (FSB) issued a report, '*Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities*'.[1] The report provides policy recommendations to address risks to global financial stability associated with certain potential structural vulnerabilities which may result from asset management activities. The report includes recommendations addressed to IOSCO related to the use of leverage in investment funds.

In Recommendation 10 of its report, the FSB asked IOSCO to "identify and or develop consistent measures of leverage in funds to facilitate more meaningful monitoring of leverage for financial stability purposes and help enable direct comparisons across funds and at a global level. IOSCO should also consider identifying and/or developing more risk-based measure(s) to complement the initial measures with a view to enhance authorities' understanding and monitoring of risks that leverage in funds may create. In both cases, IOSCO should consider appropriate netting and hedging assumptions and, where relevant, build on existing measures." In addition, two other recommendations complete the FSB's recommendations on leverage as detailed in the FSB report.[2] This final report focuses on recommendation 10.

This Final Report, *Recommendations for a Framework Assessing Leverage in Investment Funds* ('Final Report' or 'Leverage Framework') follows, and builds on, the publication of *CR08/2018 IOSCO Report: Leverage Consultation Paper* ('Consultation Paper') on 14 November 2018.

Summary of Consultation Feedback

We received 27 written responses to the Consultation Paper.[3] Most commenters agreed that there is no single metric or measure that can appropriately measure leverage.[4] Commenters

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1 *Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities*, FSB. 12 January 2017, available at: http://www.fsb.org/wp-content/uploads/FSB-Policy-Recommendations-on-Asset-Management-Structural-Vulnerabilities.pdf

2 FSB Recommendation 11 is directed to national authorities and reads as follows: 'Authorities should collect data on leverage in funds, monitor the use of leverage by funds not subject to leverage limits or which may pose significant leverage-related risks to the financial system, and take action when appropriate.'

FSB Recommendation 12 is contingent on the completion of the current work on Recommendation 10. Recommendation 12 reads as follows: 'IOSCO should collect national/regional aggregated data on leverage across its member jurisdictions based on the consistent measures it develops.'

3 Of these, 25 comment letters are available on the IOSCO website. Two respondents requested confidential treatment.

4 *See, e.g.*, Schroders letter; IA letter; ICMA letter; EFAMA letter; Blackrock letter; AIC – Invest Europe letter.

generally supported the two-step framework proposed in the Consultation Paper, including the discussion of pros and cons of each Step 1 metric.[5] Many commenters advocated an approach based on proportionality, or encouraged regulators to scale reporting requirements based on funds' characteristics. It was suggested that it may not be appropriate or necessary for a jurisdiction to evaluate investment funds that are unlikely to present leverage-related risks.[6]

The majority of commenters supported an approach under which regulators evaluate gross and net exposures of relevant funds.[7] Many commenters observed additional value in analysing exposure across asset classes and identifying both long and short exposures.[8] Comments were mixed regarding the level of granularity appropriate for an asset class breakdown of exposure.[9]

A number of commenters suggested that we clarify particular aspects of the exposure calculation, including the treatment of cash and cash equivalents, borrowings, and closed-out positions.[10] Commenters offered differing views on the merits of a GNE adjusted metric,[11] as well as the merits of different approaches to netting. Many commenters who supported a netting approach that defines the circumstances under which positions would be netted more broadly advocated using existing regulatory frameworks in their applicable jurisdictions in order to minimise industry burdens.[12]

Finally, some commenters recommended that we provide additional guidance on the types of risk-based analysis that a regulator might perform in Step 2.[13] A number of commenters also supported consideration of supplementary data points as described in the Consultation Paper, whether as part of Step 1 or Step 2.[14]

IOSCO Recommendation: The Leverage Framework

This Final Report is part of an iterative process within which the longer-term goal of achieving a meaningful consistent assessment of global leverage can be met while considering the different stages of development and sophistication of markets around the world. A number of jurisdictions have well-developed regimes for calculating, collecting and analysing information related to fund leverage. That information is generally collected from asset managers, including

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5 *See, e.g.*, EFAMA letter; AFG letter; SSGA letter; Amundi letter; ICI letter; AQR letter; ALFI letter; AIC - Invest Europe letter; Schroders letter.

6 *See, e.g.*, Vanguard letter; EFAMA letter; Schroders letter; BVI letter; AFG letter.

7 *See, e.g.*, ICMA letter; ESRB letter; AQR letter; AIC – Invest Europe letter; FSCA letter; Amundi letter; IA letter. A few commenters suggested narrower approaches. *See, e.g.*, BVI letter (suggesting a single adjusted GNE measure); CBOE letter (suggesting a delta-weighted NNE measure).

8 *See, e.g.*, Blackrock letter; Schroders letter; Invesco letter; Vanguard letter.

9 A number of commenters supported the level of granularity provided in the Consultation Paper's example asset class breakdown of exposure. *See, e.g.*, AIC – Invest Europe; AFG letter; Blackrock letter; IA letter. Other commenters recommended more or less granular breakdowns. *See, e.g.*, SSGA letter; ANBIMA letter; ALFI letter.

10 *See, e.g.*, ICI letter; BVI letter; ALFI letter; MFA – AIMA - ACC letter.

11 *See, e.g.*, Schroders letter, MFA – AIMA - ACC letter, ICI letter (supporting GNE adjusted); IA letter, Amundi letter, AFG letter (not supporting GNE adjusted).

12 *See, e.g.*, AFG letter; Blackrock letter; EFAMA letter; ICI letter; ALFI letter.

13 *See, e.g.*, US Chamber of Commerce letter; AFG letter; ALFI letter; EFAMA letter; Blackrock letter.

14 *See, e.g.*, IA letter; ICI letter; JITA letter; AQR letter; MFA – AIMA - ACC letter.

alternative asset managers. However, this is by no means the case for all jurisdictions. Accordingly, IOSCO recommends that regulators use this Leverage Framework as a basis to their own measurement processes and to inform their understanding and monitoring of risks that leverage in funds may create.

Recommendation 1: IOSCO recommends that regulators use the following two-step analysis in assessing and monitoring leverage ("the Leverage Framework"). Step 1 uses measures of leverage to identify and analyse funds that may pose a risk to financial stability (see Recommendation 2). Step 2 involves further analysis of this sub-set of funds (see Recommendation 3).

- The goal of Step 1 is to provide regulators with a means of efficiently identifying those funds that are more likely to pose risks to the financial system using at least one notional exposure metric as further specified under Chapter Two. Step 1 provides an approach to how regulators using exposure metrics in various contexts and situations to filter and select a subset of investment funds for further analysis.

- Step 2 involves a risk-based analysis on the subset of funds identified in Step 1. As discussed below, some measures or analyses are appropriate for some funds and not for others, depending on their characteristics and investment strategies. IOSCO does not prescribe a particular set of metrics or other analytical tools. These are left at the discretion of regulators who are best placed to undertake the appropriate risk assessment of funds. Some illustrative specific cases and applicable measures are detailed under Appendix C as examples of analysis that jurisdictions could consider, to the extent relevant.

The Leverage Framework is designed to achieve a balance between precise leverage measures and sufficiently simple, robust metrics that can be applied in a consistent manner to the wide range of funds offered in different jurisdictions, consistent with jurisdictions' laws and regulations. There are a variety of fund types, strategies, and risk profiles that exist across jurisdictions. The Leverage Framework recognises that there would be limited utility in regulators applying such an approach to investment funds in their jurisdiction that are unlikely to present leverage-related risks that could affect financial stability. While the Leverage Framework seeks to balance these concerns, consistent with the FSB report, it also:

(i) addresses synthetic leverage, by including exposure created by derivatives;

(ii) considers different approaches to analysing netting and hedging and the directionality of positions;

(iii) includes approaches that limit model risk; and

(iv) facilitates regulators assessing and monitoring leverage-related risks by considering risk-based metrics and other analyses to further analyse funds (in Step 2) that may contribute significant leverage-related risks to the financial system.

What is leverage?

Leverage is a financial technique generally used to increase investment exposure. Leverage allows a fund to increase its potential gains, as well as losses, by using financial instruments and/or borrowed money to increase the fund's market exposure beyond its net asset value. Leverage can come in a variety of different forms such as debt or some types of derivatives when used for this purpose.

Leverage in investment funds is typically expressed as a ratio of the fund's market exposure (however defined) over its net asset value.

$$\text{Leverage} = \frac{\text{market exposure}}{\text{net asset value}}$$

Measures of market exposure can capture investment exposure taken both through derivatives and borrowed money. Although derivatives can be used to amplify the risk and potential returns in a fund's portfolio, they do not necessarily create leverage and are also routinely used for other purposes, including:

- hedging risks;
- decreasing the fund's exposure to certain risk factors such as the portfolio's duration, or sensitivity to changes in credit spreads and/or interest rates term structure;
- enhancing liquidity in situation where derivatives are more liquid than their underlying reference assets;
- improving transactional efficiency;
- gaining exposure to less accessible markets;
- cash management.

The use of derivatives alone—which can increase certain measures of market exposure—should not, therefore, be seen as synonymous with the amplification of risk and returns.

Challenges in measuring leverage

Rules relating to leverage in funds and its measurement and monitoring vary across jurisdictions. Where metrics are in place, they may not be easily comparable as different jurisdictions have developed differing metrics. There are also challenges regarding how leverage, both on and off-balance sheet, is captured by different metrics.[15] Comparability is also hampered by the wide variety of funds and fund strategies offered around the world. Measures of fund leverage that are appropriate for one type of fund or fund strategy may be less appropriate, or informative, if applied to others.

[15] Jurisdictions that collect significant leverage-related data also may not collect data, or the same data, from all funds in the relevant jurisdiction. There is thus variability in the data available both across jurisdictions and within jurisdictions across different types of funds.

The availability of the data required to measure leverage also presents challenges. While some jurisdictions, notably the United States and European Union member states, require detailed reporting on leverage metrics (including data points sufficient to calculate leverage metrics), others do not.[16] This leads to potential data gaps in relation to the extent of leverage in funds or the lack of it. Identifying which funds and which group of funds do not make substantial use of leverage will better focus regulatory resources on those funds (including group of funds) that do.

As noted above, the details of regulatory disclosures and reporting requirements vary which reflects differences in regulatory frameworks. While such tailored approaches are appropriate given differences between markets, they do make the comparability of leverage data more challenging.

These considerations highlight the inherent tension between the ability of a given metric to provide accurate and precise information and the need for measurement to be as clear and comparable as possible. The interpretation of data is further complicated given that measures of derivatives use, which can increase measures of a fund's market exposure, may reflect the use of hedging or cost-efficiency techniques, and not just the amplification of potential risk and returns.

However, while we note the challenges described above, collection, aggregation and analysis of available data does already take place to a certain extent through the IOSCO Hedge Funds Survey. While we acknowledge the more limited scope and data limitations of the survey, it provides a reference point over time for the extent of leverage used by certain investment funds in participating jurisdictions.[17] We also highlight that the jurisdictions overseeing the largest fund markets currently require regular reporting of leverage metrics. Although the details of these metrics are not identical, there is substantial overlap in the types of information covered. The Leverage Framework thus builds on existing measures while facilitating collaboration among regulators across jurisdictions.

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16 *See, e.g.*, Form PF, a reporting form applicable to certain investment advisers registered with the U.S. Securities and Exchange Commission or in the EU, the AIFMD reporting requirements applicable to alternative investment managers and which include information on managers and the alternative investment funds they manage.

17 *See, e.g., Report on the Fourth IOSCO Hedge Funds Survey* (No. 2017), available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD587.pdf.

Chapter 2 – Step 1: Analysing Exposure

Introduction

Step 1 of the Leverage Framework uses exposure-based metrics.[18] We discuss below two measures of gross exposure and how these exposure-based metrics can be analysed by asset class and broken out into long and short positions to address the shortcomings associated with gross exposure figures considered in isolation.[19] In considering these gross-exposure metrics, we took into account that metrics used as part of this framework should, as far as possible,

- be able to be applied across all strategies and methods of leverage used by funds across jurisdictions,
- avoid model risk, and
- facilitate the identification of funds which may pose a risk to financial stability.

Below, we also discuss ways that regulators can analyse a fund's net exposure. Step 1 of the Leverage Framework includes measures of a fund's gross and net exposure. The combination of these two types of measures provides additional information about a fund's potential leverage and may help to address further the inherent limitations of gross exposure metrics.

We also recognise that there would be limited value in regulators applying the Leverage Framework to investment funds that are unlikely to present leverage-related risks that could affect financial stability. IOSCO recommends that regulators consider factors relevant in their respective jurisdictions as to whether particular funds may or may not present leverage-related risks that would warrant the regulator collecting or not collecting exposure-based or other leverage metrics as part of the Leverage Framework. For example, a regulator could consider whether regulatory requirements prohibit or restrict a fund from leveraging its portfolio; the size and scope of the fund industry; fund types, sizes, characteristics and strategies; whether the fund invests in securities or other assets that are themselves leveraged or embed leverage; and other relevant regulatory requirements related to leverage or leverage-related risks.

We acknowledge that circumstances vary across jurisdictions and that there is a need for proportionality while mindful of the need to preserve overall consistency.

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[18] As described in Appendix B of the Consultation Paper, IOSCO also assessed other methodologies, including the stress-based leverage/worst loss measure and the delta methodology. In light of the pros and cons associated with the Leverage Framework provided in this Final Paper and consistent with much of the feedback received supporting this approach, we are not recommending these methodologies.

[19] In the Consultation Paper, we discussed how a regulator could, as part of the Step 1 screening process, also evaluate supplementary data points that are generally objective and often already collected in many jurisdictions (e.g., DV01, Beta, VaR measures). We recognise, however, that whether a regulator uses these data points, and whether regulators use them in Step 1 or Step 2, will vary based on data availability and other considerations. This Final Report discusses generally supplementary data points as part of Step 2 but we recognise that these types of data points may appropriately be used in either or both of Steps 1 and 2.

Gross-Exposure Metrics

1. GNE Without Adjustments

This metric represents the gross market exposure of a fund calculated by summing the absolute values of the notional amounts of a fund's derivatives and the value of the fund's other investments.[20] No adjustments are made to any of the values.[21] This metric has some advantages as part of this two-step process: it is relatively easy to calculate and apply on a reasonably consistent basis across different types of funds using simple data points, and it avoids model risk. This metric provides information about a fund's market footprint. Higher measures indicate that a fund may be taking on higher levels of leverage. However, this metric may also show that a fund is using derivatives extensively without being able to identify whether derivatives have been used for purposes other than obtaining leverage. Fund managers that use derivatives for purposes other than obtaining leverage could be incentivised to use other, potentially more costly and less efficient methods if there were a concern about having a high GNE. The limitations of GNE include:

- GNE does not reflect the fact that a fund could be using derivatives for hedging or other purposes;[22]

- GNE's unadjusted nature may overstate a fund's exposure, particularly when the fund uses short-term interest rate derivatives and options;[23]

- if a GNE-based analysis focuses on funds with the largest GNE, it may not capture funds with less leverage on a gross notional basis but that may present greater market risk or that invest in securities that embed leverage (e.g., funds that invest in low-rated income securities, loans, inverse floating rate notes, collateralised debt obligations, small cap equities or physical assets);

- GNE does not differentiate between exposures to different asset classes unless it is presented by asset class as discussed below. For example, two given funds with the

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20 The term "notional amount" is used differently in different contexts. For purposes of the Leverage Framework, the term generally refers to the market value of an equivalent position in the derivative's underlying reference asset, or the principal amount on which payment obligations under the derivative are based. We believe this is consistent with market practice. Many funds today report notional amounts in regulatory filings. *See, e.g.*, Form PF, General Instruction 15; Section 2b, Item B, Question 30 (requiring advisers to report the "value" of the exposures of each qualifying hedge fund; defining "value" for purposes of derivatives as gross notional value); CESR, Consultation Paper, Guidelines on Risk Measurement and the Calculation of Global Exposure and Counterparty Risk for UCITS (Apr. 19, 2010), at Section 2.1 (setting out proposed guidelines on the conversion of financial derivatives into the equivalent position in the underlying assets of those derivatives).

21 Although both this metric and Adjusted GNE discussed below are based on a fund's gross exposure, we would expect that these metrics would exclude positions that are closed out with the same counterparty and result in no credit or market exposure to the fund to the extent regulators are able to identify and exclude these positions (or to the extent that they already are excluded in the information asset managers report).

22 Please see Appendix B for further details.

23 The notional amount of an option, without a delta adjustment, may overstate the exposure the option creates to the underlying reference asset. A measure that does not adjust interest rate derivatives may overstate a fund's exposure to interest rate changes.

same aggregate gross exposure are treated the same even if one fund's exposure is to more volatile assets, such as equities or commodities, and the other's exposure is to less volatile assets, such as short-term interest rate contracts;

- if multiple funds' gross exposures were aggregated together (and, in particular, not presented by asset class as discussed below), there is a risk that an aggregate figure also may present an incomplete, and potentially misleading, picture of the overall market exposure.

For these reasons, aggregate figures of GNE (or adjusted GNE discussed below) may not provide regulators with a means to exclude from consideration funds that are unlikely to pose risks to the financial system.

GNE without adjustments is therefore a basic method of assessing leverage as it only provides a baseline measure of a fund's market exposure and does not quantify the risks associated with different types of derivatives or the purpose for which they are being used. As a result, this metric—although it may be useful for evaluating trends regarding potential leverage in funds—tends to overstate a fund's economic exposure.

2. Adjusted GNE

Adjusted GNE is calculated in the same manner as described above but modified for interest rate derivatives and options.

Interest rate derivatives can be adjusted in different ways, including by presenting an interest rate derivative's notional amount in terms of a ten-year bond equivalent or other appropriate bond or synthetic position that reflects risk-free interest rates ("ten-year equivalent position"). We understand that many market participants analyse interest rate derivatives in terms of ten-year bond equivalents for risk management and other purposes. This adjustment can be done based on the duration (or modified duration) of the interest rate derivative relative to the duration of a ten-year equivalent position.

Presenting interest rate derivatives as ten-year equivalent positions allows the comparison of different interest rate derivatives that provide similar exposure to changes in interest rates but that have different unadjusted notional amounts. Expressing interest rate derivatives as ten-year equivalent positions similarly addresses the concern that short-term interest rate derivatives in particular can produce large unadjusted notional amounts that may not correspond to large exposures to interest rate changes.

Delta adjusting options similarly is designed to provide for a more tailored notional amount that better reflects the exposure that an option creates to the underlying reference asset.[24] Market participants similarly consider options' deltas for risk management, hedging, and other purposes.

[24] Take, for example, a fund that sells an at-the-money call option on a particular security with a notional amount of $100. If the delta of this option is -0.5, then the delta-adjusted notional would be $50, producing a figure designed to better reflect the exposure the option creates to the underlying security.

Adjusted GNE generally shares the same advantages and disadvantages of GNE as discussed above. However, adjusted GNE attempts to limit the overstatement of a fund's exposure to interest rate derivatives and options.

3. Analysis of GNE or Adjusted GNE Exposure by Asset Class

Recommendation 2: IOSCO recommends that regulators collect GNE or adjusted GNE broken down by asset classes, and long and short exposures.

Regulators can at their discretion complement the GNE or adjusted GNE analysis with net exposure measures using either a rules-based or analytical-based netting and hedging approach.

In their assessment of leverage in funds, which may pose significant leverage-related risks to the financial system, regulators may take action, when and to the extent they deem appropriate.

Allocating measures of a fund's GNE or Adjusted GNE to major asset classes such as equities, commodities, credit, interest rates, and currencies and broken out by long and short positions would provide more meaningful information than simply summing those figures. This presentation allows regulators to see a fund's basic asset allocation and to distinguish between funds with exposure to higher risk assets and those with exposure to lower risk assets and the directionality of the fund's positions. This form of presentation would permit regulators to differentiate funds taking into account the risk profile—and not just the scale—of their investments.

We present below a very simple example of how a regulator might organise information that it collects on a fund's GNE or Adjusted GNE when allocated across asset classes (See Table 1).[25]

Analysing GNE or Adjusted GNE in this way also allows regulators to compare exposures across funds more meaningfully - including those that may not be significantly leveraged. Information about funds' GNE or Adjusted GNE at the asset class level may more effectively allow regulators to identify funds of interest and their exposure than single figures of notional exposure that add together exposure from all asset classes. Analysing these exposure figures broken out by asset class also recognises that there may be instances in which a group of funds has exposures that may warrant further regulatory attention when considered in aggregate, but where none of the individual funds would have appeared to warrant further review. In addition to the benefits of depicting exposure figures by asset class and identifying long and short positions discussed above, this form of presentation also would provide a better estimate of potential market exposure by separately identifying cash and cash equivalents, which do not meaningfully add to a fund's market exposure. Therefore, in analysing a fund's leverage - its market exposure relative to net asset value - cash and cash equivalents would not be included in measuring the fund's market exposure.

[25] The asset classes shown in this simple example can be expanded by sub-asset class to perform more granular analysis for regulators that choose to do so. Some regulators already collect more granular information. *See e.g., infra* footnote 26.

Table 1:Example of a template, by asset class, long and short

	Market Exposure			
Investment Type	***Position (base currency)***		***% NAV***	
	Long	***Short***	***Long***	***Short***
Equity securities				
Equity derivatives				
Fixed income securities				
Credit derivatives				
Non-base currency holdings				
Foreign exchange derivatives				
Interest rate derivatives				
Commodities				
Commodity derivatives				
Cash and cash equivalents				
Other				

The value of asset allocation breakdown, however, depends on the granularity of the asset classes and whether any chosen asset classes remain meaningful over time. The table above represents one approach to balancing the costs and benefits of more granular asset allocations. More granularity may allow regulators to focus on a particular asset or sub-asset class. For example, the line "fixed income securities" could be further broken down into, for example, "high-quality sovereign bonds", "sovereign bonds", "corporate bonds", "asset-backed securities". However, additional granularity may increase complexity, and different jurisdictions may have varying abilities to implement analyses depending on the granularity of information collected.

Net Exposure Measures

In addition to analysing metrics based on gross market exposure, considering a fund's net notional exposure - a fund's exposure taking into account potential netting and hedging arrangements or relationships - can provide additional information about a fund's potential leverage. This information may help to address some of the limitations of GNE and Adjusted GNE. For example, if GNE indicates a growing use of derivatives by an investment fund, the ability to evaluate the extent of netting or hedging in a portfolio can help identify whether there is effective leverage created by these derivative positions or if they are being used to offset or otherwise limit economic exposures in the portfolio. The consideration of a net exposure metric

in addition to GNE and Adjusted GNE is optional for regulators under Step 1 and might be performed on the basis of two different approaches:

- Analysing a fund's GNE with or without adjustments by asset class and breaking out long and short positions, as discussed above, provides information that allows a regulator to assess potential netting and/or hedging relationships among a fund's positions. By collecting information about the allocation of a fund's exposure to long and short positions broken down by asset class, the regulator could view those proportions as a proxy for potential offsetting relationships among the fund's positions, particularly if the regulator collects this information by asset class or sub-asset class.[26] Even a simple allocation of GNE with or without adjustments would allow a regulator readily to distinguish between, for example, funds with equivalent or similar gross exposures where one fund is taking directionally leveraged positions and another has allocated its gross exposure across different asset classes and/or in a combination of long and short positions.

- Rules-based approaches, in which a regulator provides the conditions subject to which netting and hedging relationships are determined is an alternative solution. Defining the circumstances under which types of transactions should be regarded as netted or hedged may bring some challenges though. As trading strategies and financial instruments evolve, a static approach to netting or hedging could over- or underestimate these relationships, which also could undermine the comparability of the net figures.

  Accordingly, under rules-based approaches, specific care is required when setting the rules and calculations for netting and hedging to prevent not capturing a particular fund's level of leverage.

  As identified by commenters, one of the netting approaches discussed in the Consultation Paper was based on the AIFMD regulatory framework. Under this approach, a regulator defines the circumstances under which positions will be permitted to net, providing a measure of net exposure reflecting these adjustments. Under these regulations, netting is defined to mean a combination of trades on derivative instruments and/or securities positions referring to the same underlying assets. This then eliminates all or part of the risks linked to such portfolio positions which are netted off in proportion to the trades' combinations regardless of the transacting counterparties.

  Similarly, under the AIFMD framework, hedging arrangements are combinations of trades on derivative instruments or security positions not referring to the same

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[26] *See, e.g.*, Form PF, Section 2b, Item B, Question 30 (requiring reporting for each qualifying hedge fund allocating the fund's exposure by sub-asset class and, for each sub-asset class, allocating exposure to long and short positions).

There are other measures that may also be viewed as proxies for potential offsetting relationships among the fund's positions. One way in which to do this would be for a regulator to focus on the effects (and magnitude) of such arrangements on a fund's portfolio. For example, if a regulator collects information regarding how the fund estimates that its portfolio will change in response to changes in market factors, this information also can be a proxy for potential offsetting relationships. *See, e.g.*, Form PF, Section 2b, Item B, Question 42 (requiring reporting for each qualifying hedge fund of the effect of specified changes in market factors identified in the form, where the fund's adviser considers the market factor in connection with the fund's risk management).

underlying asset if those trades are concluded with the sole aim of offsetting risks linked to positions taken through the other derivative instruments or positions. Under the AIFMD framework, hedging arrangements may be considered if they comply with enumerated conditions. Appendix B details a rules-based approach to considering netting and hedging relationships that is based on the AIFMD framework.

Role of Supplementary Data Points

The metrics discussed above can be used by regulators to identify funds that warrant further analysis. As part of this screening process, regulators could also evaluate supplementary data points that are generally objective and are already collected in many jurisdictions. We provide additional examples of potential supplementary data points as part of the Step 2 analysis discussed below but observe that regulators also may choose to consider supplementary data points in the Step 1 analysis. For example, a regulator analysing risks related to fund's ability to meet margin calls could also consider data points such as a fund's cash and cash equivalents, unencumbered cash, and/or information about the fund's significant counterparties.

Chapter 3 - Step 2: Analysing leverage-related risks in funds

The purpose of Step 2 of the Leverage Framework is to use risk-based metrics to further analyse funds, if identified under Step 1, that may pose significant leverage-related risks to the financial system. Importantly, this second step is designed to mitigate the inherent limitations in Step 1 metrics by recognising that, to better understand leverage-related risks potentially posed by funds identified in Step 1, regulators may need to perform risk-based analyses. These analyses can take into account a fund's characteristics and consider potential market risk, counterparty risk, or liquidity risk, as appropriate. Step 2 therefore involves a closer look at identified funds and does not reflect any presumption that a fund considered in Step 2 necessarily poses any risks to financial stability.

IOSCO members have identified some leverage-related risk measures that are common across jurisdictions, as further detailed for illustration purposes and in a non-exhaustive manner in Appendix C. Regulators may choose to use these and/or other metrics or supplementary data points when further refining their analysis of leverage use by funds.

Step 2 of the Leverage Framework recognises that some risk-based measures or analyses are appropriate for some funds and not for others. Such determinations may depend on the fund type, investment strategy, portfolio composition, or other fund characteristics. For example, when evaluating a fund that invests significantly in government bonds, a regulator may look to risk measures that include duration; if a fund is focused on corporate bonds, ratings and default models may be more appropriate risk measures; or if a fund invests primarily in stocks, then volatility risk measures may be most appropriate. When analysing alternative investment funds, such as real estate funds, diversification and liquidity risk in addition to redemption conditions might be most relevant. Regulators also may analyse a fund's specific holdings, counterparties, or other factors, rather than or in addition to specific risk metrics. As a result, there is no one size fits all risk-based approach, measures and/or methodologies that may be standardised across funds and jurisdictions. Regulators may also share supervisory experiences as they deem appropriate.

Recommendation 3: IOSCO recommends that in applying Step 2 of the Leverage Framework each regulator determines its own approach to defining appropriate risk-based measures to further analysing funds identified under Step 1, that may potentially pose significant leverage-related risks to the financial system.

In conducting their Step 2 analysis, taking into account the fund's characteristics and potential market risk, counterparty risk, or liquidity risks, as appropriate, regulators may consider using the leverage-related risk measures that are common across jurisdictions, as further detailed for illustration purposes and in a non-exhaustive manner in Appendix C.

In refining its analysis, a regulator may consider a variety of factors and/or data points, including:

- Availability of assets to meet calls for margin or collateral
- Percentage of cleared and uncleared transactions
- Posted/received collateral or margin as percentage of NAV

    - Cash and cash equivalent collateral
    - Security collateral (other than cash)
    - Other collateral (letters of credit or other)

- Amount re-hypothecated or allowed to be re-hypothecated
- Holding of cash or cash equivalents
- Value of aggregate amount of borrowing and cash financing available to the fund (drawn/ undrawn, committed/ uncommitted credit lines, term financing) (absolute amounts)
- % of AuM/ TNA that can be liquidated in a day

Data points to estimate the effects of changes in market factors:

- DV01[27] and CS01/SDV01[28] for interest rate and credit-sensitive instruments
- Estimates of the change in the value of the fund in response to prescribed changes in market factors
- Betas, or the measurement of an investment's volatility relative to the market, with respect to instruments referencing equities, FX and commodities
- VaR (value at risk) measures, for example, absolute VaR or the relative VaR showing how the fund's VaR compares with a benchmark

Other general information about the fund:

- Geographical regions (North America, Europe, etc.) and/or markets invested (developed, emerging, mixed)
- Investor split retail / institutional (absolute amounts and/ or % of TNA)
- Potential size of the fund relative to the underlying market
- Investment strategy
- Counterparty exposures held by fund toward its counterparties (absolute amounts and % NAV)
- Counterparty exposures held by third parties toward the fund (absolute amounts and % of TNA)
- Leverage structure, including for example, amount of cash borrowing including external/prime broker financing as a percentage of NAV

[27] DV01 is the estimated change in the value of the portfolio resulting from a 1 basis point change in interest rates.

[28] CS01/SDV01is the estimated change in the value of the portfolio resulting from a 1 basis point change in credit spreads.

- Cash lenders to the fund (absolute amounts and/ or % of TNA)

- Securities lenders to the fund (absolute amounts and/ or % of TNA)

- Liquidity demands, taking into account target investor base, investor profiles, and expected redemption patterns under normal and stressed market conditions
- Respective values of securities financing techniques (securities lending, repos and reverse repos transactions and borrowing) as absolute amount or a percentage of NAV together with Min, Max, arithmetic average

Chapter 4 – Publication of national/regional aggregated data on leverage across jurisdictions

Recommendation 4: IOSCO recommends that jurisdictions that do not already make the following leverage data publicly available do so, or provide this information to IOSCO for publication on a yearly basis:

(i) GNE or adjusted GNE aggregated by asset class, including long and short exposures for funds assessed under Step 1;

(ii) Criteria of exclusion used to scope-out funds from Step 1 along with the aggregate amount of assets under management of funds not in scope in proportion to the total assets under management within their jurisdiction

The aggregation of data will start in 2020 and IOSCO's first report (that will develop over time and be expanded to include more jurisdictions) is scheduled to be published in 2021.

Appendix A – Consultation Feedback Statement

IOSCO Report: Leverage Consultation Paper

Public Comments were submitted by the following organisations to the IOSCO Board in respect of the consultative IOSCO Report on Leverage.

1. AFG
2. AIC – Invest Europe
3. AIC
4. ALFI
5. Amundi
6. ANBIMA
7. AQR Capital Management
8. Bank of England
9. Blackrock
10. BVI
11. CBOE Global Markets
12. EFAMA
13. ESRB
14. Finansinspektionen
15. IA
16. ICI
17. ICMA
18. Invesco
19. JITA
20. MFA – AIMA – ACC
21. SBAI
22. Schroders
23. SSGA
24. US Chamber of Commerce
25. Vanguard

Appendix B – Step 1 techniques: Calculation and reporting - Gross Notional Measures framework analysis

Gross Notional Exposure (GNE)

Calculation

As discussed above, the term notional amount is used differently by different people in different contexts. The SEC's Form PF and ESMA's AIFMD, for example, both provide instructions for reporting derivatives exposure.[29] Some regulators provide guidelines on the conversion of financial derivatives into the equivalent position in the underlying assets of those derivatives. For illustrative purposes, and recognising that there may be differences in the way market participants compute notional amounts for regulatory reporting and other purposes, this appendix sets forth a non-exhaustive table of examples of the way that a fund might determine the notional amount for certain simple derivatives:

Futures
Bond future: Number of contracts * notional contract size * market price of the cheapest-to-deliver reference bond
Interest rate future: Number of contracts * notional contract size
Currency future: Number of contracts * notional contract size
Equity future: Number of contracts * notional contract size * market price of underlying equity share
Index futures: Number of contracts * notional contract size * index level
Forwards
FX forward: notional value of currency leg(s)
Forward rate agreement: notional value
Options
Bond option: Notional contract value * market value of underlying reference bond
Equity/Index option: Number of contracts * notional contract size* market value of underlying equity share (or Index Level)
Interest rate option: Notional contract value
Currency option: Notional contract value of currency leg(s)
Option on futures: Number of contracts * notional contract size * market value of underlying asset

[29] *See, e.g.*, Form PF, General Instruction 15; Section 2b, Item B, Question 30. For example, Form PF requires advisers to report delta adjusted notional amounts for options; to report the notional amounts of interest rate derivatives in terms of 10-year bond equivalents; and to count only one currency side of any foreign exchange derivative.

Warrants (or Rights): Number of shares/bonds * market value of underlying referenced instrument
Swaps
Swaps referencing fixed/floating rate Interest rate and inflation: notional contract value
Currency swaps: Notional principal amount
Cross currency Interest rate swaps: Notional principal amount
Standard total return swap: Notional principal amount or market value of underlying reference asset
Credit default swap: Notional principal amount or market value of underlying reference asset
Contract for differences: Number of shares/bonds * market value of underlying referenced instrument

In addition and although both this metric and Adjusted GNE discussed below are based on a fund's gross exposure, we would expect that these metrics would exclude positions that are closed out with the same counterparty and result in no credit or market exposure to the fund to the extent regulators are able to identify and exclude these positions (or to the extent that they already are excluded in the information asset managers report).

Adjusted Gross Notional Exposure

Adjustments are carried out for option contracts, independently of the underlying asset, and for interest rate derivatives. Considering the example from the table above, an equity option is adjusted as follow:

*Equity Option: Number of contracts * notional contract size* market value of underlying equity share*Option delta*

Box 1: Numerical examples of Option Adjustment

Options can be delta adjusted by multiplying the option's notional amount by the option's delta. Delta-adjusting options provides a more tailored notional amount that better reflects the exposure that an option creates to the underlying reference asset. Take, for example, a fund that sells an at-the-money call option on a particular security with a notional amount of $100. If the delta of this option is -0.5, then the delta-adjusted notional would be $50, producing a figure designed to better reflect the exposure the option creates to the underlying security. Market participants similarly consider options' deltas for risk management, hedging, and other purposes.

Adjusting Interest Rate Derivatives

For interest rate derivatives, regulators may adjust the notional value to increase comparability between derivatives with varying levels of interest rate risk. One common market practice is to use a 10-year bond equivalent or other appropriate bond or synthetic position that reflects risk-free interest rates ("ten-year equivalent position"). This adjustment can be made by dividing

the duration of the interest rate derivatives (IRD) by that of a 10-year equivalent position and applying this conversion factor to the unadjusted notional amount:

$$\frac{Duration\ IRD}{Duration\ 10y\ \text{Equivalent Position}}$$

Box 2: Numerical examples of IRD adjustment

Interest rates adjustment examples:

Interest rate derivatives can be adjusted to make different interest rate derivatives' notional amounts more comparable with each other. For example, a 3-month Eurodollar futures contract with an unadjusted notional amount of $80 million represents the same risk, measured by duration, as a 10-year Treasury bond future with a notional amount of only about $2.27 million. These notional amounts are very different despite the contracts representing a similar exposure to changes in interest rates. Adjusting these derivatives' notional amounts to express them as ten-year bond equivalents provides for the same adjusted notional amount of approximately $2.27 million for both contracts.

Adjustments to interest rate derivatives also can reduce the chance that interest rate derivatives' notional amounts overstate a fund's exposure to changes in interest rates. For example, if a fund sought to decrease its duration by one year using 3-month Eurodollar futures, the fund would be required to enter into Eurodollar futures with an unadjusted notional amount of 400% of the fund's net assets. This notional amount of 400% of net assets reflects the short duration of Eurodollar futures more than the extent of the fund's exposure to changes in interest rates. Expressing these Eurodollar futures in ten-year equivalent positions, in contrast, would produce an adjusted notional amount of approximately 12% of net asset value.

Net Notional Exposure (NNE)

As discussed above, there are different ways to analyse funds' net exposure. One way is to develop a rules-based approach that seeks to identify which positions will be treated as hedging or netting arrangements. This appendix discusses the approach based on the AIFMD regulatory framework as an example of a rule-based approach (for netting and hedging arrangements) in which one would:

1. convert each derivative instrument position into an equivalent position in the underlying asset of that derivative (as noted above);
2. apply netting and hedging arrangements described below; and
3. sum the equivalent positions by underlying asset type in accordance with the discussion above, analysing exposure across asset classes, using GNE without adjustments or GNE Adjusted.

Netting rules

Netting under this approach is defined as a combination of trades on derivative instruments and/or security positions referring to the same underlying assets, irrespective of the maturity date of the derivative instruments, and where those trades are concluded with the sole aim of eliminating the risks linked to positions taken through the other derivative instruments or security positions.

Combinations of trades which aim to generate a return, however small, by reducing some risks while keeping others should not be considered as netting arrangements. For example, arbitrage investment strategies which aim to generate a return by taking advantage of pricing discrepancies between derivative instruments with the same underlying but different maturities.

Netting would apply to positions referencing the same underlying asset and between such a position and its corresponding underlying asset.

This approach allows certain transactions to be netted regardless of whether they are entered into with the same counterparty.

IRD Netting

For example, when computing the net exposures of Interest Rates Derivatives (IRD):

1. An IRD can be converted into its equivalent underlying asset position in accordance with the following methodology:

   The equivalent underlying asset position of each interest rate derivative instrument is calculated as its duration divided by a 10 years equivalent of a significant yield curve and multiplied by the equivalent underlying asset position:

$$Equivalent\ underlying\ asset\ position = \frac{Duration\ IRD}{Duration\ 10y\ Adjustment}\ \text{X CV derivative}$$

   a. Duration IRD is the duration of the interest rate derivative instrument.
   b. Duration 10y Adjustment is the duration of an asset replicating the pay-out of the derivative. For example, this could be a 10-year bond equivalent or a synthetic discount rate considered representative of a 10-year adjustment on a significant yield curve.
   c. CV derivative is the converted value of the derivative position (examples provided in the Consultation Paper)

2. The equivalent underlying asset positions calculated in accordance with the above are netted for the adjusted duration. The remaining exposure, if any, is the residual portion of the position not netted-off.

   Under this approach, the trades using the equivalents of the ten-year adjustment exposures could be netted, taking into account a coefficient that reflects the explanatory

power of a parallel shift in yield curve. The coefficient could be determined and consistent for market participants with reference to the relevant underlying asset positions / investments, as required or permitted by national regulator.

3. The methodology to calculate the IRD is:
    a. Calculate the 10-year adjusted equivalent for each interest rate derivative instrument;
    b. Net the long and short equivalents for the same underlying asset positions. The resulting netted amount is the netted position to consider for Basic NNE computation purposes;
    c. Multiply the sum of all IRD netted positions for a convexity coefficient (as required or permitted by national regulator)

Hedging rules

A regulator may take in consideration hedging arrangements which are combinations of trades on derivative instruments or security positions not referring to the same underlying asset if those trades are concluded with the sole aim of offsetting risks linked to positions taken through the other derivative instruments or security positions.

Hedging arrangements for the calculation of Basic NNE can be taken into account if they comply with all the following conditions:

- the positions involved within the hedging relationship do not aim to generate a return and general and specific risk are offset;
- there is a verifiable reduction of market risk at the level of the fund;
- the risks linked to derivative instruments, general and specific, if any, are offset;
- the hedging arrangements relate to the same asset class;
- they are efficient in stressed market conditions.

Appendix C – Step 2
Step 2 Applications: Example for Market risk

This appendix lists possible measures of market risk that regulators may find useful for their Step 2 programme. This list of indicators should not be considered exhaustive and some indicators might not be relevant for funds selected for further analysis. Therefore, regulators might need to tailor their Step 2 analysis to the type of funds and to their strategy.

Portfolio's sensitivity

Information on the sensitivity of funds' portfolio to market changes are one tool to evaluate a fund's market risk. The below list of indicators is the most common set of portfolio sensitivities currently in use:

Net DV01: The Net DV01 measures the sensitivity of a portfolio to a 1bp increase in interest rate. This information could be considered in buckets defined by maturity of the security, e.g., <5yrs, 5-15yrs and >15yrs.

CS01: The CS measures the sensitivity of a portfolio due to a 1bp increase in credit spread. This information could be considered in buckets defined by maturity of the security, e.g., <5yrs, 5-15yrs and >15yrs.

Net Equity Delta: The Net Equity Delta measures the sensitivity of a portfolio to movements in equity prices.

Vega exposure: The Vega exposure measures the sensitivity of a portfolio to a 1bp increase in implied volatilities.

Net FX Delta: The Net FX Delta measures the sensitivity of a portfolio to an increase in currency rates relative to the base currency of the fund.

Net Commodity Delta: The Net Commodity Delta measures the sensitivity of a portfolio to movements in commodity prices.

Value at Risk (VaR)

The VaR is a measure of the maximum potential loss due to market risk rather than leverage. More particularly, the VaR approach measures the maximum potential loss at a given confidence level (probability) over a specific period of time under normal market conditions. For example if the VaR (1 day, 99%) of a fund equals $4 million, this means that, under normal market conditions, the funds can be 99% confident that a change in the value of its portfolio would not result in a decrease of more than $4 million in 1 day.

Because VaR is a measure of potential losses, when two or more funds with similar GNE are compared, it is one data point that can help to identify which ones are more likely to pose financial systemic risk, reducing their liquidity faster or employ certain risk-taking strategies. Furthermore, VaR may be used to distinguish between funds, with similar economic exposures, employing derivatives for either adding risk or for reducing market risk.

Example 1 application: Market Risk and GNE measures

We take into account two funds with similar asset allocations as follow:

	GNE+	VaR		GNE+	VaR
Securities			**Securities**		
Equities	100		Equities	100	
Cash	75		Cash	75	
NAV	**175**		**NAV**	**175**	
Derivatives			**Derivatives**		
Index XYZ Long	100		Index XYZ Long	100	
			index XYZ short	80	
Exposure	275			355	
Exposure/NAV	1.6			2.0	
Portfolio VaR		2.8%			1.7%

Whilst the second portfolio, which includes a short position on the same underlying, has an incrementally higher GNE adjusted value compared to the first one, their portfolio VaR differs in favour of the latter. This is because notional based metrics, while detecting the use of leverage by funds, cannot discriminate between derivatives being used to add economic exposure and those employed to reduce such exposure.

A regulator may therefore use VaR and other statistical methods to identify these types of situations and even quantify and compare the differences in potential losses of the funds, when this information has been validated through back-testing.

Similar analysis can be carried out using other type of statistical measures such as Relative VaR for benchmarking market risk and Conditional VaR to improve tail risk analysis. These analyses are more informative if stress tested values are also taken into consideration and constantly back-tested. However, VaR needs to be carefully utilised as it is dependent strictly on trading conditions and volatility patterns of the underlying investment.

A variety of models exists for estimating VaR and in certain jurisdictions funds have to comply with specific VaR limits with prescribed methodologies (i.e. model of VaR to be used, precise reporting period, interval of confidence, holding period etc.).[30] However, IOSCO believes that it would not be appropriate to recommend specific parameters for the computation of the VaR at a global level and encourages those regulators that use or consider VaR in their Step 2 analyses to consider developing local framework tailored to their market.

[30] Each model has its own set of assumptions, advantages and drawbacks. Common models include the parametric (Variance Covariance) model, the Historical Simulation model and the Monte Carlo Simulation model. For instance, for funds investing largely in financial derivatives presenting non-linear risk features, the parametric VaR model would not appropriate and Historical Simulation model or a Monte-Carlo model might best suited.

Step 2 Applications: Example for Counterparty risk

Risk type description

A risk that is always present with leveraged funds is counterparty risk. For this reason, regulators may be interested in estimating the losses the Fund may represent as part of their Step 2 programme.

Counterparty risk refers to the threat to each party of a contract that the other party will not live up to its contractual obligations. In the fund management context, the fund may pose counterparty risks to the other party of the contract, and, likewise, the other party may pose counterparty risk to the fund. In some cases, counterparty risk is present in only one of the parties, while in other cases the risk is present in both parties. In any scenario, the estimation by the regulator is useful for both its financial system analysis and investor protection programmes.

It is often the case that counterparty risk is mitigated by the posting of collateral by one or both of the parties to a financial contract, with the amount of collateral related to the level of potential loss from the default of the counterparty.

In the case of derivatives, it is more complex to measure the extent of the counterparty risk created by the derivative. If a fund wants to gain exposure to $100 of an underlying asset, it could borrow $100 and purchase the asset (resulting in counterparty risk of $100 for the lender), or it could purchase a future contract that gives exposure to $100 of that asset. The counterparty risk that is embedded in the derivatives contract is not necessarily $100: assuming the fund has taken a long position, it will only owe its counterparty an amount equal to any decline in value of the underlying reference asset, which is unlikely to be the full $100. Measuring the potential loss to a counterparty is therefore crucial in mitigating the potential consequences of a default by a counterparty.

Example 1: potential losses estimation – asset classes based

One way of approximating the results of the calculations required to compute counterparty risk is to group assets with relatively similar distributions together and assign a specific value to all assets in that group. These groups could be more or less granular, and examples are provided below of current approaches used in other contexts. A regulator could, for example, differentiate between fund exposures by maturity or duration for the relevant asset classes and distinguish between investable and non-investable credit grades. The below table is an enhanced version of the example previously discussed in the Consultation paper.[31]

[31] See table under GNE Section.

	Investment Type	Market Exposure							
		Position		Exposure by Maturity or Duration*					
				0-1 years		1-5 years		5> years	
Market value	Cash and cash equivalents	*Long*	*Short*	*Long*	*Short*	*Long*	*Short*	*Long*	*Short*
	Equity securities								
	High-quality sovereign bonds								
	Other fixed income securities								
	(with maturity buckets)								
	Non-base currency holdings								
	Other securities								
Gross notional value (however defined)	Physical commodities								
	Equity derivatives								
	Interest rate derivatives								
	Credit derivatives (Investment Grade)								
	Credit derivatives (Non-Investment Grade)								
	Foreign exchange derivatives								
	Commodity derivatives								
	Other derivatives								
	TOTALS								

* The buckets' ranges and use of maturity vs duration depend on the estimates of counterparty risks embedded in different maturity buckets adopted by the National Competent Authority

Tables of values that try to capture the counterparty risks embedded in different derivatives type and maturity buckets have been produced for use in the banking sector (BASEL III) and in margining of OTC derivatives contracts (BIS/IOSCO). The national regulator may use these example tables, reproduced below, for these types of computations:

BASEL III

Maturity	Interest Rates	FX & Gold	Credit Invest. Grade	Credit non-Invest. Grade	Equity	Precious Metals	Others
0-1 years	0.0%	1.0%	5.0%	10.0%	6.0%	7.0%	10.0%
1-5 years	0.5%	5.0%	5.0%	10.0%	8.0%	7.0%	12.0%
> 5 years	1.5%	7.5%	5.0%	10.0%	10.0%	8.0%	15.0%

BIS/IOSCO

Duration	Interest Rates	FX & Gold	Credit	Commodities	Equity	Other
0-2 years	1.0%	6.0%	2.0%	15.0%	15.0%	15.0%
2-5 years	2.0%	6.0%	5.0%	15.0%	15.0%	15.0%
> 5 years	4.0%	6.0%	10.0%	15.0%	15.0%	15.0%

The coefficients on the tables above are multiplied by the notional amount of the derivatives contract to arrive at a counterparty risk measure. For example, let us take a 3-year interest rate future. Using the coefficients in the BASEL III table, the counterparty risk of a $1m interest rate futures contract would be $5,000, while using the BIS table it would be $20,000. Unlike in the case of borrowing $1m, where the whole $1m is at risk if not repaid, in the case of a $1m position in interest rate futures, the whole $1m is not at risk. In an unfavourable environment, where the counterparty defaults and the underlying asset experiences a severely negative price change, the potential loss is going to be closer to $20,000 than $1m.

The tables above could be constructed or modified by a regulator with the most conservative figures of each of the two tables above or other values as determined by the regulator, and could also be extended by introducing additional categories (single equities, equity indices, government bonds, corporate bonds, developed versus emerging markets) or maturity/duration buckets, depending on the nature and scale of the market. Although using tables such as the ones above is not as precise as modelling each individual asset would be, it has advantages as it is simple and quick to implement and it has low model risk. Furthermore, regulators can automatically apply the calculations without requiring further information from any funds under consideration.

By dividing that measure of counterparty loss by the NAV of the fund, we have a measure of how much any potential losses incurred by derivative positions can be covered by the assets in the fund. Some of those assets might be posted as either initial margins or collateral with respect to the derivatives positions; the rest are other assets that the fund owns that are unencumbered. Unencumbered assets could be cash (unencumbered cash) or other assets, with potentially various degrees of liquidity.

Example 2 application: Counterparty Risk and GNE measures

Below is an example of the combination of counterparty risk (CR) analysis by asset class with GNE measure for a fund. The example ignores the correlation adjustments for simplicity.

	Notional	GNE	GNE+	CR Asset Classes (Basel)	CR Asset Classes (BIS/IOSCO)
Securities					
Equities	100	100	100	100	100
Bonds	50	50	50	50	50
Cash	75	75	75	75	75
NAV		225	225	225	225
Derivatives					
Equities > 5y	100	100	100	10	15
Interest Rates (3Y)	1000	1000	120	5	20
FX (<1Y)	300	300	300	3	18
IG Credit (1.5Y)	200	200	200	10	4
Exposure		1825	945		
Exposure/NAV		8.1	4.2		
CP Exposure				28	57
CP Exposure/NAV				12%	25%

The portfolio above has a leverage measure of 8.1 times NAV, using GNE without adjustments, and a leverage of 4.2 times NAV using Adjusted GNE. However, GNE and Adjusted GNE do not say anything about the counterparty risk of the fund.

Using a CR metric with BASEL III coefficients, the counterparty risk of the fund is 12% of the NAV, while using the BIS/IOSCO coefficients the counterparty risk of the fund is 25%. Using a CR metric with BIS/IOSCO calculation, this tells us that in an extremely unfavourable scenario, the fund is likely to lose one quarter of its Net Asset Value. Presumably, in that scenario also the securities held by the fund will suffer, so a useful measure to look at is the Unencumbered Cash over NAV (see the Examples of Supplementary Data of this Appendix).

Example 2: Potential losses estimation – whole netted portfolio approach

In the case of derivatives with non-linear payoffs, such as options, the counterparty risk of one party is not the same as that of the other party, so one has to choose which side it is interested in. In the case of funds, one can calculate the counterparty risk that the fund poses to all its counterparties, and the counterparty risk that a fund's counterparty poses to it.

In this context, a regulator may want to have a more precise estimate of the fund's counterparty risk looking at the details of the whole portfolio. For this approach it is necessary to add all the counterparty risk measures from all derivatives in the portfolio, with the caveat of ignoring the possibility that the derivatives positions in a portfolio might be uncorrelated, or even negatively correlated, in which case they will not all experience a 99th percentile event at the same time. In such scenario, netting and hedging of positions could be allowed in a similar way as with the NNE metric discussed for Step 1.

On top of that, a correlation matrix could be used to allow for the diversification benefit of positions that are not perfectly correlated. regulators implementing such scheme may need to estimate correlation parameters for the same asset classes used while collecting funds' information. An example of similar computations has been produced by ISDA in the context of its Standard Initial Margin Model for non-cleared OTC derivatives. We reproduce the latest sample of correlation between risk classes within products classes below:[32]

Risk Class	Interest Rate	Credit Qualifying	Credit Non-Qualifying	Equity	Commodity	FX
Interest Rate		25%	15%	19%	30%	26%
Credit Qualifying	25%		26%	65%	45%	24%
Credit Non-qualifying	15%	26%		17%	22%	11%
Equity	19%	65%	17%		39%	23%
Commodity	30%	45%	22%	39%		32%
FX	26%	24%	11%	23%	32%	

A risk-based measure of leverage could be constructed relatively simply using the methodology described above, with some netting and hedging within asset classes, and correlations between asset classes, in order to arrive at a measure of potential counterparty loss for a fund. This would be a measure of the potential loss that a fund could cause to its counterparties, and also the potential loss that a fund's counterparties pose to it (in the case of derivatives with a linear payoff).

Step 2 Applications: Example for Liquidity Risk from Margin Calls

Risk type description

When a fund obtains leverage via collateralised transactions, such as derivatives and repos, they may be exposed to liquidity risk. In the case of collateralised transactions, liquidity risk refers to the obligation for funds to provide additional collateral (e.g., to meet margin calls) following asset price movements or changes in haircuts. Such liquidity demands arise

[32] See ISDA SIMM Methodology, Version 2.1 (https://www.isda.org/a/zSpEE/ISDA-SIMM-v2.1-PUBLIC.pdf)

regardless of whether a derivative is being used to increase exposure or hedge other risks. A fund may need to consider other factors that could impact liquidity such as the nature and type of hedge, concentration risk, volatility, and correlation among others. If a fund does not have adequate risk management processes or ready access to liquidity it may be in a position where it has insufficient liquid assets to meet these margin calls and may need to sell assets or unwind their position or hedge.

Regulators may be interested in considering potential liquidity risk in its evaluation of its application of Step 2. There are different methodologies to estimate potential liquidity demands from margin calls. Because of the nature of the exposures, some of which are all based on estimating potential losses on derivatives or positions which could generate margin calls (e.g., repos or reverse repos).

If potential substantial variation margin calls are greater than a fund's liquid assets/cash, and the fund is unable to liquidate or modify its positions in a timely manner and has no other sources of liquidity, the fund may not be able cover extreme but plausible variation margin calls. The 'shortfall' (i.e. difference between margin call and liquid assets) is an indicator of the total potential selling, or portfolio rebalancing in the case of hedges, which would be needed by the fund to obtain sufficient cash.

Example 1 application: VaR or Expected Shortfall of derivatives positions

One way of estimating potential variation margin calls a fund may receive on its derivative positions is by using statistical measures to forecast their individual value and compare the probable losses to the unencumbered cash. For example, this can be accomplished with the Value at Risk or Expected Shortfall of a fund's derivative portfolio.

Value at Risk of derivatives positions ($MN)	400	
Unencumbered cash		**350**
Government bonds	n/a	-
Coverage surplus/shortfall =		**(50)**

For this measure to be comparable across funds, Regulators would need to define the parameters of the VaR model (e.g., confidence interval, holding period, historical data used). Even then, differences in estimation methodologies limit comparability.

Example 2 application: ***Margin requirements based analysis***

A less burdensome assessment for Authorities can be based on the data for initial margins required by counterparties for each fund. International standards require initial margin to be sufficient to cover extreme but plausible estimates of losses on derivatives positions over a certain period. Information on initial margin across the range of asset classes provides insights on a fund's potential variation margin calls. Also, calculations for both total initial margin posted across asset classes and cash holdings is part of a fund internal risk management process. Moreover, it will be mandatory for many institutions – including many funds – to post initial margin on new derivatives trades by 2020.[1]

An important distinction is that for margin on cleared and uncleared derivatives. In line with the practices of CCPs, margin calls on centrally cleared derivatives can only be met with cash. However, margin calls on uncleared derivatives may be met with both cash and other liquid assets (such as government bonds), depending on the Credit Support Annex agreed by the two parties in the derivatives transaction.

Asset class	**Initial margin posted ($mn):**	
	Cleared	Uncleared
Interest rates	200	20
Credit	50	-
Equity	-	-
Foreign exchange	50	10
Other	-	-
	300	30
Total =		**330**
Unencumbered cash		**300**
Government bonds	n/a	-
Coverage surplus/shortfall =		**(30)**

Example 3 application: Sensitivity of derivatives portfolio to changes in market factors

Measures of sensitivity of a funds derivative portfolio to changes in market factors can be used to estimate potential losses for particular scenarios. Funds could be asked to report the sensitivity of their derivatives portfolio to a range of market factors (e.g., equity prices up or down 5% or 20%), or could be asked to report standard sensitivities such as DV01 (sensitivity to a 1bp increase in interest rates) and CS01 (sensitivity to a 1bp increase in credit spreads) for their derivatives portfolio.

Changes in market factors	**Effect on derivatives portfolio($mn):**
Risk free interest rates increase by 100bps	100
Risk free interest rates decrease by 100bps	(75)
Equity prices increase 20%	20
Equity prices decrease 20%	(5)
Credit spreads increase 50bps	(35)
Credit spreads decrease 50bps	35

Such measures would be comparable across funds, and so could be used to see how sensitive groups of funds' derivatives positions are to particular scenarios.

Step 2 Applications: Example Supplementary Data

Regulators can opt to use a variety of supplementary data points to improve their analysis of a fund's leverage. The information gathered for a Step 2 programme should be additional to those adopted for Step 1 measures. Their aim is to shed light on further risk-aspects emanating from leveraged positions, which the regulator might find very valuable in its wider analysis of leverage within investment funds. The combination of these different data points with the exposure metrics data provides for valuable input for a well-rounded analysis of risks within these funds.

The following list of supplementary information is a selection of various data points which IOSCO C5 members believe to be relevant and could be used to achieve a more encompassing view on leverage-related risks within investment funds. This is neither exhaustive nor prescriptive, and it requires regulators to implement their own version.

Initial margin posted (absolute amounts)

Definition: Initial margin means the collateral collected by a counterparty to cover its current and potential future exposure in the interval between the last collection of margin and the liquidation of positions or hedging of market risk following a default of the other counterparty and can refer to cash and or securities posted by an investment fund to its transacting counterparty. It is intended to protect the non-defaulting counterparty of the transaction against the loss that occurs if the cost of replacing /closing out the netting set of trades exceeds the amount of variation margin held. This can happen if the mark-to-market value of the netting set to the non-defaulting counterparty has increased since the last variation margin payment was made.

Purpose/Benefit: The absolute amount of initial margin posted provides an indication of the significance of margin trading conducted by the fund. Margin trading is usually leverage driven and can thus be used to get a better understanding of the extent to which funds are potentially leveraged.

Value of cash/unencumbered cash (absolute amounts)

Definition: Unencumbered cash refers to the amount of cash and cash equivalents available for immediate use without restriction.

Purpose/Benefit: Unencumbered cash can be considered as a key metric for funds which make significant use of derivatives and possibly need to make margin payments to fund counterparties. It can be generally expected that highly leveraged funds keep sufficient unencumbered cash at least equivalent to a multiple of the initial margin posted. The analysis of the proportions of unencumbered cash to the amount of initial margin posted by the fund can provide an indication of the robustness of the fund in terms of leverage risk that is, its likely ability to meet any additional margin calls in response to changes in the value or volatility of the underlying reference asset(s).

Link to Example 2 for CR application: GNE measures, Counterparty Risk and Unencumbered cash

In the example provided for CR metrics above, we stressed how using a CR metric it was identified that in an extremely unfavourable scenario, the sample fund would likely lose one quarter of its Net Asset Value. In such scenario, the securities held by the fund will suffer and information on Unencumbered Cash would be useful for this matter.

	Notional	GNE	GNE+	CR Asset Classes (Basel)	CR Asset Classes (BIS/IOSCO)
Securities					
Equities	100	100	100	100	100
Bonds	50	50	50	50	50
Cash	75	75	75	75	75
NAV		225	225	225	225
Derivatives					
Equities > 5y	100	100	100	10	15
Interest Rates (3Y)	1000	1000	120	5	20
FX (<1Y)	300	300	300	3	18
IG Credit (1.5Y)	200	200	200	10	4
Exposure		1825	945		
Exposure/NAV		8.1	4.2		
CP Exposure				28	57
CP Exposure/NAV				12%	25%

Using the same information, provided the cash position is 75, if the fund has posted 25 in initial margins, this leaves 50 as unencumbered cash. Margins are 11.1% of NAV, and Unencumbered Cash 22.2% of NAV. Unencumbered Cash is therefore able to cover margin calls equal to twice the amount of the initial margins.

Should the unencumbered cash not be sufficient to cover the margin calls, the other securities can be used, depending on their liquidity and relevant market conditions.

Split exchange-traded/ OTC derivatives invested (absolute amounts)

Definition: OTC derivatives contracts are negotiated and entered into outside of an organised exchange and may not be cleared by a central clearing organisation. The split between exchange-traded and OTC derivatives refers to the manner in which the fund has distributed its exposures to derivatives across regulated and non-regulated markets.

Purpose/Benefit: Unlike exchange-traded derivatives, OTC derivatives may be significantly customised, and may not be cleared by a central clearing organisation. OTC derivatives that

are not centrally cleared may involve greater counterparty credit risk, and may be more difficult to value, transfer, or liquidate than exchange-traded derivatives The split of the absolute amounts invested by the fund in the two different types of products can provide an indication of the type of market (regulated v/s unregulated) on which leverage is incurred and information about whether contracts are centrally cleared can provide information about counterparty risks. It provides further detail on the degree of riskiness and complexity of the investment strategy of the fund.

Amount of cash borrowing (unsecured and secured (collateralised)) (absolute amounts)

Definition: A fund can increase its market exposure beyond its net asset value by entering into derivatives, as discussed above, or by making investments with borrowed money.

Purpose/Benefit: The ratio of borrowed cash to the gross assets or net assets, especially if reported across time (possibly also with Min./Max./Average), can provide an indication of the extent to which the fund is usually leveraged. Considering the universe of funds with a comparable gross/net asset, the higher the ratio, the more leveraged is the fund. In case of stressed markets conditions/market breakdown, the funds exhibiting higher ratios may be exposed to losses of a higher magnitude.

Amount of synthetic Borrowing via derivatives (absolute amounts)

Definition: Derivatives are mainly used by funds for hedging and investment purposes. Derivatives (such as Futures, Forwards and Options) and securities can also be combined in such a way that the resulting cash flows have similarities to a cash borrowing transaction. In this case, the fund is having recourse to synthetic borrowing via derivatives.

Purpose/Benefit: The ratio of synthetic borrowing to the Assets under management (AuM) or total net assets (TNA) especially if reported across time (possibly also with Min./Max./Average), can provide a further indication of the extent to which the fund is leveraged.

Value of aggregate amount of borrowing and cash financing available to the fund (drawn / undrawn, committed / uncommitted credit lines, term financing) (absolute amounts)

Definition: In addition to effective cash borrowing by investment funds above, a fund might also have signed agreements with banks or other financing-providers to receive financing (borrowing by the fund), e.g., in case of market stress (for liquidity management purposes). Combined with borrowed cash this provides for the maximum cash financing available to a fund.

Purpose/Benefit: This provides for the maximum borrowing available to the investment fund and thus can be used to calculate the maximum extent to which a fund could leverage its portfolio through cash borrowings.

Value of collateral posted/ received (absolute amounts)

1) Cash and cash equivalent collateral
2) Security collateral (other than cash)
3) Other collateral (letters of credit or other)
4) % of posted collateral rehypothecated by counterparties/ allowed for rehypothecation

Definition: Collateral is usually used to reduce counterparty risk in various financial derivative transactions. The type of collateral a fund posts or receives; the diversification of its counterparties; and whether collateral is held by a third-party custodian all may be relevant considerations in analysing counterparty risk.

Purpose/Benefit:

Reported collateral amounts can be used from different perspectives:

(i) The amount of collateral posted by the fund can provide an indication of the extent to which the fund is leveraged: the higher the collateral posted, the higher is the expected engagement of the fund in collateralised financial derivative transactions. The split by collateral category provides for additional information on the inherent risks of the collateral received (possibly necessity to apply haircuts).

(ii) The rehypothecation/reuse of collateral by the investment fund is usually being perceived as amplifying leverage in a fund. The practice by banks and brokers of using, for their own purposes, assets that have been posted as collateral by their clients, e.g., investment funds, increases the risk for the investment fund in case of a bank/ broker default. The use of the same asset as underlying collateral for different transactions increases the sum of exposures in the financial system and as a result creates leverage in the intermediation chain. The analysis of this variable can thus provide useful insights in the leverage build up not only in the fund but also across several financial intermediaries. It also provides valuable information on further risks with counterparties of the investment fund.

The re-hypothecation rate could be expressed as follows:

a. the ratio between the total mark-to-market value of all collateral re-hypothecated by the counterparty and the mark-to-market value of all the collateral posted by the fund; and

b. the ratio between the total mark-to-market value of all collateral re-hypothecated by the fund and the mark-to-market value of all collateral received by the fund.