

Frequently Asked Questions on Repo

Published by the International Capital Market Association (ICMA) in February 2013 and amended in January 2019.

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Understanding repo and the repo market..... 3

1. What is a repo?.....	3
2. What does repo do?	4
3. What is the role of repo in the financial markets?	5
4. How big is the repo market?	9
5. Who are the main users of the repo market?	10
6. What types of asset are used as collateral in the repo market?	10
7. What are the typical maturities of repos?.....	12
8. What is general collateral (GC)?	12
9. What is a ‘special’ in the repo market?	13
10. What is ‘rehypothecation’ of collateral?	14
11. What is the difference between a repurchase transaction and a buy/sell-back?.....	15
12. What is an open repo?.....	16
13. What is the difference between repo and securities lending?	16
14. Is repo in Europe the same as repo in the US?.....	17

How repos are managed 18

15. Is repo riskless?.....	18
16. Does repo encourage lending to risky counterparties?	19
17. Who regulates the repo market?	19
18. Why is it important to document repo?.....	19
19. What is the GMRA?	21

20. How do repo parties ensure they have enough collateral?	22
21. What is a haircut?	22
22. Who is entitled to receive coupons, dividends or other income payments on a security being used as collateral in a repo?	23
23. Who can exercise the voting rights and corporate actions attached to equity and corporate bonds being used as collateral in a repo?	23
24. What is tri-party repo?	24
25. What happens if a party fails to deliver collateral in a repo?.....	26
26. What happens to repo in a default?.....	27
27. What does a repo CCP do?	29
28. What happens to repo transactions when interest rates go negative?	31

Topical issues.....35

29. What has been the regulatory response in the repo market to the Great Financial Crisis?	35
30. What is 'short selling' and what is the role of repo?.....	40
31. Do repos allow for infinite leverage?	41
32. Do changes in haircuts/margins exacerbate pro-cyclicality?	42
33. Do banks that lend through repo receive preferential treatment over other creditors?	43
34. Does repo 'encumber' a borrower's assets?	43
35. Was a 'run on repo' the cause of the Great Financial Crisis in 2007?	44
36. Is repo a type of 'shadow banking'?.....	46
37. Is repo used to remove assets from the balance sheet?.....	46
38. Could a repo rate benchmark replace LIBOR or EURIBOR?.....	47
39. How do MiFID II and MiFIR apply to the repo market in the EU?	49

Special articles.....51

40. Mapping the interdealer European repo market (January 2019)	51
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International Capital Market Association (ICMA) and European Repo and Collateral Council (ERCC)60

These FAQs have been written by Richard Comotto, Senior Visiting Fellow at the ICMA Centre at Reading University.

Understanding repo and the repo market

1. What is a repo?

Repo is a generic name for both *repurchase transactions* and *buy/sell-backs*.¹

In a repo, one party sells an asset (usually fixed-income securities) to another party at one price and commits to repurchase the same or another part of the same asset from the second party at a different price at a future date or (in the case of an *open repo*) on demand.² If the seller defaults during the life of the repo, the buyer (as the new owner) can sell the asset to a third party to offset his loss. The asset therefore acts as collateral and mitigates the credit risk that the buyer has on the seller.

Although an asset is sold outright at the start of a repo, the commitment of the seller to buy back the asset in the future means that the buyer has only temporary use of that asset, while the seller has only temporary use of the cash proceeds of the initial sale. Thus, although repo is structured legally as a sale and repurchase of securities, it behaves economically like a collateralised or secured deposit (and the principal use of repo is in fact the secured borrowing and lending of cash).

The difference between the price paid by the buyer at the start of a repo and the price he receives at the end is his return on the cash that he is effectively lending to the seller. In repurchase transactions, and now usually in the case of buy/sell-backs, this return is quoted as a percentage per annum rate and is called the *repo rate*. Although not legally correct, the return itself is usually referred to as *repo interest*.

An example of a repo is illustrated below.



¹ Repos are sometimes known as 'sale-and-repurchase agreements' or just 'repurchase agreements'. In some markets, the name 'repo' can be taken to imply repurchase transactions only and not buy/sell-backs. Repurchase transactions are also known as 'classic repo'. Under EU regulation --- along with securities lending, commodities lending and margin lending --- repurchase transactions and buy/sell-backs are types of 'securities financing transaction' (SFT).

² In the Global Master Repurchase Agreement (GMRA), the same or similar assets are described as 'Equivalent Securities'. 'Equivalent' means assets that are economically but not necessarily legally identical (the same issue of securities with the same ISIN or, if the issue is divided into classes or tranches, the same class or tranche, but not the same part of that issue, class or tranche).

The buyer in a repo is often described as doing a *reverse repo* (ie buying, then selling).

A repo not only mitigates the buyer's credit risk. Provided the asset being used as collateral is liquid, the buyer should be able to refinance himself at any time during the life of a repo by selling or repoing the assets to a third party (he would, of course, subsequently have to buy the same or a similar asset back in order to return it to his repo counterparty at the end of the repo). This right of use (often called *re-use*) mitigates the liquidity risk that the buyer takes by lending to the seller. Because lending through a repo exposes the buyer to lower credit and liquidity risks, repo rates should be lower than unsecured money market rates.

There is a definition of repo in the EU's Securities Financing Transactions Regulation (SFTR) but this is incorrect and should not be used other than for the purpose of reporting under the SFTR. Article 5 of the SFTR defines a repurchase transaction as a transfer of 'securities or commodities or guaranteed rights relating to title to securities or commodities where that guarantee is issued by a recognised exchange which holds the rights to the securities or commodities and the agreement does not allow a counterparty to transfer or pledge a particular security or commodity to more than one counterparty at one time'. In reality, there are no repos against guaranteed rights and true repos do not use pledges. In addition, SFTR incorrectly defines a buy/sell-back ([see question 11](#)).

2. What does repo do?

Repo performs four basic functions which are fundamental to the efficient working of many other financial markets ([see question 3](#)).

- 1 One party can invest cash secured against the asset provided as collateral --- **safe investment**.
- 2 The counterparty can borrow cash in order to finance a long position in an asset, in an amount and at a repo rate that reflect, among other things, the collateral provided to the lender --- **cheap borrowing**.³
- 3 One party can earn a return by lending out an asset that is in demand in the market, in exchange for cheap cash, which can be used for funding or reinvested for profit ([see question 9](#)) --- **yield enhancement** for securities investors.
- 4 The counterparty can borrow an asset in order to sell and establish a short position or to deliver in order to settle a sale that has already been agreed ([see question 30](#)) --- **short-selling** and **short-covering**.⁴

For lenders of cash (repo buyers), repo offers a safe investment because:

- The buyer receives collateral to hedge his credit risk on the seller. Moreover, in a repo, title to the collateral is sold to the buyer, which should mean that, unlike pledged collateral, it can be liquidated in the event of the seller's insolvency without interference from an insolvency court. In other words, repo provides 'bankruptcy-remote' collateral, which reduces the credit risk of a cash investor more than a traditional secured loan.
- The buyer can diversify his credit exposure by taking collateral issued by a third party whose credit risk is uncorrelated with the credit risk of the seller.
- Collateralisation through transfer of title can reduce, not only the credit risk arising from lending, but also the liquidity risk. Where a buyer is given liquid collateral, he can meet any unforeseen

³ A 'long position' in an asset is created by buying the asset outright. The holder benefits from price rises, the accrual or payment of income on the asset and any other benefits of ownership.

⁴ A 'short position' in an asset is created by borrowing the asset and selling it outright. The holder will have to buy back the asset in due course in order to return it to the asset lender. This means he will benefit from a fall in the price of the asset between selling and buying it back, but will lose the income accruing or being paid in the interim and any other benefits of ownership.

need for liquidity during the life of the repo by selling the collateral to a third party, either through another repo or an outright sale (he would, of course, subsequently have to buy the collateral back in order to be able to return it to his repo counterparty at the end of the repo).

For borrowers of cash (repo sellers), repo offers a cheap and potentially more plentiful source of funding because the collateral they provide to the lenders (repo buyers) reduces the risks to the latter and does so in a more legally certain way than collateralisation by pledging.

For lenders of securities (repo sellers), repo offers a means of generating incremental income, on their investment portfolio, as in the securities lending market ([see question 13](#)).

For borrowers of securities (repo buyers), repo offers an alternative or supplement to the securities lending market, particularly for fixed-income securities.

3. What is the role of repo in the financial markets?

The repo market is pivotal to the efficient working of almost all financial markets. Its importance reflects the wide range and fundamental nature of repo's applications:

- **Providing an efficient source of short-term funding.** By being able to offer deposits secured by legal title to *high-quality liquid assets (HQLAs)* and diversification to include lenders other than commercial banks, repo is able to mobilise cheaper and deeper funding for financial intermediaries, in particular, securities dealers. And by reducing the degree of dependence on commercial banks, access to short-term funding is made easier and more reliable. Cheaper and easier funding helps to lower the cost of financial services provided by intermediaries to investors and issuers. Institutional investors also use repo, to meet temporary liquidity requirements without having to liquidate strategic long-term investments. Since the introduction of the Basel regulatory requirement to clear standardised OTC derivatives across *central counterparties (CCPs)* and the related imposition of margin on uncleared OTC derivatives, the repo market has become an important source of cash for non-banks to provide as variation margin to CCPs.
- **Providing a more resilient money market.** The resilience of the repo market helps to mitigate systemic risk. Repo is a more stable source of short-term wholesale funding than unsecured deposits, because collateral in the form of HQLA (overwhelmingly the most common type) and secured by the transfer of legal title hedges both the credit and liquidity risks of lenders ([see question 1](#)). This means lenders are more willing to offer longer-term funding and, as recognised in the Basel Liquidity Coverage Ratio (LCR), are less likely to refuse to roll-over lending, even in a stressed market. For example, although the repo market was not immune to the disruption triggered by the default of Lehman Brothers in 2008, it did not suffer a seizure and has been essential in avoiding total and unsustainable dependence on central bank liquidity.⁵ The stability of repo funding is reinforced by the wide range of lenders who are willing to lend in the wholesale money market on a suitably secured basis. Diversification creates a market which is deeper and naturally more resilient. Repo also mitigates systemic risk by allowing traders and investors who need liquidity in a stressed market to convert assets temporarily into cash in a way that is less disruptive than outright sales. Outright sales would depress the price of collateral securities and crystallize any unrealised losses on the holdings being liquidated or on hedges that have to be

⁵ *Papadia & Välimäki point out that, between 2008 and 2011, the unsecured eurozone money market shrank by EUR 327 billion, forcing the ECB into exceptional emergency lending in order to prevent a seizure of the financial system and serious damage to the real economy. In fact, the ECB lent EUR 115 billion. But growth in the repo market contributed another EUR 212 billion, without which, the burden on the ECB would have been dramatically greater.*

unwound when holdings are sold. Falling prices and mounting losses could amplify market stress and fuel the self-reinforcing dynamics of a crisis.

- **Providing a secure and flexible home for short-term investment.** The capacity of repo collateralised by HQLA to mitigate credit and liquidity risks is particularly valued by risk-averse money market investors seeking a secure and liquid investment for their working capital or other cash balances. Such investors include large non-financial corporates, money market mutual funds and other non-bank financial institutions (NBFIs), asset managers (including pension funds and insurance companies), the treasuries of financial market infrastructures such as CCPs and *central securities depositories (CSDs)*, and official agencies such as sovereign wealth funds, foreign exchange reserve managers and debt management offices (DMOs). Repo allows these investors to reduce their exposure to commercial banks and diversify counterparty credit risk by shifting cash out of bank deposit accounts. Repo is also the most secure short-term asset available to many such investors, given that they are often ineligible for deposit protection schemes because of the size of their deposits and that most do not have access to risk-free deposit accounts at central banks. While treasury bills could provide an alternative risk-free investment to repo, in most countries, the supply of treasury bills is oversubscribed by investors who hold these bills to maturity. This makes the secondary market narrow and forces investors to compete in the crowded primary market, which (like most money market securities) offers only a few tenors, whereas repo offers a full range of maturity dates without *broken date* penalties or premiums.
- **Facilitating central bank operations.** Repo is a widely-used instrument for central bank open market operations. Its collateralised nature reduces the credit risk of the central bank. And it allows the use of wider range of assets than outright purchases, which are limited to short-term securities with maturities similar to the horizon of most money market operations. The repo market is a ready-made collateral market which enables central banks to implement monetary policy more efficiently under normal market conditions and to act more swiftly as lenders of last resort during periods of market stress. Central bank repo can feed seamlessly into the interdealer repo market through which liquidity can be efficiently redistributed to banks and non-banks. Moreover, a liquid repo market is a source of near risk-free interest rates which can provide the central bank with a sensitive gauge of monetary and macro-economic conditions and, in the form of a repo rate index, a meaningful operational target for open market operations.
- **Financing leveraged investors and covering short investors.** Institutional investors such as alternative investment funds (hedge funds) borrow cash in the repo market to fund leveraged investment strategies on a cost-efficient basis and also borrow securities to allow them to take short positions. These funds play an important role in feeding market liquidity and driving price discovery through trading and arbitrage, and their ability to borrow securities to sell short is important in helping to stop asset price bubbles from developing. Repo is also used as a source of leverage by many traditional investment firms, especially liability-driven pension fund managers, who need to borrow to fund purchases of government bonds to hedge the long-term exposure of pension liabilities to interest rate and inflation risks. Such investors also borrow securities in the repo market to sell short in order to hedge their investment portfolios against temporary adverse movements in securities prices. And repo allows investors to buy and finance purchases of foreign securities in the same currency, avoiding exchange rate risk and facilitating the cross-border diversification of investment portfolios.
- **Hedging primary debt issuance.** In the primary debt market, repo allows dealers to fund their bids at bond auctions and their underwriting positions in syndicated bond issues at reasonable cost, thereby providing cheaper and less risky access to the capital markets for issuers, both governments and corporates. Primary dealers and other underwriters also rely on the repo market to hedge the interest rate risk on a long position in a new issue while it is in the process of distribution to investors by taking an off-setting short position in an existing issue with similar risk. For example, a new 5-year government bond issue can be hedged with a short position in the current 5-year government bond and a new 5-year corporate bond issue can be hedged with a

short position in the 5-year government bond in the same currency.⁶ The delivery of securities to settle the short position is covered by borrowing in the repo market. Without hedging, bond issuance would be riskier for primary dealers and other underwriters and therefore more uncertain and expensive for issuers.

- **Supporting corporate bond investors.** Investors in corporate bonds often seek to neutralize their exposure to general interest rate movements in order to target just the credit risk of these securities in the form of the credit spread. This can be done by taking a short position in the benchmark government bond with the closest duration to the corporate bond (investors are said to ‘spread corporate bonds against government bonds’). The delivery of the benchmark government bond to settle the short hedge position is covered by borrowing in the repo market.
- **Ensuring liquidity in the secondary debt market.** Liquidity in the secondary market for securities depends upon market-makers being willing to offer ‘immediacy’ or ‘urgency’ to investors by continuously quoting prices at which they are committed to trade on demand.
 - To be able to quote immediately-executable selling prices, a market-maker may hold inventory which allows him to sell to investors on demand in the knowledge that he will be able to make good delivery. The market-maker has to finance inventory and also hedge any material interest rate risk on that inventory. Only repo can provide cost-effective funding for market-makers, given the scale of their financing requirements, the thin margins on market-making and the fact that most securities dealers have relatively low credit ratings due to their leverage. Hedging the interest rate risk on inventory means taking an off-setting short position in another security with a similar duration, which means borrowing the other security in the repo market.⁷ On the other hand, if an investor wishes to buy an issue which a market-maker does not hold in inventory, and the market-maker cannot or does not wish to source that sale by immediately purchasing the security from someone else in the market, the market-maker’s ability to sell and be confident of being able to make good delivery will depend on being able to borrow that issue in the repo market until such time as he is able or willing to purchase. The liquidity provided by market-makers reduces risk for investors by allowing them to buy on demand, which in turn reduces the cost of borrowing for issuers. The alternative would be for the market-maker to hold a larger inventory or to fund his inventory in the unsecured market (assuming unsecured funding was actually available) or both. Or market-making would have to be constrained to a rigid *matched-book* style of activity (only buying when there is a seller and vice versa). All these alternatives would raise the cost of market-making, damaging secondary market liquidity and making portfolio management by investors riskier and more onerous, which would make debt securities a less attractive investment and raise the cost of debt financing to issuers. Several debt management agencies recognise the importance of repo to market-makers by offering special facilities from which market-makers can borrow whenever the available market supply is inadequate.
 - To be able to quote immediately-executable buying prices, a market-maker needs to be able to buy a security from an investor, even if he is unable or unwilling to sell that security

⁶ An alternative hedge for a long position in a new issue would be a short position in a related derivative instrument, such as a bond future or interest rate swap, but the derivative will ultimately have to be hedged by someone else borrowing the underlying security in the repo market.

⁷ Market-makers in corporate and other credit bonds also hedge the credit risk on any long positions that they accumulate. This can be done, subject to various degrees of basis risk, by: (1) shorting a security from the same issuer but issued in another part of the capital structure (eg senior against subordinated tranches); (2) shorting a security from a similar issuer with the same seniority; (3) selling protection through a single-name credit default swap (CDS) written on the same issuer and for the same seniority; or (4) selling protection through a CDS written on an index that is a reasonable proxy to the issuer of the security being hedged. The use of a CDS ultimately has to be hedged by someone else going short of the underlying security or index and covering that short position by borrowing in the repo market.

immediately to another investor or dealer. To do this, the market-maker has to take the security onto his trading book and both fund the long position and hedge any material interest rate risk until such time as he is able or willing to sell the security. Funding means borrowing cash by repoing out the security. Hedging means taking an off-setting short position in another security which has a similar duration, which means borrowing the other security in the repo market.

The importance of repo to secondary market liquidity is recognised in the regulatory definition of HQLA under the LCR, which includes the existence of an active and resilient repo market.

- **Fostering price discovery.** The repo market fosters price discovery by facilitating primary market activity but, most crucially, by feeding liquidity in the secondary market, which fosters trading and arbitrage. At a technical level, repo rates are a key component of the cost of carry of long and short positions in securities, and thus of the forward prices that measure the relative value of a security. Repo itself can be used to arbitrage inconsistent valuations between securities from the same issuer of similar maturity and thereby generate an accurate yield curve. In addition, repo links the money and capital markets, creating a continuous yield curve. Accurate and complete yield curves are essential for the correct pricing of other financial instruments and thus the efficient allocation of capital by financial markets.
- **Hedging and pricing derivatives.** The use of repo to efficiently fund long positions in securities and cover short positions is fundamental to the hedging and pricing of derivatives, given that securities are the ultimate hedge for their own derivatives (eg a position paying fixed rate in an interest rate swap can be hedged by a long position in a bond of the same maturity financed by a repo of the same tenor as the swap's floating rate). Derivatives are essential tools of risk management for both financial intermediaries and end-users of the financial markets. An active repo market is therefore a prerequisite for liquid markets in derivative instruments. Attempts to establish new derivatives markets, exchange-traded or over-the-counter (OTC), have foundered where there have been no active repo markets to facilitate basis trading, hedging, arbitrage and pricing.
- **Preventing settlement failures.** The repo market plays a critical role in maintaining the confidence of investors in the securities market by helping to ensure that the securities which they purchase are delivered on time. Where an intermediary has sold securities to one party which it has purchased from another, but the inward delivery fails to arrive on time, the intermediary can borrow those securities in the repo market to ensure that it can make timely delivery to the first party until such time as the second party delivers or an alternative purchase can be made from a third party. Without the ability to borrow securities, delivery failures might propagate through the market, leading to disorderly conditions, which could interrupt trading and damage investor confidence. Widespread failure to deliver can also make yields more volatile, and create large and persistent distortions in the yield curve, which would deter investors from participation in the market and discourage issuers by confusing price discovery. The role of repo in stemming delivery failures is enhanced by its ability to attract new supply into the market to meet increased borrowing demand by means of changes in repo rates. Thus, intermediaries seeking to borrow a security that is in demand offer cheaper cash by reducing the repo rate on that security in order to incentivize holders of the security to repo it out ([see question 9](#)). The reinvestment of the cheap cash will directly improve the overall portfolio return to investors (an improvement called *yield enhancement*). Investors lending securities also reap an indirect benefit. By helping to keep supply and demand in balance, they will support the longer-term efficiency and liquidity of the market in the securities which they hold, making it easier and cheaper for them to sell when the time comes. Delivery failures in Europe in actively-traded securities are generally rare and short-lived but can occur for a variety of reasons, including operational problems within firms and structural inefficiency in cross-border settlement (a persistent problem in Europe). In addition, bouts of market illiquidity can lead to involuntary delivery failures by market-makers. Given that they are obliged or committed to quote immediately-executable

prices to investors, they have to sell even if they do not hold a security in their inventory. If they cannot immediately buy that security in the market or borrow it from the repo market, they would be forced to fail on delivery. Frequent settlement fails could lead to *buy-ins* being exercised against market-makers, the cost of which might cause them to cease providing liquidity to the market.⁸

- **Permitting faster settlement times.** The role of repo as a means of borrowing securities has been, and will continue to be, crucial in allowing settlement periods to be shortened in order to reduce systemic risk in securities settlement systems. While faster settlement reduces systemic risk, it leaves less time for delivery problems to be corrected and therefore requires an efficient source of securities borrowing to overcome delivery failures. This is provided by the repo market. The settlement period for most securities transactions in the EU changed from T+3 to T+2 in October 2014.
- **Preventing market ‘squeezes’.** By allowing the borrowing of securities, repo helps to prevent individual institutions ‘squeezing’ the market in a particular security issue by cornering supply and thereby creating or exacerbating temporary imbalances between supply and demand. Squeezes can lead to settlement failures and disorderly markets.
- **Allowing more efficient collateral management.** Trading in the repo market is key to the valuation and management of collateral, and therefore to its efficient mobilisation and allocation. Where a firm’s investment or trading portfolio does not include the types of securities required as collateral (for example, HQLAs or CCP-eligible collateral), it can exchange the securities it does hold for those that it needs by using a repo to lend what it has and a reverse repo to borrow what it needs, with the opposite cashflows largely offsetting each other (this is a *collateral swap* performing *collateral transformation*). Collateral management is becoming ever more important. Traditional demand for collateral --- for use in payments and settlement systems, in derivatives exchanges and in securities financing transactions (SFTs) --- is being increased by the wider use of SFTs and regulatory requirements to hold larger liquidity reserves and to either centrally-clear or collateralise OTC derivatives. At the same time, quantitative easing by central banks has reduced the supply of HQLA currently available to the market, while loss of confidence in some sovereign debt has created uncertainty over future aggregate supply. The trading of collateral is particularly useful to investors such as pension funds and insurance companies, as it allows them to acquire securities eligible to use as collateral against the derivatives positions hedging their investment risk, while keeping their investment portfolios as close as possible to the optimum asset allocation and asset-liability management position.
- **Allowing more efficient employment of capital.** The global economic impact of the increasing regulatory risk capital charges which have been introduced since the 1980s has been accommodated by the more efficient use of capital through a shift from unsecured to secured financing.

4. How big is the repo market?

There are large repo markets in the US and Europe (including the eurozone, UK, Denmark and Poland). There is also a large repo market in Japan, although the form it has traditionally taken (*gentan*) is strictly-speaking a type of securities lending transaction. The top 20 markets include Argentina, Australia, Canada, India, Mexico, New Zealand, Russia, Singapore, South Africa, South Korea, Sri Lanka, Switzerland, Taiwan, Thailand and Turkey. The remainder of the world’s repo markets are in perhaps another 30-40 countries with reasonably active markets (excluding central bank repo). There are also

⁸ A ‘buy-in’ is a process whereby a buyer of a security that has not been delivered by the seller, appoints an agent to buy in the security on his behalf or buys in directly from the market. Any cost over and above the original purchase price is charged to the failing seller.

markets in what are incorrectly called repo, notably in China. These actually trade secured loans rather than true (title transfer) repos.

The ICMA's semi-annual survey of the European repo market in June 2018 produced a figure of about EUR 7 trillion in terms of outstanding repo contracts for the survey sample (which includes the most active participants in the European repo market but is not comprehensive). At about the same time as the ICMA survey, the Federal Reserve Bank of New York reported that the outstanding repo business of its primary dealers (who may account for as much as 80-90% of the US market) as almost USD 4 trillion. The global market, although it has contracted since 2007, may be over EUR 15 trillion in outstanding size and turnover about EUR 3 trillion per day.

The results of the ICMA's semi-annual survey of the European repo market, which has been conducted since 2001 and is the most authoritative source of regional repo market data, are published on the [ICMA website](#).

5. Who are the main users of the repo market?

Traditionally, the principal users of repo on the sellers' side of the market have been securities market intermediaries (market-makers and other securities dealers in firms called 'broker-dealers' or 'investment banks') and leveraged and other bond investors seeking funding. On the buyers' side, the principal traditional users have been cash investors seeking secure short-term investments, many of whom are highly risk-averse. These include large commercial banks, central banks investing foreign currency reserves, international financial institutions, money market mutual funds, agents investing cash collateral received by their securities lending clients, asset managers with temporary cash surpluses and the treasuries of large non-financial corporates and of financial market infrastructures such as *central counterparties (CCPs)* and *central security depositories (CSDs)*. Since the Great Financial Crisis, because of generally higher risk aversion and regulatory pressure, repo has reportedly been attracting smaller commercial banks, as well as a greater number of non-bank financials such as sovereign wealth funds.

Most central banks rely on the repo market as the main channel for the transmission of monetary policy to the wider financial market and to provide emergency assistance to the banking system.

6. What types of asset are used as collateral in the repo market?

Ideally, collateral should be free of credit and liquidity risk and exhibit minimal correlation (*wrong-way risk*) with the credit risk of the collateral-provider. The market value of such perfect collateral would be certain, meaning that it would be easy to sell for a predictable value in the event of a default by the collateral-giver, even in stressed markets. The type of asset that comes closest to this paradigm, and is in fact the most commonly-used type of collateral in the repo market, are bonds issued domestically by central governments. The ICMA's semi-annual survey of the European repo market estimates government bond collateral to account for over 80% of EU-originated repo collateral. In the US, Treasury securities may account for about two-thirds of that repo market. Much of the rest of the US market is government-guaranteed Agency debt and Agency Mortgage-Backed Securities (MBS).

Repo using collateral other than high-quality government bonds is often called *credit repo*. On the cusp between government and credit collateral are *high grade* bonds issued by supranational institutions such as the World Bank, as well as sovereign issues (foreign currency bonds issued by governments) and agency issues (issued by public sector bodies such as the government-guaranteed mortgage agencies in

the US). These issues are AAA-rated and often large and liquid, although they do not offer the range of maturities and issue size of the major government bond markets.

Bonds issued by central governments in emerging markets are included in credit repo by international investors. Nevertheless, many of these are large issues and can be reasonably liquid.

Private sector assets form the smallest sector of the repo market. Such assets tend to be riskier and much less liquid than government bonds, although higher yielding. They include:

- **Corporate bonds**, typically senior unsecured debt issued by investment-grade banks and large non-financial companies. This class of security has become less popular since the Great Financial Crisis, in part, reflecting decreased liquidity in the cash market in corporate bonds due to heightened risk aversion towards financial corporates and the cost of tighter regulation.
- **Equity**, particularly baskets reproducing market indexes such as the FTSE-100, CAC and DAX. The use of equity as collateral has increased since the Great Financial Crisis, during which, equity performed well as collateral (in terms of the continuous availability of tradeable prices).
- **Covered bonds** such as pfandbrief, which are secured by pools of public loans or mortgages held on the balance sheet of the issuer but ring-fenced in statute by special public laws. Covered bonds issued in countries with stronger banking sectors have been increasing in popularity as collateral, in part, because regulators have signalled its acceptability to meet regulatory liquidity ratios.
- **Mortgage-backed securities (MBS)**, particularly residential MBS (RMBS), which are held largely off the balance sheet of the mortgage issuer and ring-fenced contractually within bankruptcy-remote special purpose vehicles (SPV). To be widely accepted as collateral, these issues need to be AAA-rated. However, use of this type of asset as collateral fell back during the Great Financial Crisis because of contagion from MBS backed by sub-prime mortgages and rising default rates in some housing markets.
- Other **asset-backed securities (ABS) and re-securitizations** (eg CDO, CLO, CLN), which are held off the balance sheet of the originator of the underlying assets and ring-fenced contractually within bankruptcy-remote SPV. Most investors require a AAA-rating on such assets. This type of asset also suffered during the Great Financial Crisis because of contagion from securities backed by collateral pools which included sub-prime mortgages or sub-prime MBS.
- **Money market securities** such as treasury bills and, in some countries, certificates of deposit (CD) and commercial paper (CP). However, CDs are not always popular because they represent an exposure to commercial banks and CP issues are difficult to use as collateral because they tend to be relatively small.
- **Bank loans**, also referred to as *credit claims*. Bank loans need to be made transferable in order to be used as collateral, which can be a legal challenge in some jurisdictions. And because they are not traded, parties have to estimate the value. Bank loans are seen as a deep pool of potential high-quality collateral assets that could help to alleviate a possible global shortage of collateral.
- **Gold**. This is a specialised type of collateral but its use has been boosted by periodic interest in gold in response to market crises.

Assets that pose material credit, liquidity and wrong-way risks can be used as collateral but not for their full market value. Instead, the collateral value of the asset is usually set below its market value in order to take account of potential price volatility between variation margin calls, the probable high cost of liquidation in the event of a default and other risks. The difference is called a *haircut* or *initial margin* ([see question 21](#)). But the question also arises as to whether such assets properly require long-term funding, which tends to be unsecured, rather than repo, which tends to be short-term.

7. What are the typical maturities of repos?

Traditionally, repos have been short-term instruments and the bulk of liquidity is still relatively short-term, reflecting its core role in funding securities dealers. The US repo market is mainly overnight. The ICMA's semi-annual survey of the European repo market shows that the proportion of open and *short-dated repos* (remaining terms of one month or less) has largely fluctuated between about 60% and 70% of the outstanding value of repos. Of this, repo with only one day to maturity has been between about 15% and 25% of outstanding value. The ECB has estimated that, in euros, overnight repos were over 75% of turnover.

Since the Great Financial Crisis, the share of repos with between one and three months remaining to maturity has been growing (reaching about 15% of outstanding value), reflecting collateral transformation transactions, and there is a well-established market in forward repos, which often start one or more months in the future (about 10% of outstanding value). For more information, see the results of the [ICMA's surveys](#).

8. What is general collateral (GC)?

GC or *general collateral* is a set or *basket* of security issues which trade in the repo market at the same or a very similar repo rate, which is called the **GC repo rate**. GC securities can therefore be substituted for one another without changing the repo rate much, if at all. In other words, the buyer in a GC repo is indifferent to which of the GC securities he will receive. The fact that GC securities can be substituted for one another means that the driver of the GC repo rate is not the supply and demand of particular issues of securities, but of cash. For this reason, GC repo is sometimes called *cash-driven repo*. As a measure of the cost of borrowing cash, the GC repo rate is highly correlated with unsecured money market interest rates.

The basket of security issues that form a particular GC repo market belong to the same class (eg government bonds) or sub-class (eg government bonds with no more than five years remaining to maturity). This is why they can be substituted for each other without changing the GC repo rate. There is usually only one GC basket in each currency and this is typically of government bonds. However, it is possible to have several classes of GC in the same currency. For example, in the US, there is Treasury GC, Agency Debt GC and Agency MBS GC.

In the eurozone, the Great Financial Crisis which erupted in 2007 fragmented the GC repo market in government bonds by causing investors to differentiate between the credit of issuers in core and peripheral eurozone countries. There is consequently a German GC market, an Italian GC market and so on, but there is no longer a eurozone GC market.

Because the buyer in a GC repo is indifferent to which of the securities in a GC basket he will receive, the choice is the seller's (although subject to the buyer's consent) and is left until the end of a negotiation. It can also be delegated to an automated tri-party repo management system.

GC baskets have traditionally emerged through tacit market consensus. However, it is possible to formally create a GC basket for the purposes of facilitating trading. A formal GC basket is a basket of security issues prescribed by an *automatic repo trading system (ATS)* or a *central clearing counterparty (CCP)* which users of those systems are able to trade with each other. Trading such a GC basket means that users have to accept that, when they are (net) buyers, the (net) sellers have the right to deliver any of the issues in the GC basket. This allows negotiations between users to be restricted to term, amount and price, which simplifies and speeds up trading. In *GC financing* or *GC pooling systems*, the GC basket

is defined by a CCP and the selection of security issues for delivery is automated and managed by a tri-party repo agent, which is given net delivery instructions by the CCP. Where a GC basket is defined by an ATS and no tri-party agent is involved, sellers decide which of the eligible issues they will deliver and the buyer cannot reject their choice.

9. What is a 'special' in the repo market?

A *special* is an issue of securities that is subject to exceptional demand in the repo and cash markets compared with very similar issues. Competition to buy or borrow a special causes potential buyers in the repo market to offer cheap cash in exchange. A special is therefore identified by a repo rate that is distinctly lower than the GC repo rate ([see question 8](#)). The demand for some specials can become so strong that the repo rate on that particular issue falls to zero or even goes negative in an otherwise positive interest rate environment. The repo market is the only financial market in which, historically, a negative rate of return has not been unusual.

Specialness is driven by an excess of demand for a particular issue of securities over its supply. For this reason, special repos are sometimes described as *securities-driven* repo. As a special repo rate is unique to a particular issue of securities, it is uncorrelated with the GC repo rate or other money market interest rates.

The spread between the GC repo rate and a special repo rate represents the return which the buyer of that security is willing to give up on the cash he pays for that security. In other words, this *specialness spread* is an implicit securities' borrowing fee and special repo can be seen as another form of securities lending and borrowing.

The specialness spread can also be seen as a *convenience yield*, which is a reduction in the rate of return on an asset reflecting the non-pecuniary benefits to investors of holding that asset (in the case of specials, because of its value as collateral).

Because the buyer in a special repo is only interested in one particular security, the choice of collateral is the buyer's and is made at the start of a negotiation, in contrast to a GC repo, in which the collateral is selected by the seller at the end of the negotiation.

Bonds trading special in the repo market will also be in demand in the *cash* market.⁹ Indeed, demand in the cash market is usually the reason why securities trade special in the repo market. Market-makers and other dealers will use the repo market to borrow securities that are in strong demand in the cash market (and therefore difficult or very expensive to buy immediately) in order to fulfil delivery commitments on sales of those securities in the cash market. The premium in the price of a special in the cash market means that, in theory, it should not be impossible to buy a special in the cash market and repo it out for cheap cash in order to reap an arbitrage profit by reinvesting the cheap cash in GC repo. There is evidence that a no-arbitrage condition prevails in the overnight repo market for US Treasuries but academic studies have found that the term repo spread tends to overestimate future special repo rates.

The excess demand that creates specials tends to arise because an issue is very liquid, often because it is a benchmark or *on-the-run* issue, and therefore routinely in demand. For this reason, the specialness spread is sometimes described as a liquidity premium. It is often argued that deeper liquidity is valued

⁹ The 'cash' market in a security is that segment of trading in which the security is bought outright or sold outright. The term is used to distinguish outright buying and selling from repo trading in the same security.

by investors because it allows them to sell off the security more easily if they wish to switch into cash, for example, at an expected market turning point or in a crisis. However, an alternative argument is that liquidity is valued by short-sellers, both speculators and hedgers, as it makes it easier to open and close out a short position.

One of the most common reasons for an issue of securities to go special is when that issue becomes the *cheapest-to-deliver* in the futures market for that bond. Some futures sellers will have difficulty buying what they need to deliver to the futures clearing house. As failure to deliver to a clearing house would incur serious penalties, these parties will be forced to borrow the issue in the repo market and may have to bid aggressively to secure it, including sometimes offering negative repo rates.

The term 'special' is often incorrectly used to describe any particular issue of securities that the seller and buyer in a repo agree in advance to use as collateral, as opposed to issues selected from a GC basket after the other terms of the repo have been settled. A special is identified only by the fact that its repo rate is below the GC repo rate. Not all issues of securities specifically agreed in advance as collateral trade at repo rates below the GC repo rate. Such issues could be called *specifics* but should not be called 'specials'. The latter form a subset of the former.

10. What is 'rehypothecation' of collateral?

Rehypothecation is an alternative name for *re-pledging*. In the derivatives market, rehypothecation is sometimes called *re-use*. However, the term 're-use' is also applied in the repo market for the onward outright sale of collateral by a repo buyer to a third party in the cash market. This has caused some confusion.

There is an important legal distinction between pledge-based rehypothecation on the one hand and the sale or use of collateral in the (non-US) repo market on the other. In a pledge, title to collateral remains with the collateral-giver. If the collateral-giver grants a right of rehypothecation to the collateral-taker, the collateral-giver remains the owner but only until the collateral-taker exercises his right of rehypothecation. When this right is exercised, there is a material change in the legal relationship between the parties. The pledge is extinguished and the collateral-giver loses his title to the collateral, which is transferred to the third party to whom the collateral has been rehypothecated. In exchange, the collateral-giver is given a contractual right to the return of the same or similar collateral but this claim is intrinsically unsecured (although the collateral-giver is likely to have received funding in return for giving the right of rehypothecation to the collateral-taker and, in the event of the collateral-taker's insolvency, the collateral-giver may have a contractual right of set-off of all mutual obligations to and from the collateral-taker).

In a repo, the buyer becomes the owner of the collateral at the start of the transaction and can dispose of the collateral when and as he wishes. His right of use is not a discretionary right granted by the seller. It is an automatic right arising from property ownership.

Rehypothecation is widely used by prime brokers involved in the collateralisation of derivatives transactions with hedge funds. It is a practice introduced into Europe by US firms. The concept was alien to English and other European laws but formally introduced in 2003 by the adoption of the EU Financial Collateral Directive. Rehypothecation is regarded by prime brokers as essential to the economics of their business. In return for rights of rehypothecation, they can offer clients cheaper funding.

Following the Lehman Brothers default in September 2008, it was discovered that this firm's operational procedures for managing rehypothecated assets were inadequate, resulting in delays in retrieving the rehypothecated collateral. Some clients may not have fully understood the nature of rehypothecation. The regulation of rehypothecation differs between countries. In the US, Federal Reserve Regulation T and SEC Rule 15c3-3 limit the amount of a client's assets which a prime broker may rehypothecate to the equivalent of 140% of the client's net liability to the prime broker. In many other markets, there are no such limits. However, many other restrictions are applied to the rehypothecation of client assets in these markets.

Unfortunately, the inappropriate use of the word rehypothecation in the context of non-US repo has sown confusion among regulators about the nature of repo collateralisation and fed a tendency to conceive of repo as a pledge. Looking at repo through this prism, some regulators perceive systemic risk in the possibility that the return of collateral back along long chains of repos could be obstructed by the failure of one party in the chain. Such an obstruction could indeed be a problem in a chain of pledges (if such a construct were in fact feasible) as the original piece of collateral would need to be passed all the way back along the chain. In repo, however, only equivalent collateral needs to be returned and, as chains of repos are only possible with liquid collateral, the longer the chain, the more liquid the collateral has to be and so the easier it should be to find equivalent collateral. Moreover, if a party in a chain of repos fails to return collateral, its obligation can be netted against the failed party's obligation to repay cash, which would provide the cash to the latter to try to buy the collateral from a third party. It is argued that misconceived regulatory concerns about collateral re-use along chains of repo are manifest in a largely futile attempt, under the auspices of the G-20's Financial Stability Board (FSB), to measure the rate of collateral re-use. The chosen formula simply assumes that collateral posted by a firm will be passively sourced pro rata from securities received as collateral and securities purchased outright. For example, if a firm's holdings of a bond issue came 40% from collateral received and 60% from outright purchases, then the firm is assumed to post that bond as collateral by taking 40% from those bonds received as collateral and 60% from outright purchases. The resulting rate of collateral re-use may therefore be driven as much by cash trading as by repo and so will say little about re-use.

11. What is the difference between a repurchase transaction and a buy/sell-back?

Repurchase transactions and buy/sell-backs are both types of repo and both function (outside the US --- [see question 14](#)) by means of the legal sale of collateral but behave economically like secured deposits ([see question 1](#)). One principal difference between these two types of repo stems from the fact that a repurchase transaction is always evidenced by a written contract, whereas a buy/sell-back may or may not be documented. To document a buy/sell-back, the parties to the ICMA's *Global Master Repurchase Agreement (GMRA)* agree to apply the Buy/Sell Back Annex to the standard GMRA. Because repurchase transactions and documented buy/sell-backs are written contracts, they are legally more robust and commercially more flexible than undocumented buy/sell-backs.

Because an undocumented buy/sell-back lacks a written contract, its sale and repurchase legs are considered to be separate contracts. The lack of a contractual relationship between the parties to an undocumented buy/sell-back, other than on the first and last day of a transaction, means that it is not possible for one party to make a legally-enforceable variation margin call on the other in order to eliminate any differences that open up between the values of the cash and the collateral during the life of the repo. In addition, because they are undocumented, the right to net opposite obligations following a counterparty default is less certain because obligations under separate contracts may not be regarded as mutual in some jurisdictions and the intention of the parties has not been made explicit. These deficiencies make undocumented buy/sell-backs riskier.

Another key principal difference between a documented buy/sell-back and a repurchase transaction is that the former uses the same method as an undocumented buy/sell-back to deal with coupons, dividends or other income payments made on collateral during the term of a repo ([see question 22](#)). In the case of a repurchase transaction, an immediate and equal income payment (often call a *manufactured payment*) is made by the buyer to the seller. In the case of a buy/sell-back, there is no income payment between buyer and seller. Instead, the repurchase price to be paid on the repurchase date is reduced by the amount of the income payment on the collateral plus some extra interest to compensate the seller for the delay between the income payment date on the collateral and the repurchase date of the repo.

The EU Securities Financing Transaction Regulation (SFTR) incorrectly defines a buy/sell-back as an undocumented repo (Article 5(a)).

Some markets predominantly use repurchase transactions (eg US, UK, France, Belgium, Netherlands and Switzerland). Other markets predominantly or even exclusively use buy/sell-backs (eg Italy until 2017, Spain and most emerging markets).

12. What is an open repo?

An open repo (also known as *on demand*, *terminable on demand* or *open-ended* repo) is a repurchase transaction that is agreed without fixing the maturity date. Instead, the repo can be terminated on any business day in the future by either party, provided they give notice within an agreed period of time. Open repo is used to invest cash or finance assets where the parties are not sure how long they will need to do so.

Until an open repo is terminated, it automatically runs from one day to the next, offering the convenience of not having to negotiate and settle daily roll-overs. Interest accrues daily but is not compounded (ie interest is not earned each day on interest accrued over previous days). Where parties have open repos outstanding between themselves over extended periods, accumulated interest is typically paid off in aggregate every month. The initial repo rate on an open transaction should, in theory, be slightly below the overnight repo rate given the lower operational cost, but it will not subsequently change until the parties agree to re-set the rate or the rate has been linked to an interest rate index which is updated automatically.

13. What is the difference between repo and securities lending?

Securities lending, like repo, is a type of *securities financing transaction* (SFT). The two types of instrument have many similarities and can often be used as functional substitutes for each other.

In a securities lending transaction in the international market, as in repo, one party gives legal title to a security or basket of securities to another party for a limited period of time, in exchange for legal ownership of collateral (although it is also possible for the collateral to be pledged and there are still uncollateralized securities loans). The first party is called the *lender*, even though he is transferring legal title to the other party. Similarly, the other party is called the *borrower*, even if he is taking legal title to the security.

The collateral in securities lending can be either other securities or cash (securities lending against cash collateral looks very much like repo). The borrower pays a fee to the lender for the use of the loaned security. However, if cash is given as collateral, the lender is obliged to reinvest the cash and 'rebate' an agreed proportion of the reinvestment return back to the borrower. In this case, the lender usually

deducts the borrowing fee he owes from the rebate interest that he pays to the borrower, rather than paying it separately, so the fee is implicit in the rebate rate.

A key difference between repo and securities lending is that the repo market overwhelmingly uses bonds and other fixed-income instruments as collateral, whereas an important segment of the securities lending market is in equities.

Because the securities lending of equity transfers not only the legal ownership, but also the attached voting rights and corporate actions, it has become convention in the securities lending market for loaned securities (both fixed income and equities) to be subject to an express right of recall by the lender, so that he can recover securities if he wishes to exercise voting rights or respond to corporate actions. In contrast, unless a termination open is specifically agreed between the parties, repo does not allow a seller to recall his securities during the life of a transaction.

Another difference between repo and securities lending is that most repo is motivated by the need to borrow and lend cash, whereas securities lending is typically driven by the need to borrow securities. However, there is an overlap between securities lending and the specials segment of the repo market, which is also driven by the demand to borrow particular securities. And securities lending is sometimes used by securities investors to raise cash.

The repo market in Europe is represented by the *European Repo and Collateral Council (ERCC)* of the *International Capital Market Association (ICMA)*, which publishes the most widely-used model contract for international and many domestic repos, the *Global Master Repurchase Agreement (GMRA)* ([see question 19](#)). The securities lending market in Europe is represented by the [International Securities Lending Association \(ISLA\)](#), which publishes the most widely-used model contract for international securities lending, the *Global Master Securities Lending Agreement (GMSLA)*.

14. Is repo in Europe the same as repo in the US?

There are important differences in the way that repo works in Europe compared with the US, and between the structure and operation of the two markets.

In Europe, repo transfers legal title to collateral from the seller to the buyer by means of an outright sale (also known as a *true sale*). Under New York law (the predominant jurisdiction for US repo), transferring title to collateral has been considered legally difficult so title transfer is backstopped by the contingent pledging of collateral but with the pledge exempted from certain provisions of the US Bankruptcy Code that normally apply to pledges. In particular, collateral pledged in repo (as well as securities lending and against derivatives exposures) is exempt from the automatic stay on enforcement of collateral in the event of insolvency. In addition, unlike in traditional pledges, the pledgee/buyer in a US repo is given a contractual general right of use of collateral. Consequently, the resulting set of rights is deemed to be much the same in effect as those achieved by an outright sale.

In contrast to the European repo market, the US market is dominated by tri-party repo ([see question 24](#)), where post-trade collateral selection, management and settlement are outsourced to an agent. Tri-party repo may account for something in the order of two-thirds of the US market, whereas it is only around 10% of the European market.

The US repo market has traditionally had a shorter average maturity than the European market ([see question 7](#)) and repo has tended to account for a higher proportion of the balance sheets of key market intermediaries. On the other hand, the US market is a domestic market in one currency, whereas the European market is largely cross-border.

How repos are managed

15. Is repo riskless?

There is no such thing as a riskless financial instrument. But repo can achieve a substantial reduction in the credit and liquidity risks of lending, if managed prudently. The degree to which repo can mitigate risk depends upon the careful selection of counterparties, the use of high quality and liquid collateral, the operational ability to mobilise collateral easily and securely across clearing and settlement systems, efficient collateral management (particularly frequent variation margining) and legal certainty about the ownership of and right to liquidate collateral in the event of a counterparty default.

- Careful selection of counterparties is vital to the performance of repo. Collateralisation does not change the probability of default of a counterparty, so collateral taken from risky counterparties is more likely to be tested by a default and may turn out to be worth less than expected due to fluctuations in price, the impact of liquidation, and possible legal and operational problems. Consequently, collateral should be treated only as insurance against the default of the seller, not as a simple substitute for his credit risk. This means that the primary exposure in a repo remains counterparty credit risk. Repo does not therefore avoid the need for conventional credit risk management and does not allow lending to parties deemed unsuitable for unsecured lending. Rather, repo is intended to reduce the risk of lending to existing counterparties in order to make more efficient use of the capital supporting such lending.
- Although counterparty credit risk is the primary exposure in a repo, the choice of collateral is still very important. First, the credit risk on the collateral should have a minimal correlation with the credit risk on the repo counterparty (ie low *wrong-way risk*) in order to diversify credit exposure as much as possible. Second, collateral should have minimal credit and liquidity risks, in order to maximise certainty about its value and ease of liquidation in the event of a default. Government bonds have traditionally provided collateral that can best meet both criteria.
- Even the best asset is no good as collateral if it cannot be easily and securely transferred to a counterparty. This is straightforward in an integrated market such as the US but more complicated in Europe, which is a cross-border market that has suffered from a fragmented securities clearing and settlement infrastructure. Great strides have been made in integrating the European infrastructure, particularly the creation of T2S in the Eurozone, but barriers to the efficient mobilisation of collateral persist, particularly between some domestic CSDs and the ICSDs that are used by most cross-border investors.
- Efficient collateral management is mainly about frequent and accurate calling for variation margin to compensate for fluctuations in the value of collateral ([see question 20](#)). It may also be helpful to overcollateralize by discounting the initial market value of some types of collateral by applying a haircut or initial margin ([see question 21](#)) in order to cover the intervals between variation margining and to take account of the potential cost of liquidation following a default. Guidance on efficient variation margining is set out in the [Guide to Best Practice in the European Repo Market](#) published by the European Repo and Collateral Council (ERCC) of the ICMA. Collateral management also involves dealing with coupons, dividends or other income payments on collateral during the term of a repo, possible substitution of collateral by agreement, resetting floating repo rates, addressing failure to deliver collateral and all the operations needed to run open repos.
- Legal certainty about a buyer's right to collateral and the right of a non-defaulting party to net mutual obligations with a defaulting and insolvent counterparty depend critically on robust contractual documentation such as the ICMA's *Global Master Repurchase Agreement (GMRA)* ([see questions 18 and 19](#)). This functioned well during the Lehman Brothers' and other recent defaults.

16. Does repo encourage lending to risky counterparties?

Collateralisation does not change the probability of default of a counterparty, so collateral taken from risky counterparties is more likely to be tested by a default and may turn out to be worth less than expected due to fluctuations in price and the impact of liquidation. Consequently, collateral should be treated only as insurance against the default of the seller, not as a simple substitute for his credit risk. This means that the primary exposure in a repo remains counterparty credit risk. Repo does not avoid the need for conventional credit risk management and does not justify lending to parties deemed unsuitable for unsecured lending. Rather, repo is intended to reduce the risk of lending to existing counterparties and make more efficient use of the capital supporting such lending. The principle should be that the decision to use repo to mitigate the credit risk on a counterparty is taken after the decision on whether to extend any credit to that counterparty (ie the decision on whether to extend credit to a counterparty should not be driven by the decision to use repo). The primary importance of counterparty credit risk was confirmed during the Great Financial Crisis by the refusal of parties to roll over repos with Bear Stearns in March 2008, when doubts had arisen about the firm's solvency, despite the firm having substantial holdings of US Treasuries to use as collateral.

17. Who regulates the repo market?

The use of repo is subject to a wide range of laws and regulations enforced by various regulatory agencies. Regulation has significantly intensified since the Great Financial Crisis ([see question 29](#)). In Europe, repo is impacted directly by laws and regulations implementing the EU Financial Collateral Directive as well as by the Short Selling Regulation and the Securities Financing Transaction Regulation (SFTR), and indirectly through regulation of market users such as commercial banks and investment banks by banking and securities market regulators under laws and regulations implementing the Capital Requirements and similar Directives and Regulations, which themselves implement the Basel III regime. There is a raft of other laws and regulations affecting the repo market in the EU, including the European Market Infrastructure Regulation (EMIR), the Markets in Financial Instruments Directive (MiFID) and Regulation (MiFIR), the Bank Resolution and Recovery Directive (BRRD), the Central Securities Depository Regulation (CSDR), a possible Securities Law Directive and the Crisis Management Directive. And, as part of the discussion on 'shadow banking', the Financial Stability Board is considering so-called macro-prudential regulation of collateral management through the use of devices such as mandatory minimum haircuts.

18. Why is it important to document repo?

The key purpose of collateralisation is to secure a cash lender (ie mitigate his credit risk) by giving him the right to liquidate the collateral provided by the cash borrower in the event that the borrower becomes insolvent or defaults in some other way. In traditional secured lending, the right to liquidate is established under a *pledge* attached to or other type of *security interest* in the collateral in favour of the cash lender. In repo, security is established (outside the US --- [see question 14](#)) by a transfer of legal title to the collateral. In order to ensure that courts will enforce a lender's rights to liquidate collateral, it is prudent to provide a written contract as evidence of the original intention of the parties to create this right for the non-defaulting party and to ensure that a court will not re-characterize the repo as a secured loan. In many jurisdictions, such re-characterisation would deprive the holder of any rights to the collateral, as the parties would not have originally intended to make a pledge so would not have performed any of the formalities normally required to create a valid pledge. The lender could therefore find himself relegated to the position of an unsecured creditor.

Other legal reasons for having a written contract are:

- To reinforce the right, if one of the parties becomes insolvent and defaults, of the non-defaulting party to offset the value of cash and securities owed to the defaulting party against the value of cash and securities owed by the defaulting party, both within individual transactions and between separate repos. These *close-out netting* rights can eliminate or dramatically reduce the loss caused by the default of a counterparty. In this respect, it is also helpful to have sufficient flexibility in terms of the timing and method of valuation of obligations to accommodate less liquid collateral and time zone differences and to cope with difficult market conditions.
- To set out how variation margining and other risk mitigation measures should be implemented by the parties.
- To set out how to deal with problems which do not necessarily constitute an event of default (eg failure to deliver collateral).

Use of an enforceable written contract and its variation margining provisions are the minimum regulatory conditions for recognition of the risk mitigation impact of collateral and close-out netting in the calculation of regulatory capital requirements and large exposure monitoring. In some jurisdictions, the use of master agreements is a requirement for close-out netting.

Written contracts also allow the terms of a repo to be varied in order to create useful structured transactions, such as open and forward repos. Such variations are only possible if the parties have somewhere to record how the structures will operate, eg how much notice is required to terminate an open repo and how forward repo will be margined.

Written contracts for financial transactions such as repo frequently take the form of a *master agreement*, such as the ICMA's *Global Master Repurchase Agreement (GMRA)* ([see question 19](#)). A master agreement sets out the general terms and conditions of the business relationship between the parties, and consolidates all outstanding transactions within one contract. This not only legally underpins transactions but also offers important operational benefits:

- Enhancing the operational efficiency of individual transactions by allowing the negotiation of transactions to be limited to the specific commercial terms of each transaction, rather than repeating the general terms and conditions of the relationship between two parties. For this reason, master agreements are called 'framework agreements'.
- Enhancing the operational efficiency of individual transactions by setting out agreed procedures for managing repos post trade (eg dealing with income payments on the collateral).
- Consolidation of all outstanding transactions within one contract allows operational efficiencies such as the netting of payments and collateral deliveries.
- Where standard master agreements, such as the GMRA, are adopted across the market, the operational efficiency of the market as a whole is improved through harmonization of market practice.

In addition to documenting repos in a master agreement, it is essential that the enforceability of the master agreement is regularly re-assessed. Accordingly, the ICMA commissions legal opinions on behalf of its members on the GMRA each year in over 65 jurisdictions for transactions with commercial banks, securities dealers and other companies, and in many countries, various types of non-bank financial institution.

19. What is the GMRA?

GMRA is the acronym for the *Global Master Repurchase Agreement*. It is a model legal agreement designed for parties transacting repos and is published by [the International Capital Market Association \(ICMA\)](#), which is the body representing the cross-border bond and repo markets in Europe. The GMRA is the principal master agreement for cross-border repos globally, as well as for many domestic repo markets.

The GMRA was first published in 1992. It was updated in 1995 to incorporate lessons learned in the Baring Brothers crisis and, in 2000, to incorporate lessons from the Russian and Asian financial crises. The latest version was published in 2011. Although this version followed the Great Financial Crisis that erupted in 2007, it was not the result of any material shortcomings exposed by the crisis. Indeed, the GMRA 2000 performed well, including following the Lehman Brothers default in 2008. Rather, the updating mainly reflected the desire to harmonise the GMRA more closely with other master agreements, including the *Global Master Securities Lending Agreement (GMSLA)* and the ISDA Master Agreement, and the need to reflect changes in market practice and general legal developments since 2000. The opportunity was also taken to clarify certain terms and conditions.

The GMRA consists of a pre-printed master agreement that contains standard provisions, which are generic to the market in standard repo, and Annex I, which lists specific choices that need to be made by the parties to operationalize the agreement (eg fixing minimum delivery periods) and provides somewhere to record supplemental terms and conditions, if the parties wish to customise the master agreement to reflect the special character of the business relationship between them. The specific commercial terms of each transaction are recorded in confirmations, a model template for which is provided in Annex II of the GMRA.

The GMRA is designed for short-term repos of simple high-quality fixed-income securities that take the form of repurchase transactions between principals under the law of England and Wales. To apply the GMRA to repos of equities, repos by or with an agent, or repos in the form of buy/sell-backs, it is necessary to amend the master agreement. This can be done by signing the standard Equity, Agency and Buy/Sell-Back Annexes, respectively. Other product annexes accommodate certain domestic securities (eg UK gilts). To adapt the master agreement to jurisdictions other than England and Wales, there are also a number of country annexes. In addition, the parties can add special supplementary terms or conditions to Annex I of the GMRA.

To ensure that the GMRA remains effective, the ICMA commissions legal opinions on behalf of its members every year on the enforceability of the whole agreement, the effectiveness of title transfer, its mechanism for close-out netting in insolvency and other provisions in over 65 jurisdictions for transactions with commercial banks and investment firms, and in many countries, transactions with various types of non-bank financial institution. If parties agree material amendments to the GMRA, they will need to see their own supplementary legal opinions to ensure that their amendments have not affected the legality, validity and enforceability of the contract.

Regulators require repos to be documented under robust written legal agreements like the GMRA, supported by regularly updated legal opinions, as a condition of recognising the reduction of credit risk by collateral and close-out netting in the calculation of regulatory capital requirements and large exposures.

20. How do repo parties ensure they have enough collateral?

The first step is collateral selection. Collateral that is high quality and liquid will be inherently more stable in value. In addition, collateral issued by a party whose credit risk is uncorrelated with that of the repo seller will diversify exposure and avoid so-called *wrong-way risk*, which is the danger of the collateral value falling as the creditworthiness of the seller deteriorates.

Whatever collateral is accepted, buyers then need to anticipate potential problems in liquidating less liquid collateral in the event of a default, possibly during an episode of market stress, by applying a risk adjustment to its market value in the form of a haircut or initial margin ([see question 21](#)).

Once the terms of a repo have been agreed, both parties should revalue the collateral frequently (preferably daily) and as accurately as possible. When the value of collateral falls, the buyer should promptly call for variation margin from the seller to rebalance cash and collateral and vice versa. It is also important for parties to agree deadlines for calling, agreeing and delivering margin and to try to agree what assets will be acceptable as margin. Guidance on efficient variation margining is set out in the [Guide to Best Practice in the European Repo Market](#) published by the European Repo and Collateral Council (ERCC) of the ICMA. There is an alternative mechanism to variation margining involving the early termination and replacement of transactions, which was designed for documented buy/sell-backs, that achieves the same result as margining but is not widely used.

In order to minimise the problems that may occur in the aftermath of a default, it is important to have a robust written legal agreement such as the ICMA's *Global Master Repurchase Agreement (GMRA)*. This protects the rights of the buyer to sell collateral in an event of default, including insolvency, and to net his exposures to the defaulter, as well as providing flexibility in terms of the timing and method of valuation of obligations in order to accommodate less liquid collateral and difficult market conditions.

21. What is a haircut?

A *haircut* is the difference between the initial market value of an asset and the purchase price paid for that asset at the start of a repo. An *initial margin* is analogous in function to a haircut. The difference between the two is merely a matter of expression. A haircut is expressed as the percentage deduction from the market value of collateral (eg 2%), while an initial margin is the initial market value of collateral expressed as a percentage of the purchase price (eg 105%) or as a simple ratio (eg 105:100).

Ideally, collateral should be free of credit and liquidity risks. The market value of such risk-free collateral would be more certain, meaning that it would be easy to sell for a more predictable value in the event of default by the collateral-giver. The type of asset that comes closest to this paradigm, and is in fact the most commonly-used type of collateral in the repo market, is a domestic bond issued by a creditworthy central government.

Assets that pose material credit and/or liquidity risks can be used as collateral but their value needs to be adjusted for their risk by deducting a haircut from the market value of collateral in order to calculate the purchase price or multiplying the purchase price by an initial margin in order to calculate the required collateral market value.

A haircut or initial margin represents the potential loss of value due to factors such as:

- price volatility between regular variation margining dates (in case there is a default between a calculation of a variation margin call and the payment or delivery of that variation margin);

- the probable cost of liquidating collateral following an event of default due to the impact of liquidation on market price;¹⁰ and
- the possibility of the issuer of the collateral defaulting.

The potential loss could be increased by delays in responding to a variation margin call due to operational problems or a legal challenge to the non-defaulting party's title to the collateral or his right to net. If the cash and collateral are denominated in different currencies, price volatility must include the effect of exchange rate fluctuations. It is arguable as to whether the credit risk of the repo counterparty should affect the size of a haircut or initial margin, given that the risk of a liquidation loss by a non-defaulting party is a function of the collateral and that party's collateral management rather than the credit of the counterparty (which should in theory be compensated by the repo rate). However, it is appropriate to take account of any significant correlation between the credit risks of the repo counterparty and the issuer of the collateral (so-called *wrong-way risk*), as this will diminish the effectiveness of the collateral. In practice, many parties do factor in the credit risk of their repo counterparties but this probably reflects differences in the relative commercial power of parties who have different credit ratings.

The use of haircuts and initial margins is explained in the guidance on efficient margining set out in the [Guide to Best Practice in the European Repo Market](#) published by the European Repo and Collateral Council (ERCC) of the ICMA.

22. Who is entitled to receive coupons, dividends or other income payments on a security being used as collateral in a repo?

During the life of a repo, the buyer holds legal title to the collateral. In other words, the collateral is his property. He is therefore entitled to any benefits of ownership, including any coupons, dividends or other income that may be paid by the issuer of the collateral.

However, the seller of collateral retains the risk on the collateral, as he has committed to buy it back in the future for its original value plus repo interest (so, if the price falls between selling and buying, the seller will suffer the loss and vice versa). The seller would not accept the risk on the collateral unless he also receives the return, including coupons, dividends or other income. To satisfy the seller, under the ICMA's *Global Master Repurchase Agreement (GMRA)*, in the case of repurchase transactions, the buyer agrees to immediately pay compensatory amounts to the seller equivalent to any income payment received on the collateral. In the UK, these are called *manufactured payments*. In the case of buy/sell-backs, the seller is compensated, not by a manufactured payment, but by a reduction in the repurchase price that the seller is required to pay back at maturity.

23. Who can exercise the voting rights and corporate actions attached to equity and corporate bonds being used as collateral in a repo?

During the life of a repo, the buyer holds legal title to the collateral. In other words, the collateral is his property and he is entitled to any benefits of ownership. In the case of equity, and sometimes corporate bonds, the benefits of ownership may include voting rights. The buyer can, if he wishes, vote in accordance with the wishes of the seller but he is under no obligation whatsoever to do so. However, while the buyer obtains any rights to vote that are attached to collateral securities, it is unacceptable

¹⁰ It is also possible that the non-defaulting party may have to buy securities that it had expected to receive from the defaulting party. In this case, its risk is that buying will drive up market price.

under corporate governance recommendations to use repo to buy securities solely in order to exercise the voting rights given that the repo buyer is only a short-term holder of those securities.

In the case of equity and sometimes corporate bonds, options may arise such as rights issues and stock splits --- so-called *corporate actions* --- on which holders are required to make a choice. As with voting rights, under the ICMA's *Global Master Repurchase Agreement (GMRA)*, the decision about how the corporate action is exercised with regard to a security provided as collateral rests entirely with the buyer, as he is the owner (assuming the buyer is still holding the security when a decision has to be made). However, who should take the decision, after a corporate action, about which security is to be delivered back to the seller at the end of the repo (called the *Equivalent Securities* in the GMRA)? This is not expressly stated in the GMRA. On the one hand, it could be argued that the GMRA should be consistent with the Equity Annex, which expressly allocates the decision to the seller, as does the *Global Master Securities Lending Agreement (GMSLA)*. In addition, one of the economic principles underlying a repo is that only the seller should be exposed to the risk and return on the collateral, which implies that the seller should decide how to respond to a corporate action. On the other hand, it can be argued that the securities to be returned at the end of a repo, like the securities delivered at the start, should always be agreed between the parties, so the buyer should be consulted.

24. What is tri-party repo?

Tri-party repo is a transaction for which post-trade processing --- collateral selection, payments and deliveries, custody of collateral securities, collateral management and other operations during the life of the transaction --- is outsourced by the parties to a third-party agent. A tri-party agent can be a custodian bank, an *international central securities depository (ICSD)* or a national *central securities depository (CSD)*. In Europe, the principal tri-party agents are Clearstream Bank Luxembourg, Euroclear Bank, Bank of New York Mellon, JP Morgan and SIS. In the US, there is now only one: Bank of New York Mellon (JP Morgan largely gave up its tri-party role in 2018).

Because a tri-party agent is just an agent, use of a tri-party service does not change the risk relationship between the parties. If one of the parties defaults, the impact falls entirely on the other party. This means that parties to tri-party repo need to continue to sign bilateral legal agreements such as the ICMA's *Global Master Repurchase Agreement (GMRA)*.

Nor does the tri-party agent provide a trading venue where the parties can negotiate and execute transactions (although some tri-party agents are linked to trading platforms). Instead, once a transaction has been agreed directly between the parties --- usually by telephone or electronic messaging --- both parties independently notify the tri-party agent, who matches the instructions and, if successful, processes the transaction. The agent will typically automatically select, from the securities account of the seller, sufficient collateral that satisfies pre-agreed credit and liquidity criteria, concentration limits and any transaction preferences agreed between the buyer and the seller. The selected collateral will be delivered against simultaneous payment of cash from the account of the buyer (*delivery-versus-payment* or *DVP*), subject to the deduction from the collateral of pre-agreed initial margins. Subsequently, the tri-party agent manages the regular revaluation of the collateral, variation margining, income payments on the collateral, as well as (in the case of most European tri-party agents) substitution of any collateral which ceases to conform to the quality criteria of the buyer, substitution to prevent an income payment triggering a tax event, substitution to retrieve a security being used as collateral which is then sold by the seller to another party and substitution at the request of the seller. Tri-party agents also conduct *optimisation* of collateral, which means the ongoing reassessment of whether there is a better combination of securities that can be posted as collateral given changes in the seller's holdings since the start of a tri-party repo and execution of the

substitutions necessary to achieve the better combination (eg subsequent to the start of the tri-party repo, the seller may have bought new securities which have lower ratings than those posted as collateral but are still acceptable to the buyer, so these can be substituted for those initially posted).

Because collateral is typically selected automatically by the tri-party agent, tri-party repo cannot be used for borrowing and lending specific securities. It is a pure GC funding facility. This is reflected in the large average deal size of tri-party repo and collateralization by multiple securities.

Moreover, because tri-party collateral operations are automated and benefit from the agent's economies of scale, and because settlement is across the books of the agent, the post-trade costs of tri-party repo are less than those managed in-house and settled across a securities settlement system (which charges a settlement fee for each issue of securities transferred). This makes it economic to collateralise a tri-party repo with multiple securities. Tri-party agents also have the capability to efficiently manage baskets of collateral denominated in several currencies. The ability to collateralise with multiple securities facilitates larger deal sizes.

On the other hand, the lower post-trade overheads of tri-party repo also makes it economic to use non-government securities as collateral. These less liquid securities trade in smaller amounts than government securities, which can make bilateral transfers across securities settlement systems prohibitively expensive. Consequently, repos of equity, corporate bonds, MBS, ABS and other structured securities are concentrated in tri-party repo.

Tri-party is the preferred repo market segment for many customers (non-intermediaries) given that the delegation of collateral management to a tri-party agent allows these firms to avoid the cost of setting up and running their own collateral management operation. This includes central banks, some of whom allow the use of tri-party agents by the counterparties in their monetary policy operations and others who use tri-party services when conducting investment operations.

There are important differences between European and US tri-party markets.

- Tri-party agents dominate the settlement of US repo, accounting for something in the order of two-thirds of the outstanding volume of the US market, compared to about 10% in the European market.
- European tri-party repo is normally used to manage non-government bonds and equity (although the proportion of government bonds has more than doubled since the Great Financial Crisis), whereas US tri-party is focused on Treasury and Agency debt (over two-thirds of that market).
- In most European tri-party systems, there has always been true term repo, whereas term repos in US tri-party systems were traditionally unwound each morning and re-arranged in the afternoon. This was intended to give sellers (who are usually broker-dealers) the daily opportunity to withdraw and replace collateral securities and adjust for price fluctuations (instead of operationally more intensive direct substitution and variation margining with the other party), but this procedure required the tri-party agents to finance the sellers for most of the day, creating a systemic intra-day credit exposure. In Europe, the need to unwind tri-party repos daily has been avoided by the use of direct substitution and variation margining. Concern about the systemic risk posed by the huge intra-day credit exposures taken by the US tri-party agents (Bank of New York Mellon and, until 2018, JP Morgan) have prompted reforms to the US tri-party market which are bringing it closer to the European tri-party model.
- The US tri-party market is dominated by two types of investor, money market mutual funds and securities lending agents reinvesting cash collateral, who together account for almost two-thirds of that tri-party market. These investors are required or prefer to reinvest a substantial proportion of their cash in repo and they tend to use tri-party repo because of the operational convenience. The problem is that cash collateral taken in the securities lending market is an open-ended liability (as the securities loans can typically be recalled at any time) but most tri-party repos are collateralised

by medium or long-term securities. If there were to be a default on a repo, investors would have to take the securities onto their balance sheets. Given that they cannot or may not wish to hold such longer-term collateral securities, they would be obliged or might feel impelled to immediately sell. If the default was by a large borrower, sufficient collateral might be sold to trigger a *fire sale*, that is, a self-reinforcing cycle of disposal and price collapse. The European tri-party repo market does not suffer from such a concentration of the investor base.

25. What happens if a party fails to deliver collateral in a repo?

There are two occasions when this might happen: at the start of a repo, the seller may fail to deliver to the buyer; or at the end of a repo, the buyer may fail to deliver to the seller.

In the event of a failure by a seller to deliver collateral securities to the buyer at the start of a repo, if the parties have signed the ICMA's *Global Master Repurchase Agreement (GMRA)*, one of the following will happen:

- If the parties have agreed, when they negotiated their agreement, to treat a failure to deliver collateral securities as an event of default, the buyer could place the seller in default. However, putting a counterparty into default is a very serious step. Before doing so, it is important to be sure that the seller's failure to deliver reflects credit problems and not temporary operational problems, infrastructure frictions or market illiquidity, which can be beyond the seller's control.
- The contract remains in force, allowing the seller to deliver the collateral securities at any time during the remaining life of the contract. Only if and when delivery eventually takes place will the buyer pay the seller. But at any time while the failure to deliver continues, the buyer can terminate the contract and the seller will be contractually obliged to pay the repo interest accrued up to that point. In other words, the seller will have to pay repo interest even though he will not have had the use of the buyer's cash. This means that the seller is charged for failing to deliver and the buyer is recompensed.

In the event of a failure by the buyer to deliver collateral securities to the seller at the end of a repo, if the parties have signed a GMRA, one of the following will happen:

- If the parties have agreed, when they negotiated their agreement, to treat a failure to deliver collateral securities as an event of default, the seller could place the buyer in default. As for a fail on the purchase date, before placing a counterparty into default for failing to deliver, it is important to be sure that the buyer's failure to deliver reflects credit problems and not temporary operational problems, infrastructure frictions or market illiquidity, which are all beyond the buyer's control.
- The seller could call a *mini close-out*, which is a colloquial term for the right of the buyer to terminate the failed transaction (but no others), value the collateral in that transaction using the methodology set out in the GMRA for defaults ([see question 26](#)), offset this against the cash he owes the buyer and settle any difference. However, mini close-outs can prove to be very expensive for parties failing to deliver. In repo markets, such as those for government bonds, which trade at narrow spreads, the risk/return ratio is so skewed that it is felt that the threat of mini close-outs would drive many banks out of the market and fatally damage its liquidity, so mini close-outs are in practice restricted to fails in types of collateral such as corporate bonds. Note that the mini close-out mechanism works differently from the *buy-in* procedure used in the cash market when the seller fails to deliver to the buyer in an outright transaction (in this case, the security is bought from the market and any extra cost is passed to the failing party).
- The parties could negotiate a solution. Until then, the repo would continue, with the seller holding cash, which will be interest-free after the repurchase date, thus recompensing the seller and charging the buyer.

In the event of a failure by the seller to deliver collateral securities at the start of a repo or by the buyer to deliver at the end, if the other party has paid cash to the failing counterparty before discovering that there has been a failure to deliver, he can require the failing counterparty to immediately repay the cash or he can make a cash margin call to recover his cash. If the failing counterparty does not promptly return the cash, he risks being placed into default. In practice, however, cash will rarely be paid without delivery given the prevalence of settlement by delivery-versus-payment (DvP).

26. What happens to repo in a default?

If the parties have documented their repo business under a master agreement, such as the ICMA's *Global Master Repurchase Agreement (GMRA)*, default means that one of the parties has committed one of the *Events of Default* listed in the agreement. In the GMRA, the standard list of Events of Default includes *Acts of Insolvency* such as the presentation of a petition for the winding-up of the party or the appointment of a liquidator or equivalent official. Other standard Events of Default are:

- failures to pay cash amounts (such as purchase price, repurchase price and manufactured payments) or to meet variation margin calls;
- making an admission of one's inability or intention not to meet debts as they fall due (under the GMRA 2000, this admission has to be in writing);
- making materially incorrect or untrue representations;
- being suspended or expelled from a securities exchange for specified reasons or (under the GMRA 2000) from a self-regulatory organisation;
- being suspended for specified reasons from dealing in securities by an official body (a 'government agency' under the GMRA 2000 or 'Competent Authority' under the GMRA 2011, the latter term being intended to include the new types of agency established in the wake of the Great Financial Crisis, such as resolution authorities);
- (under the GMRA 2000) having assets transferred to a trustee by a regulator.

There is also a catch-all provision that failure to perform any other obligation under the GMRA is also an Event of Default, if it is not remedied within 30 days of a notice being given of such failure. The parties can also elect to make failure to deliver collateral an Event of Default.

Under the GMRA 2000, the occurrence of either of two particular Acts of Insolvency --- the filing of a petition for the winding-up of a party and the appointment of a liquidator or similar officer --- automatically puts the insolvent party into default. For all other Events of Default, under the GMRA 2000, a party is not actually in default until its counterparty serves a default notice. Under the GMRA 2011, a party is in default as soon as an Event of Default occurs: notice is necessary only to initiate the process of terminating the agreement.

Default notices under the GMRA must be served in writing in English. They can be delivered:

- in person or by courier;
- by registered mail;
- by telex (but not under the GMRA 2011);
- by fax;
- in the form of an electronic message which is capable of reproduction in hard copy (under the GMRA 2011, but not the GMRA 2000, electronic messaging includes e-mail).

Under the GMRA 2000, default starts when letters are delivered; registered mail is either delivered or delivery is attempted; telexes prompt an answerback from the recipient; faxes are received by a responsible employee in legible form; or when an electronic message is received. If the defaulting party refuses to accept delivery or is obstructive, and the non-defaulting party has made all practicable efforts to serve a notice using two of the methods listed in the agreement, the latter can draw up a *Special*

Default Notice to be given to the defaulting party as soon as practicable. By signing such a notice, the non-defaulting party places his counterparty into immediate default under the GMRA 2000 and gives effective notice of the date of termination under the GMRA 2011.

Under the GMRA 2000, once a party is formally in default, the process of *close-out netting* starts. Under the GMRA 2011, close-out netting requires the non-defaulting party to serve a notice specifying a termination date or as soon as an Event of Default has occurred that the parties have pre-agreed should be subject to *Automatic Early Termination*. Close-out netting has three stages.

- First, all outstanding obligations due on repos documented under the same GMRA are accelerated for immediate settlement and all variation margin held by the parties is called back.
- Second, the *Default Market Value* of the collateral securities is fixed and transactions costs and professional expenses included. The non-defaulting party can also add the cost of replacing defaulted repos or, if he considers it reasonable, the cost of replacing or unwinding hedges.
- Third, all sums are converted into the same currency (the one chosen as the *Base Currency* by the defaulting party when the GMRA was negotiated) and are netted off against each other to produce a single residual amount, which must be notified to the defaulting party. Whoever owes the residual sum must pay it by the next business day. Either party can be charged interest on late payment.

The speed of the valuation stage of the close-out netting process will depend upon the liquidity of the collateral assets. Valuation is under the control of the non-defaulting party. Under the GMRA 2000, he has five business days from the formal date of default to complete the valuation (although this can be extended in exceptional circumstances). Under the GMRA 2011, the non-defaulting party is required only to complete valuation as soon as reasonably practicable. Under both versions of the GMRA, the non-defaulting party has a menu of three valuation options. If he buys or sells collateral, he can use the actual dealing prices realized by selling the collateral. Or he can use dealing prices realized when selling other holdings of the same security. These dealing prices can be applied to whatever collateral is liquidated at the time or to the whole amount. Or the non-defaulting party can use market quotes, or a mix of dealing prices and market quotes, provided the quotes are from two or more market-makers or regular dealers in 'commercially reasonable' size. However, if the collateral is so illiquid that the non-defaulting party cannot buy or sell the collateral or, acting in good faith, he cannot find market quotes, does not think it commercially reasonable to try to obtain quotes or he can find quotes but believes it would not be commercially reasonable to use them (eg they are for amounts much smaller than needed), then he can estimate the *Net Value* of the collateral. This is a measure of their fair market value, calculated using whatever pricing sources and methods the non-defaulting party deems appropriate in his reasonable opinion. Sources can include, without limitation, securities with similar maturities, terms and credit characteristics. In effect, the calculation of Net Value is marking-to-model (calculating a theoretical fundamental price) as opposed to marking-to-market (using dealing prices or quotes). Net Value under the GMRA is different from fair market value as defined in accountancy standards. Fair market value for accountancy purposes should be agreed between a willing buyer and a willing seller, neither being under any particular compulsion to trade. The GMRA, on the other hand, is designed for the liquidation of securities after one of the parties has been placed in default, possibly in stressed market conditions.

The non-defaulting party cannot use the close-out netting process to try to recover what are called *consequential losses* (with the exception of the cost of replacing repos or the cost of replacing or unwinding hedges). These are downstream losses caused by the default (those not immediately due to the default on repos).

The default procedure in the GMRA was thoroughly tested by the default of Lehman Brothers in September 2008. It worked well and the netting of credit exposures under the GMRA and other standard master agreements (eg the Global Master Securities Lending Agreement and the ISDA Master

Agreement) significantly mitigated the impact of Great Financial Crisis. Accordingly, the changes to the default procedures introduced by the GMRA 2011 are not fundamental. They are generally intended to give the non-defaulting party more flexibility in calculating the Default Market Values of collateral and to align the provisions of the GMRA more closely to standard master agreements in other markets.

27. What does a repo CCP do?

CCP is the acronym for *central (clearing) counterparty*. In exchange-traded markets, they are known as *clearing houses*. CCPs perform two so-called *clearing* functions:

- Once a transaction has been agreed between two parties and registered with a CCP, the CCP inserts itself into the transaction (so that one contract becomes two --- a legal process called *novation*) or is deemed to be an original party to the transaction (one transaction negotiated between two CCP members does not produce a contract between them but instead automatically generates two contracts, between the CCP and each of the members --- a process called *open order*). The CCP famously becomes the buyer to every seller and the seller to every buyer. On this basis, if one of the CCP members defaults, the CCP guarantees scheduled settlement for other members.
- The CCP will net transactions between members on a centralized basis (netting by a CCP is referred to as 'clearing'). This means that a delivery of a security sold via the CCP by party A to party B can be netted off against deliveries of the same security on the same date bought via the CCP by party A from party C, thereby reducing A's exposure. The same applies to cash payments in the same currency. This produces much smaller net exposures than decentralised bilateral netting, in which netting is only between separate pairs of parties. This type of netting is often called *multilateral netting*.

The benefits offered by CCPs include:

- The reduction of risk by having the CCP as a counterparty. CCPs are backed by a series of capital buffers (in the form of initial margins posted by members, committed and contingent contributions by members to a default fund, reserves and equity --- often called a *waterfall* of default resources). In a default by a member, the CCP will replace or hedge the positions of the defaulting member and seek to cover any replacement or hedging costs by drawing on the initial margin and, if necessary, default fund contribution of the defaulting member (a *defaulter-pays* process). If these resources are insufficient, the CCP will draw on a share of its own capital (this is called its *skin-in-the-game* and is intended to align the interests of the CCP and its members in ensuring risks are prudently managed). Next, the CCP can call on the default fund contributions of the non-defaulting members and, if necessary, call for further default fund contributions (a *survivor-pays* process). In extremis, it can draw on the rest of its capital. Non-defaulting members will also be expected or formally committed to help the CCP put in place replacement transactions or hedges. The commitments taken on by the members of a CCP means that risk is shared or *mutualized* among the membership. CCPs are also subject to a special regulatory regime. Consequently, CCPs are deemed to be low-risk counterparties, for which reason, they have a much lower regulatory counterparty risk weight.
- The reduction of risk by the centralized netting of risk exposures.
- The reduction of risk by variation margining (several times a day) to eliminate current or mark-to-market exposure.
- Risk management practices that are likely to be more rigorous than those of most market users.
- The reduction of balance sheets through netting.
- Operational efficiencies from the netting of payments and deliveries.

For these reasons, regulators wish to encourage the migration of as much financial activity as possible to CCPs in order to reduce the systemic risk arising from the uncoordinated response of the market to a default. In the case of standardized OTC derivatives, use of a CCP is mandatory. However, there are a

number of drawbacks to the use of CCPs, which regulators need (and are generally attempting) to address:

- As a higher proportion of trading is cleared across CCPs, more and more credit, liquidity and operational risks will be concentrated in these institutions, which will themselves become potential sources of systemic risk.
- Banks will have to apply credit limits to CCPs, taking account of the fact that, if they are members, they will also have contributed resources upfront and accepted contingent obligations to help support the CCP as a crisis becomes more severe. These limits may constrain market liquidity.
- Greater use of CCPs means greater collective reliance on a limited range of risk management methodologies, which may synchronise reactions to news (through changes in haircuts or collateral eligibility) and generate pro-cyclical shocks to the financial system. Strict haircutting by CCPs arguably had such an effect on Greece, Ireland, Italy, Portugal and Spain in 2011.
- Initial margins applied by CCPs can change, even if the size of the underlying position does not. This exposes members to unexpected calls on their resources and may be a source of *pro-cyclicality* in the market ([see question 32](#)).
- Although CCPs apply more rigorous risk management practices than many market users, their methodologies are often proprietary and therefore opaque, and it is not possible for members to scrutinize these methodologies, despite their critical dependence on them.
- Most financial assets are not eligible for clearing across CCPs. This includes most credit instruments. CCPs focus on liquid instruments in order to be able to value the risk, to be confident of being able to replace or hedge the positions of a defaulting member and to access sufficient turnover to be commercially viable.
- CCPs tend to specialise in particular products or asset classes. Use of CCPs therefore reduces the scope for netting across products, which institutions are currently able to do when they net on a bilateral basis.
- Because CCPs accept a limited range of collateral assets, usually only cash in major currencies and top-quality government bonds, they may contribute to a systemic shortage of prime collateral for bilateral transactions.
- The initial margins or haircuts imposed by CCPs are very high compared to current market practice, and the remuneration of cash margin paid to members is low. Consequently, CCPs are expensive to use. The extra cost of using CCPs will raise the cost of funding to all market-users.
- CCPs may not be suitable for all types of market user. The access criteria and cost represent barriers to entry for smaller firms. Netting is only cost-effective for institutions with two-way flows of business, in other words, for market intermediaries rather than end-investors. Many end-users are unused to variation margining and may be deterred from trading by the cost and effort.
- Netting requires standardization of financial instruments. Less customization means that residual risks have to be managed in the uncleared market or left with the end-user. Given that uncleared business will be subject to higher regulatory capital requirements (in order to encourage migration, where possible, to CCPs), the latter outcome may be common. To this extent, financial markets will be constrained from their essential task of managing financial risks and allowing non-bank financial and non-financial institutions to focus on their core business.

During the crisis that erupted in 2007, CCP clearing helped to preserve access to the repo market for banks from some peripheral Eurozone countries who were being squeezed out of the uncleared market by other banks cutting their risk limits on these countries.

The principal CCPs clearing repos in Europe are LCH Ltd in the UK, LCH SA in France, Eurex Clearing in Germany, CC&G in Italy and BME Clearing (formerly MEFF) in Spain.

CCPs clear a very significant proportion of the European repo market. The ICMA's semi-annual survey of the European repo market suggests that about 30% of outstanding repos by value are cleared across a

CCP. The proportion of repo turnover cleared across a CCP is likely to be even higher because the repos cleared in CCP tend to be short-term transactions and are therefore relatively understated in measures of outstanding volume (the ECB's money market survey suggests in the order of about two-thirds for euro-denominated repos).

Most CCP-cleared repos are negotiated on *automatic repo trading systems (ATS)* such as NEX Markets (formerly BrokerTec), Eurex Repo and MTS. However, repo negotiated directly between parties or via a voice-broker can also be registered with a CCP post trade.

28. What happens to repo transactions when interest rates go negative?

Following the global financial crisis which erupted in 2007, various rates of return in Europe started to become negative. Since 2014, negative rates have become persistent and widespread. Initially, many cash investors have been reluctant to accept negative rates, including parties to repo transactions being remunerated on deposits of cash margin and on income due on securities they have given as collateral.

Before the crisis, repo was the only financial instrument which paid a rate of return that could become negative under normal market conditions. Negative repo rates can happen when a particular collateral security is subject to exceptional borrowing demand and/or reduced supply in the repo market. In order to borrow these securities, buyers have to tempt potential sellers with cheap cash. 'Cheap' means a repo rate less than the GC repo rate. When the repo rate on a particular collateral asset falls below the GC repo rate ([see question 8](#)), that asset is said to have gone 'on special' ([see question 9](#)).

In the case of very special collateral, the repo rate can fall so far that it becomes negative. This naturally happens more frequently when the GC repo rate is already close to zero, as there is less distance for a special repo rate to fall in order to become negative.

During periods of financial stress in Europe, GC repo rates in several currencies became negative. This meant that most, if not all, securities in a particular currency were subject to exceptional demand. Typically, these securities were the government bonds of strong economies and were strongly sought after because they were seen as 'safe haven' assets.

Since 2014, negative rates have also been driven by the exceptional lending extended by the ECB and other European central banks in order to try to head off deflation, as well as regulatory disincentives to wholesale deposit-taking by banks (who try to deter depositors by quoting negative interest rates).

What does a negative repo rate mean?

A negative repo rate means that the buyer (who is lending cash) effectively pays interest to the seller (who is borrowing cash). For example, consider a one-week repo with a purchase price of EUR 10 million at a repo rate of -0.50%. The repurchase price will be:

$$10,000,000 * (-0.50 \times 7/100 \times 360) = 9,999,027.78$$

The buyer (cash lender) pays the purchase price of 10,000,000 and receives the repurchase price of 9,999,027.78, therefore making a loss; whereas the seller (cash borrower) receives the purchase price of 10,000,000 and pays the repurchase price of 9,999,027.78, therefore making a gain.

Problems caused by negative rates for repo transactions

These problems fall into two categories:

- Difficulties arising from the fact that standard repo contracts --- such as the GMRA --- have been drafted under the implicit assumption that GC repo rates would only ever be positive. When GC repo rates are negative, problems arise:
 - In the case of the early termination of a buy/sell-back following a default or in calculating the exposure on the transaction for the purpose of variation margining, where the payment of a coupon, dividend and other income on collateral is assumed to be reinvested at the repo rate on the transaction before being passed to the seller by means of a reduction in the repurchase price (in lieu of a manufactured payment).
 - Where parties have agreed to use a repo rate as the interest rate to be paid on cash margin.
 - Because a negative repo rate creates a perverse incentive to the seller to fail to deliver collateral on the purchase date.
- Initial disagreements between parties, due to the novelty of negative interest rates in general, over the interest rate to be paid on cash margin.

The reinvestment rate on coupons, dividends and other income payments on collateral during the term of a buy/sell-back which is closed out following an event of default or used in the calculation of net exposure for the purpose of margin maintenance

When income is paid on collateral in a repo, it is paid to the buyer, who is the legal owner. But the buyer is obliged to make an equivalent payment to the seller. In a repurchase transaction, the payment is due immediately and is often called a 'manufactured payment' ([see question 22](#)). But in a buy/sell-back, this payment is deferred until the repurchase date, when it is deducted from the repurchase price. In the interim, the buyer is obliged to reinvest the value of the payment in order to compensate the seller for the delay in reimbursement. If (1) such a buy/sell-back is terminated because of a default by one of the parties or (2) the exposure on the transaction is being calculated for the purpose of variation margining, a reinvestment rate has to be assumed. The reinvestment rate is given in the formula for the Sell Back Price (which is equivalent to the repurchase price) in the Buy/Sell-Back Annex of the GMRA (see paragraph 2(a)(iii)(y)):

$$(P + AI + D) - (IR + C)$$

where:

P Purchase Price – ie the clean price of collateral in the case of a buy/sell-back.

AI amount equal to Accrued Interest at the Purchase Date, paid under paragraph 3(f) of the Buy/Sell-Back Annex – which is coupon interest accrued on the collateral security since the last income payment date.

D Sell Back Differential (equivalent to repo interest).

IR amount of any coupon income in respect of the Purchased Securities payable by the issuer on or, in the case of registered Securities, by reference to, any date falling between the Purchase Date and the Repurchase Date – which is a coupon, dividend or other income paid during the term of the buy/sell-back.

C aggregate amount obtained by daily application of the Pricing Rate for such Buy/Sell Back Transaction to any such income from (and including) the date of payment by the issuer to (but excluding) the date of calculation – which is the reinvestment income on the income payment calculated at the repo rate on the buy/sell-back.

If the repo rate (C) is negative solely because the collateral is special, it is not appropriate to use it as a cash reinvestment rate. However, unless the parties agree to amend this formula, they will be obliged to follow it.

In practice, this problem may not be significant for parties who are active dealers in buy/sell-backs, given the likely alternation in the direction of underlying positions and payments of income, as well as the likely infrequency of income payments.

Where the interest rate to be paid on cash margins is a repo rate

Under paragraph 4(f) of the GMRA, parties holding cash margin are obliged to pay interest “at such rate, payable at such times, as may be specified in Annex I... or otherwise agreed between the parties...” Parties could have agreed to use the repo rate on the underlying transaction, particularly where that transaction is being margined in isolation. In the first case, if the agreed repo rate goes on special --- in other words, if it falls below the GC repo rate --- that rate is no longer representative of the going rate for cash reinvestment. The spread between a special repo rate and the GC repo rate represents a borrowing fee for the specific collateral asset. Using a special repo rate as a cash investment rate is therefore implicitly charging a fee that has nothing to do with the value of cash. Accordingly, the use of a special repo rate violates the principle that the use of a security as collateral in a repo should not cause the seller to gain or lose on his investment in that security as a consequence of having repoed it out. However, whatever the economic argument, a party cannot unilaterally change the cash reinvestment rate previously agreed with its counterparty. It must seek to negotiate a new interest rate with the counterparty.

The perverse incentive created by negative repo rates to sellers to fail to deliver on the purchase date

If a seller fails to deliver collateral on the purchase date of a repo, he will not receive or be able to retain the purchase price until he does deliver. However, the seller will remain obliged to pay repo interest to the buyer, even if he delivers the collateral late and therefore has delayed use of the cash. Having to pay interest without having the use of cash is a cost that provides an incentive to the seller to remedy a failure to deliver as well as providing compensation to the buyer.

However, if the repo rate on a particular transaction is negative (whether this is because the collateral is on special or because GC repo rates have gone negative), the automatic cost of failing to deliver collateral becomes a perverse incentive to fail. This is because the repo interest due to be paid is negative, which means it has to be paid by the buyer, despite the fail being caused by the seller. Thus, the seller will be rewarded for his failure!¹¹

To eliminate the perverse incentive arising from negative repo rates, the ICMA issued a recommendation in November 2004 on behalf of the then European Repo Council (ERC) that, when the seller fails to deliver on the purchase date of a negative rate repo, the repo rate should automatically reset to zero until the failure is cured, while the buyer has the right to terminate the failed transaction at any time. Subsequently, this recommendation has been included as an optional supplementary condition in Annex I of the GMRA 2011. For parties using the GMRA 2000, it is best practice to adopt the ICMA recommendation by an agreed amendment to the GMRA or, if that is not practicable, by inclusion in confirmations.

¹¹ *Even at zero or low positive repo rates, there is a perverse incentive on the Seller to fail, inasmuch as a failure to deliver creates a free option on the repo rate. If the repo rate rises subsequently, the Seller can cure the fail with collateral borrowed through a separate reverse repo. He will owe interest at the original repo rate on the cash he receives on repo on which he has just delivered but will receive interest at the new higher rate on the cash he gives on the reverse repo.*

Disagreements between parties due to the novelty of negative interest rates

The negative interest rates that appeared following the crisis that erupted in 2007 were historically unusual, episodic in appearance and not expected to persist. Many parties therefore felt that it was inappropriate to apply negative rates to cash margin paid under repo agreements and to the reinvestment of income payments on collateral in buy/sell-back.

However, as already explained, whatever the economic argument, a party cannot unilaterally change the cash reinvestment rate previously agreed with its counterparty. It must seek to negotiate a new interest rate with the counterparty.

Since 2014, it has become apparent that negative interest rates are likely to persist for some time in many currencies. They have become a 'new normal'. It is now no longer possible to sustain an argument that negative interest rates are some sort of aberration.

What is the most appropriate cash investment rate for use in repo transactions?

The most appropriate rate for the reinvestment of cash margin and collateral income in buy/sell-backs is the GC repo rate for the currency. In the case of cash margin, this should be the overnight GC repo rate, given that margin can change daily. In the case of the reinvestment of collateral income in buy/sell-backs, the theoretical choice would be a GC rate for a tenor equal to the interval until the repurchase date (the reinvestment period). However, GC repo rates for some tenors may be difficult to agree, in which case, the next best choice would also be the overnight GC repo rate (depending on the perceived roll-over risk).

If it is not possible to agree on the fixing of an overnight GC repo rate, the most pragmatic alternative would be to use a recognized overnight unsecured interbank deposit rate benchmark. Under normal market conditions, there should not be much difference between overnight secured and unsecured rates. And in practice, such overnight indexes are already commonly used in the repo market as cash reinvestment rates.

Topical issues

29. What has been the regulatory response in the repo market to the Great Financial Crisis?

The international regulatory response to the Great Financial Crisis that erupted in 2007 has been coordinated by the G-20's *Financial Stability Board (FSB)*. The FSB identified a number of financial stability risks in the use of *securities financing transactions (SFTs)*, which it defines to include repo, securities lending, commodities lending and margin lending. These have been grouped into risks (1) affecting the regular banking system, (2) arising in the so-called 'shadow banking' sector, and (3) spanning both sectors. Shadow banking is defined as market finance involving credit intermediation or 'bank-like' activities by non-banks.

1 Risks to regular banking

Those risks arising from SFTs which are seen as threats to the regular banking system have been addressed through broad reforms of the Basel international banking supervision regime.

- The **Leverage Ratio** was introduced to stop the build-up of excessive leverage in the market by imposing a simple backstop to the traditional Basel risk-weighted capital calculations, which the FSB believe did not accurately reflect the degree of leverage in the financial system due to defects in risk modelling and data, and regulatory arbitrage. The ratio is between Tier 1 capital and exposures calculated from balance sheet positions in: traditional instruments like deposits; SFT like repo; derivatives; and other off-balance sheet positions such as guarantees. For the purpose of calculating the Leverage Ratio, positions are not risk-weighted, no account is taken of collateralisation and there are severe restrictions on netting positions other than in derivatives.
- The **Liquidity Coverage Ratio (LCR)** was introduced to tackle *market liquidity risk* --- the possibility of the whole market drying up --- by ensuring firms have a stock of *high-quality liquid assets (HQLA)* to sell or repo out which provides a buffer that is sufficient to cover projected net cash outflows during a hypothetical 30-day market crisis. To calculate the stock of HQLA available to a firm, the authorities list which assets qualify as HQLA and grade them by quality, prescribing haircuts and concentration limits for lower-grade HQLA. To calculate projected net cash outflows in a stressed market, the authorities prescribe: (1) inflow factors to be applied to each type of asset and in-the-money off-balance sheet position (ie all receivables) maturing within 31 days to estimate the extent to which these positions are not likely to be rolled over or extended; and (2) run-off factors to be applied to each type of liability and out-of-the-money off-balance sheet position (ie all payables) maturing within 31 days to estimate the extent to which these positions are not likely to be rolled over or terminated. The available stock of HQLA must exceed any excess of estimated receivables over estimated payables.
- The **Net Stable Funding Ratio (NSFR)** is being introduced to address *funding liquidity risk* --- arising because of asset-liability mismatches between long-term assets and short-term liabilities and because of wholesale funding of leveraged non-banks by banks --- by ensuring that firms have sufficient sources of 'stable' funding to sustain the financing of their assets and off-balance sheet positions during a year-long market crisis. Each type of asset and in-the-money off-balance sheet position is prescribed a *required stable funding weight*, which measures its expected liquidity in a crisis and the importance attached by the authorities to this type of asset continuing to be financed. Each type of liability and out-of-the-money off-balance sheet position is prescribed an *available stable funding weight*, which measures the likelihood of it being able to be rolled over during a crisis. The amount of available stable funding must exceed the amount of required stable funding for each legal entity.

2 Pure shadow banking risks

- The FSB was concerned that non-banks can use repos to conduct the ‘bank-like’ activities of **maturity and liquidity transformation** outside the regular banking system and beyond the reach of prudential liquidity and capital regulation. This means the financing of longer-term and/or less liquid assets with leveraged short-term and more liquid ‘money-like’ liabilities. But if the assets being financed become very illiquid or lose value, their worth as collateral will be reduced or disappear altogether, forcing non-banks to seek other sources of financing. In contrast to banks, non-banks are generally not directly or permanently supported by any official safety net (deposit insurance or guarantees, and access to central banks as lenders of last resort). Instead, they are reliant on private sector guarantees (such as back-up lines for asset-backed commercial paper (ABCP), credit guarantees, and credit default swaps (CDS) provided by insurers, credit derivative product companies and credit hedge funds). In systemic crises, private credit and liquidity support can prove ineffective, as providers are unable to perform due to stress on their own balance sheets, potentially leading to bank-like runs on confidence. These are thought by the FSB to be more likely in shadow banking because the wholesale or institutional cash which finances this sector, in contrast to the retail cash which finances much of regular banking, is seen as unstable (being described as ‘well-informed, herd-like and fickle’). Moreover, shadow banks are seen as more dependent on wholesale sources of financing than traditional banks are reliant on retail deposits. Consequently, wholesale funding is seen as inherently fragile. It is often compared with the *free banking* system of the US in the 19th and early 20th century. And, whereas banks are subject to a well-developed system of prudential regulation, the shadow banking system and funding through wholesale market instruments like repo are seen by the FSB as being subject to less stringent, or no, oversight.
- The vulnerability of shadow banking to a run on confidence can be accentuated by **excessive leverage** built up through the repetitive use of repos (eg repoing out assets for cash to buy more assets, which can then be repoed out for more cash and so on).

3 Risks spanning regular and shadow banking

- Fluctuations in the value of assets driven by the financial cycle tend to be self-reinforcing. Thus, falling asset values reduce the net worth, creditworthiness and borrowing capacity of borrowers, who may as a result be forced to deleverage, which would amplify the fall in asset values and so on. Rising asset values would trigger the opposite process. The propensity for cycles to reinforce themselves is called **pro-cyclicality**. Regulators are concerned that collateralised financing, including repo, may be more pro-cyclical than traditional unsecured wholesale financing because of the direct relationship of borrowing capacity to the value of the assets used as collateral and because additional feedback loops are introduced by collateral management procedures such as haircuts and variation margining, which can create feedbacks that amplify financial cycles, alternately accentuating up-cycles and down-cycles. The concern is that a surge in confidence is reflected in rising asset prices, reduced or reversed variation margin calls and shallower haircuts, all of which increase firms’ net worth, creditworthiness and borrowing capacity, which will tend to increase asset purchases and boost asset prices, so reinforcing the up-cycle. A collapse in confidence, on the other hand, will trigger a fall in asset prices, increased variation margin calls and deeper haircuts, or even the exclusion of assets from the pool of eligible collateral, which decreases firms’ net worth, creditworthiness and financing capacity, which will tend to decrease asset purchases and depress asset prices, so reinforcing the down-cycle. In addition, inadequate collateral management practices at some firms, such as infrequent variation margin calls and insufficient haircuts, particularly for illiquid collateral, can amplify pro-cyclicality by encouraging firms to belatedly and dramatically tighten up lending practices after a crisis has broken. This was believed to have happened in the US MBS market during the Great Financial Crisis. Pro-cyclicality may also be amplified by the increased

sensitivity of market participants to counterparty credit risk in stressed conditions, which may intensify strains already present in markets.

- If a run on repo in the shadow banking sector is accompanied by defaults, non-bank lenders may be forced into a **fire sale** of long-term assets taken as collateral. The driver may be liquidity needs, regulatory restrictions on holding longer-term assets or limited collateral management capacity among non-bank lenders. For example, money market mutual funds can take long-term bonds as collateral in repo but cannot hold them directly as investments so must immediately sell off any bonds received as a result of a default. Such fire sales would amplify market stress and spread problems outside the shadow banking sector by impacting the wider asset markets.
- The impact of a run on repo in the shadow banking sector may be propagated by the increased **interconnectedness** of large market participants arising from the formation of chains of collateral re-use. These chains are potential channels of **contagion** down which sudden losses of confidence and failures to deliver re-used collateral may be propagated. The risk of contagion could be increased by the scale of exposures created by excessive leverage. Although variation margining and netting after default should normally minimise the risk, these safeguards could be overwhelmed by sudden jumps in collateral value between variation margining or legal challenges to netting agreements. There is also concern that complex interconnected systems are inherently unstable.¹²
- Regulators believe that the lack of instrument-specific data has contributed to the **opacity** of the repo market, which has prevented their detection of emerging risks. Opacity is believed to be increased by the complexity of chains of re-use.

4 Measures to address the systemic risks arising from repos

The FSB set out three approaches to tackling possible systemic risk arising from repos:

- improvements in **transparency**
- improving market practice with regard to **collateral management**
- reinforcing repo **market structure**

4.1 Improvements in transparency

4.1.1 Increasing regulatory reporting

The FSB decided that regulatory authorities need more information to help detect and monitor systemic risks as they are building up. Their concern is that direct exposures between large institutions would mean the failure of one institution would destabilise other large institutions by making them more vulnerable to a liquidity shortage, particularly if their repo financing was excessively short-term. To monitor such risks, they proposed the collection of more granular data on repo (and other SFTs) between large international financial institutions, in order to detect major bilateral linkages as well as common exposures to and dependencies on countries, sectors and financial instruments. They envisaged leveraging the work of the FSB Data Gaps Group, which had been established to build a consistent global framework to pool and share data on major bilateral credit linkages between large international financial institutions. The FSB proposed to aggregate national and regional data to provide a consistent global picture of exposures.

¹² *Attempts to model financial networks as a basis for regulatory analysis and prescription need to be treated with caution. Work to date is entirely theoretical and not calibrated against any real interbank market. The results of theoretical modelling are very sensitive to parameters such as the degree to which banks will withdraw credit lines from other banks in a crisis. This is usually set to 100%, whereas anecdotal evidence suggests withdrawal tends to be gradual and only becomes total immediately prior to a default. When this parameter is relaxed, the impact on models tends to be dramatic.*

For repo, the FSB working group on SFTs identified two alternative sets of potentially useful data: eight transaction-level data elements to be collected by national or regional trade repositories; or seven firm-level data elements that could also be collected by survey or regulatory reporting.

In the EU, regulatory reporting of repo has been mandated under the Securities Financing Transactions Regulation (SFTR), which dramatically expands the FSB's data list. In part, this reflects the authorities' belief that they need to 'learn' about the repo market through research and because some authorities originally (but incorrectly) believed that the necessary data was readily available from *central securities depositories (CSDs)*. The ECB and Bank of England have imposed separate money market reporting regimes in advance of SFTR.

The FSB propose to publish some aggregated information from the data they collect.

4.1.2 Improvements in corporate disclosure

The FSB also saw a need for accounting standards bodies to improve the disclosure about repo (and other SFT) activities in firms' financial statements, including greater consistency in reporting across firms and jurisdictions, speedier publication, more detail and measurement of risk rather than just nominal size. The FSB proposed a 'sources and uses of securities collateral' statement (from whence collateral is received and to where it is despatched) as well as more qualitative information on counterparty concentration, maturity profile, composition of collateral, haircuts, re-use of collateral, client business and credit exposures, all broken down by type of SFT.

4.1.3 Improvements in reporting by fund-managers to end-investors

The FSB believed that investors should be informed frequently of the degree to which investment managers leverage their portfolios through the use of repo in order for them to be able to better select investments on the basis of risk. They recommended the reporting of the amount of repo, repo maturity profile, repo currencies, repo rates, the top 10 collateral issues, types of collateral, collateral maturity profile, top 10 counterparties and location, re-use of collateral, use of CCPs or tri-party agents, number of custodians and holdings of assets by each, and use of segregated or omnibus accounts.

4.2 Improving market practice with regard to collateral management

4.2.1 Mandatory minimum haircuts for risky collateral assets in SFTs with the shadow banking sector

The FSB argued that collateral haircuts calculated over a whole financial cycle would remove the need for firms to increase haircuts when market conditions deteriorated, thus reducing pro-cyclicality. Higher haircuts were also seen as useful in restraining the build-up of leverage by progressively reducing the financing potential of collateral each time it is re-used.

The FSB proposal, since adopted by the Basel Committee on Banking Supervision, was for a set of floors under haircuts applied to non-centrally cleared repos against non-government bonds through which regulated financial intermediaries provide finance to shadow banks. The scope of the proposal includes collateral swaps constructed of back-to-back repo and reverse repo, as well as securities lending against cash collateral (unless the use of cash is restricted) and securities lending against non-cash collateral (unless the collateral cannot be re-used). After consultation, the haircuts were set in line with the standard supervisory haircuts applied under the Basel regime for the calculation of risk-weighted capital requirements.

Discussion is continuing on whether to extend the scope of mandatory minimum haircuts to all market participants, to include sovereign bonds and to use the floors as macro-prudential tools by changing them anti-cyclically in response to evolving financial conditions.

4.2.2 Minimum standards for methodologies to calculate haircuts

The FSB recommended that firms should calculate haircuts to cover, at a high level of confidence, the maximum expected decline in the market price of a collateral asset over a conservative liquidation horizon taking account of how much longer it would take transactions to be closed out in stressed conditions and the possible widening of bid-offer spreads. The price observation period should cover a least one past stress period.

It was also recommended that risks other than collateral price volatility should be taken into account by firms when calculating haircuts, such as large concentrations of collateral, wrong-way risk and any currency mismatches between cash and collateral, as well as the specific characteristics of each type of collateral, including asset type, issuer credit risk, structure, price sensitivity and residual maturity. Haircuts should also take account of the frequency of valuation and variation margining.

4.2.3 Minimum regulatory standards for valuation and management of collateral

The FSB recommended that firms should be subject to minimum regulatory standards in their jurisdictions which:

- restrict them to taking collateral which they could hold after a counterparty default without breaching legal or regulatory restrictions and which they are able to value, manage and liquidate in an orderly way;
- require them to have contingency plans to deal with the failure of their largest counterparties in both normal and stressed markets;
- require at least daily marking-to-market and variation margining of material net exposures.

4.3 Reinforcing repo market structure

4.3.1 Mandatory central clearing of SFT

In the aftermath of the Great Financial Crisis, proposals were made for the mandatory central clearing across CCPs of all repos, similar to the mandatory central clearing of standardised OTC derivatives. However, the FSB recognised that there were problems in trying to impose a blanket requirement for central clearing across all parts of the repo market. They also believed that there were sufficiently strong incentives for central clearing already in place in the inter-dealer market for high-quality collateral but that repos with customers and against lower quality collateral would be difficult to clear. It was left to regional and national jurisdictions to assess the situation in their own markets.

4.3.2 Amending bankruptcy law treatment of repo

The FSB considered academic arguments that repo should lose its exemption from the automatic stay on the enforcement of collateral and other measures imposed by insolvency regimes. Some academics claimed that the so-called *safe harbour* status conferred on repo by its exemption increases its 'money-like' status, which encourages the rapid growth of cheap but potentially unstable short-term funding; is likely to trigger fire sales after a default; and reduces the incentive of creditors to monitor counterparty credit risk ([see question 3](#)).

The problem with this proposal was that only repos in the US are specifically exempt from the insolvency regime. In other jurisdictions, including Europe, repo works by means of the transfer of title to collateral, so restrictions on the disposal of collateral would interfere with basic property rights. It is worth noting that a stay on enforcement of collateral has since been imposed in most jurisdictions under recovery and resolution regimes but only for a very short period while the authorities assess the possibility of rescuing, reorganising or breaking up a systemically-important firm in distress in an orderly manner.

4.3.3 Repo resolution authorities

The FSB also examined academic proposals for an official body to buy collateral at market prices less pre-defined haircuts from the repo creditors of a firm in default and subsequently sell off the collateral in an orderly manner when the market recovered, with profits or losses being attributed to the creditors. The FSB decided the practical and legal challenges were too great.

30. What is 'short selling' and what is the role of repo?

Short-selling is the sale of a security which the seller has not yet purchased. In due course, the short-seller will have to buy the borrowed security back from someone else in the market, in order to return it to the lender. Between selling and then buying back the security, the short-seller is said to have a *short position*. If the price of the security falls before it is bought back from the market, the short position will yield a capital gain (and vice versa). Short-sellers can borrow securities in the repo or securities lending markets.

Short-selling allows essential functions to be performed in the financial market:

- **Market-making.** Short-selling allows a market-maker to continuously quote prices for securities that he does not hold in inventory. If an investor buys one of these securities, the market-maker can be sure of being able to deliver, because he knows he can borrow it if he is unable or unwilling to immediately buy that security from someone else in the market. The liquidity thus provided reduces risk for investors by allowing them to buy on demand, which in turn reduces the cost of borrowing for issuers. Several debt management agencies offer special repo or securities lending facilities to market-makers to allow them to borrow whenever the available supply in the market is inadequate.
- **Hedging.** A long position in one security can be hedged by a short position in a similar security, so that, as prices fluctuate, changes in the value of one position will be substantially offset by opposite changes in the value of the other. Hedging allows market-makers in the secondary market to hedge the interest rate risk on inventory and temporary long positions accumulated through buying. It also allows the underwriting of new bond issues and is therefore essential to the primary market both for government bonds and corporate bonds.
- **Traders take short positions in assets they believe are over-priced.** This is essential to efficient price discovery and the prevention of asset price bubbles.

Short-selling incurs significant risks and costs. It must therefore be undertaken cautiously.

- **Risk.** The price of a security sold short may rise, in which case, it will have to be bought back at a price higher than that at which it was sold, which means a capital loss. In theory, there is no limit to where the price of a security can rise, so the possible capital loss on a short position is potentially unlimited. On the other hand, since the price of a security can only fall to zero, there is a limit to the possible capital gain on a short position. In this respect, taking a short position can be compared to the risky practice of writing a call option.
- **Running cost.** A daily loss will accrue on a short position at a rate equal to the coupon on the security sold short (since the daily accrual of coupon interest on the security will add to the

eventual cost of buying it back) less the repo rate on the cash lent in the reverse repo through which the security has been borrowed (borrowing a security in a reverse repo means investing cash and earning the repo rate). This differential is known as the *cost of carry*. Coupons are usually higher than repo rates because bonds are longer-term and repos are short-term, which means the cost of carry is typically a loss to a short-seller.

- Penalty cost. A short-seller who is unable to buy back a security from the market and return it to the lender may be penalised for failing to deliver and may have to compensate customers in order to keep their business.

Borrowing to cover short positions can be arranged before or after a short sale is agreed, but should be done before delivery is due. Short-selling without borrowing before delivery is said to be *uncovered* or *naked*. Concern is sometimes expressed that uncovered short-selling permits unlimited selling of a security, allowing speculative forces to massively leverage negative sentiment and manipulate the market. However, many, if not all, uncovered short positions are either temporary and/or unintentional. Temporary uncovered short positions are usually only intraday and arise because it is more convenient to borrow after a short sale has been agreed (otherwise, there is a risk of borrowing and then not selling short). Unintentional uncovered short positions arise when it turns out to be difficult to borrow securities in the market because of lack of supply, or because lenders fail to deliver (which is often due to inefficient clearing and settlement, particularly of cross-border transactions).

Uncovered short-selling becomes a market abuse in the case where a seller has no intention of borrowing and delivering the securities that he has sold short. However, in contrast to the equity markets of the past, this is difficult to do in fixed-income markets, given that it will always result in failure to deliver a security, which incurs costs and penalties, and would be unacceptable to the counterparties expecting delivery. Anyone who has failed to receive a delivery of bonds that he has purchased in the cash market also has recourse to *buy-ins*, which allow him to buy the bonds from a third party and pass any extra costs (which can be significant) to the seller who has failed to deliver. There are different fail management mechanisms in the repo market ([see question 25](#)).

In the EU, the *EU Short Selling Regulation* which came into force in November 2012 prohibits uncovered short-selling of government bonds or listed shares in Europe, other than by market-makers or banks involved in the issuance of government bonds.

31. Do repos allow for infinite leverage?

In theory, one could buy a security with one's own funds and then repo out that security to raise more funds, which could be used to buy another security, which could be repoed out for yet more funds, and so on, ad infinitum.

However, in practice, this infinite multiplier would come up against the credit limits imposed by all banks on their counterparties and regulatory capital constraints (including new measures such as the Basel Leverage Ratio). Even if the borrower tried to borrow from different firms, the inflation of its balance sheet would soon become visible and deter potential lenders. There are also practical constraints such as the impact of haircuts or initial margins, where the purchase price is set below the market value of collateral, reducing its financing potential.

32. Do changes in haircuts/margins exacerbate pro-cyclicality?

Pro-cyclicality means a propensity to amplify cycles of financial activity. Policy-makers and regulators have expressed concern that increases in haircuts and initial margins demanded by collateral-takers (including buyers in repos) in response to a cyclical deterioration in credit and liquidity conditions, while rational for the individual parties, may worsen the problem for the market as a whole. On the other hand, reductions in haircuts and initial margins in response to a cyclical improvement in credit and liquidity conditions may add fuel to market exuberance.

The postulated dynamic driving pro-cyclicality is a haircut-asset valuation spiral. In a down-cycle, haircuts/initial margins may be increased in response to an initial loss of confidence, perhaps following bad news. In the manner of a credit multiplier in reverse, this would reduce the liquidity of market users, who may sell assets in response. Asset sales would reduce the value of and increase the risk on collateral, as well as eroding the net worth of borrowers, possibly causing haircuts/initial margins to be increased again as well as generating variation margin calls on the borrowers. And so on. In an up-cycle, haircuts/initial margins may be reduced in response to growing confidence. This would improve the liquidity of market users, who may buy assets in response. Asset purchases would boost the value of and reduce the risk on collateral, as well as enhancing the net worth of borrowers, possibly causing haircuts/initial margins to be decreased again as well as generating variation margins calls in favour of the borrowers. And so on.

This hypothetical scenario underpins a broader claim that the market crisis of 2007-09 was essentially, if not entirely, a “run on repo”. The main proponents have been two US academics, Gorton and Metrick ([see question 35](#)). However, they based their hypothesis on a single set of data on collateral haircuts taken on highly structured securities by a single anonymous US broker-dealer. This type of collateral constitutes a very small part of the repo market. It has been argued that it is naïve to extrapolate events in this narrow sector of the US repo market to the entire global repo market without any calibration of the importance of such collateral. Such an extrapolation of the Gorton-Metrick hypothesis has been refuted by the evidence of other studies, including that gathered by a Study Group of the Committee on the Global Financial System (CGFS) at the BIS, which observed that haircuts were generally stable during the 2007-09 crisis and that credit was very largely tightened by the reduction or closing of credit limits and the shortening of lending. Nevertheless, the Gorton-Metrick thesis has spawned proposals for mandatory minimum haircuts as a macroprudential regulation to dampen the pro-cyclicality ascribed to haircuts and initial margins (as well as to reduce leverage). The idea is that, if haircuts are deep enough before a crisis, they will remain stable across a financial cycle as there will be no need for the market to increase them in response to a crisis.

Ironically, there is a counter-argument that deep haircuts will allow creditors to run from the market earlier, as deep haircuts will be able them to better absorb fire sale losses. In addition, there is criticism of the implicit assumption underlying haircuts that the borrower (repo seller) will always be the risky counterparty. Defaults in the Russian repo market a few years ago were by repo buyers who benefited from deep haircuts.

A detailed discussion of the role of [Haircuts and initial margins in the repo market](#) was published by the ICMA in February 2012.

33. Do banks that lend through repo receive preferential treatment over other creditors?

Some commentators have claimed that parties receiving collateral through repos have an unfair priority over other creditors, particularly unsecured creditors, in the event of a default by the collateral-giver. However, this perception is based on the legal form of collateralisation of US repo, where US Treasury and Agency securities can (if a court rejects the argument that title to collateral has been transferred) be given as collateral through a pledge which is exempt from the provisions of the Bankruptcy Code that normally apply to pledged collateral, in particular, the stay on the enforcement of rights to collateral in an insolvency. In Europe and elsewhere, the legal form of a repo involves purely the outright sale of legal title to collateral. The buyer in a repo therefore has exactly the same rights as someone who has purchased securities in an outright transaction. There is no preference. Unfortunately, some commentators and European regulators have assumed that the legal structure of all repo markets is identical to that of the US ([see question 14](#)).

34. Does repo ‘encumber’ a borrower’s assets?

If a borrower pledges collateral to a lender, legal title to the assets remains with the borrower, unless and until he defaults on the loan. As a result, the assets are said to have been *encumbered* by the legal interest in the assets given to the lender. This means that, in the event of a default by the borrower, his unsecured creditors cannot benefit from the liquidation of these assets.

The argument that repo encumbers assets is largely illusory. Consider a bank with assets of 10 in the form of bonds funded with liabilities in the form of 5 of equity and 5 of unsecured deposits. Assume the bank then repos out the bonds for cash of 10. On its balance sheet, it now has 20 of assets in the form of 10 of now encumbered bonds (as they have been repoed out) and 10 in cash. Against these assets, the bank has 20 of liabilities in the form of 5 of equity, 5 of unsecured deposits and 10 of repo debt. Assume the bank then uses the borrowed cash to buy 10 more in bonds, so that it still has 20 of assets but now in the form of 20 in bonds and 20 of liabilities in the same form as before. 10 of the bonds remain encumbered. In the event of a default by the bank, its 10 of repo debt would be netted off against the 10 in cash owed to the repo counterparty. This would leave the bank with the same 10 of assets (in the form of 10 unencumbered bonds) that it had at the start to cover the 5 of unsecured deposits. The bank’s unsecured depositors are as well protected as they were before the bank repoed out the bonds, even though the ratio of encumbered assets to total assets has risen from zero to 50%. The example is summarised in the table below.

assets			liabilities			ratio of encumbered assets to total assets
cash	bonds	of which: encumbered	equity	deposits	repo debt	
	10		5	5	0	0/10 = 0%
10	10	10	5	5	10	10/20 = 50%
	20	10	5	5	10	10/20 = 50%

Those unfamiliar with repo are sometimes misled by its accounting treatment. Assets sold as collateral in a repo remain on the balance sheet of the seller, even though legal title to those assets has been transferred. This could give the appearance that the assets would be available to other creditors in the event of default. The collateral does not leave the balance sheet of the seller because he is committed to buy back the collateral at the original price plus repo interest, which means that the seller retains the risk and return on the collateral (if the market price of the collateral falls during the repo, the seller has to buy back at a loss, and vice versa). Balance sheets are intended to measure the economic substance

of transactions, not the legal form. If collateral was moved off the balance sheet of the seller, it would disguise his leverage (this is what Lehman Brothers and MF Global did). Under International Financial Reporting Standards (IFRS), assets sold or pledged as collateral are kept on the balance sheet of the seller but are distinguished from other assets, so the situation is clearly explained to investors ([see question 37](#)).

The one occasion on which repos can really encumber assets is when there is a haircut or initial margin imposed on the collateral, as there is no cash received in exchange for those assets. In addition, potential variation margin calls can be seen as contingent asset encumbrance. However, this is a marginal encumbrance. Ironically, official proposals for a minimum mandatory haircut on collateral may make encumbrance a more material issue.

35. Was a 'run on repo' the cause of the Great Financial Crisis in 2007?

This phrase was coined by two academics, Gary Gorton and Andrew Metrick of Harvard University, in a paper published in 2010, which has had a major influence on the regulatory debate on the procyclicality of haircuts, spawning the idea of a minimum mandatory haircut and changes to the treatment of repo in insolvency.¹³ Unfortunately, there are fundamental flaws in the calibration of their model.

Gorton and Metrick argue that the Great Financial Crisis of 2007-08 was akin to a traditional banking deposit panic but was precipitated specifically by a run on the repo market, which they describe as being part of the 'securitised banking' market. Securitised banking is defined as the business of packaging and re-selling loans, with repo as the source of funding. Gorton and Metrick propose that deepening haircuts reduced the value of collateral to such an extent that it forced massive deleveraging in the financial system. Firms from which repo funding was progressively withdrawn by the imposition of higher and higher haircuts were forced to deleverage by selling assets. The resulting fire sales amplified and aggravated the crisis. The importance attached to the Gorton and Metrick hypothesis derives in large part from the empirical evidence they employ in the form of a set of data series on collateral haircuts taken on 10 classes of highly structured securities by a large (but anonymous) US broker-dealer between 2007 and 2009.

The main shortcoming with Gorton and Metrick's data is that it only includes highly structured securities (ABS, RMBS, CMBS, CLO and CDO). Gorton and Metrick mistakenly assume that the collateral used in the US repo market is 'very often' securitized bonds. They offer no data on US Treasuries and Agencies, which constitute by far the largest pool of repo collateral in the US, and ignore evidence from the tri-party market, which may have accounted for almost two-thirds of outstanding US repo. This is significant because, although the US Task Force on Tri-Party Repo Infrastructure (2009) concluded that 'tri-party repo arrangements were at the center of the liquidity pressures faced by securities firms at the height of the financial crisis', they concluded that the available data suggested that initial margins in the tri-party repo market did not increase much during the crisis, if at all. They observed that, 'It appears that some tri-party repo investors prefer to stop financing a dealer rather than increase [initial] margins to protect themselves'. This point was also made by the BIS Committee on the Global Financial System (CGFS) Study Group. Gorton and Metrick ignore the reduction or closing of credit limits and the shortening of lending. There is also no recognition of the evaporation of unsecured credit. They are therefore simply incorrect to attribute the entire deleveraging of the US financial system and loss of liquidity in the US money market to the dynamics of the repo market in the form of deepening haircuts.

¹³ Gorton, Gary, & Andrew Metrick, *Securitized Banking and the Run on Repo* (9 November 2010).

While Gorton and Metrick's analysis may have overestimated the impact of haircuts/initial margins in the US market, critics claim that it says even less about the European repo market, which has a very different structure to the US market.

- Some 80% of collateral in the European repo market was government securities at the time. Structured securities were a very small component. Most structured securities in the European market are managed as tri-party repos. ICMA data suggests such collateral accounted for no more than 10% of tri-party repo, which itself was about 10% of the wider European repo market.
- The US market is largely overnight, whereas in Europe, only 18.3% of outstanding contracts were one-day maturities in June 2007 (ICMA survey). In a market dominated by one-day maturities, variation margin is redundant. Valuation changes will be reflected entirely in adjustments to haircuts/initial margins, which also factor in forward-looking risks, making for potentially more abrupt changes in collateral value than margin calls. In a market like Europe, the extended maturity distribution means variation margin is more significant and haircuts/initial margins will change less frequently.

It is therefore a serious mistake to extrapolate certain events in one small part of the US credit repo market into the entire global repo market. This can be demonstrated by quantifying the impact of changes in haircuts/initial margins in the European market. In a paper published by the ICMA in February 2012, an estimate was made of the likely impact over 2007-09 of changes in haircuts/initial margins in the European repo market using the results of the ICMA's semi-annual European repo market survey for June 2007 and June 2009, and the CGFS Study Group survey of haircuts.¹⁴ Even on the basis of conservative assumptions, the impact on the value of collateral of changes in haircuts/initial margins on repo balances is less than 3%, which is insignificant in terms of the scale of deleveraging seen over the same period (eg the headline totals of the ICMA survey dropped by 28.1%, from a peak of EUR 6,775 billion in June 2007 to EUR 4,868 billion in June 2009, and the maximum fall was 31.6% to December 2008). Although the estimations are necessarily approximate, the difference is of an order of magnitude, which seriously calls into question haircut spiral models such as Gorton and Metrick's as feasible explanations for the market crisis of 2007-09.

These doubts have been reinforced by a study by Krishnamurthy, Nagel and Orlov, who make the point that 'much of the discussion of the repo market has run ahead of our measurement of the repo market.'¹⁵ They derived a new data set from regulatory and industry sources on investment in the US repo market by money market mutual funds and securities lenders' cash reinvestment desks. These institutions are estimated to have provided some two-thirds of the cash borrowed by shadow banks in the US repo market in 2007. Krishnamurthy et al calculated that only some 3% of non-Agency MBS and ABS were financed by repo bought by money market mutual funds and securities lenders. Most of their repo collateral was US Treasuries or Agencies (80% for money market mutual funds and 65% for securities lenders). While there was a deterioration in repo terms (rates, maturities and haircuts) for structured security collateral, there was no contraction in purchases of repo against Treasuries and Agencies. Krishnamurthy et al also observed no increase in haircuts on Treasury and Agency collateral. Moreover, in the tri-party market, they measured only modest increases in haircuts for structured securities and corporate bonds, from 3-4% in 2007 to 5-7% in 2009, compared to the changes in Gorton and Metrick's data for structured securities in the bilateral repo market, which showed haircuts often rising from 0% to in excess of 50%. The evidence is once again that, rather than increasing haircuts, market users initially responded to the crisis by reducing or withdrawing credit lines, shortening the terms for which they were willing to lend and narrowing the range of eligible collateral. The conclusion is that repo was not key to the funding of shadow banking and had a modest impact on changes in aggregate funding conditions.

¹⁴ [Haircuts and initial margins in the repo market](#), ICMA (8 February 2012).

¹⁵ Krishnamurthy, Arvind, Stefan Nagel and Dmitry Orlov, *Sizing Up Repo*, Stanford University (November 2011).

Finally, it is worth noting that, during the Great Financial Crisis, although the repo market was not free of stress, it continued to function, in sharp contrast to the unsecured money market, which largely evaporated. Papadia and Välimäki estimate that, between 2008 and 2011, the unsecured eurozone money market shrank by EUR 327 billion, forcing the ECB into exceptional emergency lending in order to prevent a seizure of the financial system and serious damage to the real economy. In fact, the ECB lent EUR 115 billion. But growth in the repo market contributed another EUR 212 billion, without which, the burden on the ECB would have been dramatically greater.

36. Is repo a type of ‘shadow banking’?

‘Shadow banking’ is an unfortunately pejorative term which has been applied, since the Great Financial Crisis, to *market finance* (as opposed to *bank finance*). It is defined, for regulatory purposes, as traditional banking activity conducted by non-banks. The regulatory concern is that this bank-like activity falls partially or entirely outside the scope of prudential capital and liquidity regulation and beyond the safety nets provided by deposit protection or official lenders of last resort. Nevertheless, there are linkages and feedbacks into the regulated banking system. Moreover, credit intermediation in the shadow banking sector involves maturity and liquidity intermediation and the creation of leverage on a scale that could pose systemic risk. And because the process often takes place in stages, along complex chains of transactions between separate entities, and lacks safety nets, it is seen as particularly susceptible to contagion risk, which may amplify systemic risk. Complexity is also seen as making the repo market opaque. Moreover, it is argued that, because of the lack of safety nets, shadow banks have to rely on securities financing transactions (SFT), including repo, and that collateral is pro-cyclical (amplifying credit growth in booms and accentuating credit shrinkage in busts --- [see question 32](#)).

However, repo is not intrinsically a shadow banking instrument, as it is not used exclusively by so-called shadow banks. Indeed, it is mainly employed by commercial banks and securities firms --- all of which are regulated entities --- and increasingly by regulated end-users such as pension funds and insurance companies. This is the predominant case in Europe (whereas money market mutual funds --- classic shadow banks --- play a major role only in the US market). Repo is also the principal tool used by central banks in the implementation of monetary policy and when acting as lenders of last resort.

37. Is repo used to remove assets from the balance sheet?

This question has been prompted by incidents such as Lehman Brothers’ ‘Repo 105’ or MF Global’s use of *repo-to-maturity*. In both cases, assets sold in repos were accounted for as disposals and removed (temporarily) from the balance sheets of the sellers. This disguised their true leverage. However, in both cases, this accounting treatment made use of provisions specific to US Generally Accepted Accounting Principles (GAAP). These options have since been closed.

In Europe, such accounting options have never been available and repo must be accounted for in the standard way. This follows the principle that balance sheets are intended to measure the economic substance (the value and risk of a company) not the legal form in which it has structured its transactions. In a repo, as the seller commits to repurchase the collateral at its original price plus repo interest, he retains the risk and return on that collateral. Accordingly, the collateral remains on the balance sheet of the seller, even though he has sold legal title to the collateral to the buyer. The logic of this accounting treatment is confirmed by the consequence that, because the cash paid for the collateral is added as an asset to the seller’s balance sheet (balanced on the liability side by the repayment due to the buyer at maturity), this will expand, thereby signalling that that seller has increased his leverage by borrowing. In order to make it clear to the reader of a balance sheet which assets have been sold in repos, the International Financial Reporting Standards (IFRS) require that

securities out on repo are reclassified on the balance sheet from 'investments' to 'collateral' and are balanced by a specific 'collateralised borrowing' liability.

38. Could a repo rate benchmark replace LIBOR or EURIBOR?

The concern that emerged in 2012 over the collusive manipulation of widely-used interest rate benchmarks such as LIBOR and EURIBOR by banks on the fixing panels also served to highlight the long-standing problem of dwindling liquidity in longer-term unsecured interbank deposits on which such indices are based. For example, what have been the sources of rates such as 6, 9 and 12-month LIBOR and EURIBOR, given the thin or non-existent trading in such tenors over many years? The unsecured interbank deposit market had become increasingly illiquid since the 1990s and liquidity vanished entirely during the Great Financial Crisis that erupted in 2007. Illiquidity, even more than the manipulation of fixings, has called into question the validity of these traditional money market benchmarks. Manipulation can be prevented but liquidity cannot be invented. Given that liquidity has been migrating from unsecured to secured money markets, the logical question is whether a repo rate benchmark should be substituted for LIBOR, EURIBOR and other unsecured interbank deposit (IBOR) benchmarks.

The question has become more urgent following the announcement by the UK regulator that panel banks will no longer be required to contribute to LIBOR after 2021. It is expected that few, if any, will continue after this date and it is questionable whether other IBORs can survive much longer. Moreover, formerly reliable unsecured overnight benchmarks such as EONIA have been undermined by the reduction in market liquidity caused by the exceptional monetary policies pursued by many central banks following the Great Financial Crisis and new regulation aimed at discouraging short-term wholesale market funding. As a consequence, regulators have been leading a search for virtually risk-free rates to act as replacement benchmarks for both overnight and term interest rates. Repo provides a virtually risk-free rate.

As a practical matter, it will be difficult to redesign or renegotiate the trillions of dollars of financial contracts currently linked to LIBOR, EURIBOR and other IBORs. And even if the legal obstacles can be overcome, the transition cost of switching to a new benchmark would be substantial.

A fundamental theoretical obstacle to the construction of any meaningful interest rate benchmark is the current fragmented state of the financial markets. Interest rate benchmarks have traditionally measured the average cost of wholesale funding to banks. However, heightened anxiety about counterparty credit risk has resulted in the tiering of banks in terms of perceived creditworthiness and cost of funding, undermining the idea of any average cost of funding.

If the repo rate were to be used as the source of a future interest rate index, it would have to be the GC repo rate given that this is cash-driven ([see question 8](#)). To produce a pure GC repo rate, it will be necessary to minimise the influence of the credit risk of the repo counterparties, the credit and liquidity risks of collateral and the correlation between the credit risks of the repo counterparty and collateral issuer (so-called *wrong-way risk*).

In the case of IBORs, the influence of counterparty credit risk has been minimised by taking quotes only from *prime banks*, something which has become increasingly difficult as bank credit ratings have generally deteriorated. In the case of repo, it is proposed to eliminate counterparty credit risk by using rates for repo cleared and therefore guaranteed by CCPs.

In order to eliminate the influence of collateral risks and wrong-way risk, the eligible collateral for repo would have to be government bonds in the relevant currency. Unfortunately, in the eurozone, frequently divergent perceptions of the creditworthiness of member states has fragmented the euro GC repo market into national segments. Moreover, as a result of the search by investors for safe havens, most high-quality government bonds are specials, trading at idiosyncratic rates reflecting the scarcity of supply for these bonds rather than the cost of cash-driven repo funding ([see question 9](#)). These problems contributed to the demise in December 2014 of Eurepo, which was the first attempt to construct a eurozone repo index.

One attempt to circumvent these problems is the MTS/NEX Markets family of Repo Financing Rates (RFR), in which a statistical filter trims the upper and lower quartiles of daily repo rates. In principle, the repo rates of risky countries should be trimmed off the top and the repo rates of specials should be trimmed off the bottom.

An alternative is to take rates from Eurex's Euro GC Pooling market, which uses a rules-based algorithm to select the collateral. As collateral selection by the algorithm is post trade and therefore unknown when transactions are being priced, the repo rate could be considered to be a GC rate.

However, in all indices, there appears to be insufficient term business in repo to extend the yield curve beyond the very short term. Most proposals and plans for term indices therefore rely on the emergence of futures and interest rate swap markets to extrapolate term rates.

The manipulation of traditional indices such as LIBOR and EURIBOR has made both the market and the authorities cautious about the use of contributions from panels of banks or brokers' associations (including the now defunct sterling Repo Overnight Index Average (RONIA)). There is a preference for using rates from sources such as trading venues, CCPs, and clearing and settlement systems, which also have the advantage of offering rates on transactions rather than quotes. However, such sources need to have wide market coverage in order to be useful. Ultimately, the success of any interest rate benchmark is likely to depend upon the degree to which it is correlated with the rates at which banks actually fund themselves.

Current repo rate indices include:

- *STOXX GC Pooling Indices* based on data from Eurex Repo's Euro GC Pooling Market is a transaction-weighted overnight repo rate benchmark compiled from actual repo rates and volumes over the day on its Euro GC Pooling automatic repo trading system but supplemented in the longer tenors by quotes (albeit executable quotes).
- The *GCF Repo Index* published by the Depository Trust & Clearing Corporation (DTCC), which operates the CCP for the US repo market, is a family of three transaction-weighted overnight US dollar repo rate benchmarks for repos against US Treasury, Agency and Agency MBS collateral in the inter-dealer brokered CCP-cleared General Collateral Finance (GCF) market. It is compiled from actual repo rates and volumes over the day by the DTCC. A futures contract on the benchmark has been launched by NYSE LIFFE.
- The *RepoFunds Rate* published by MTS and NEX Markets since December 2012, starting with a family of three transaction-weighted one-day repo rate benchmarks for electronically-traded CCP-cleared repos against French, German and Italian euro-denominated government bond collateral, then a general eurozone benchmark and more recently, Belgian, Dutch and Spanish government bonds. This benchmark is based on a quasi-GC basket of collateral constructed by eliminating a constant percentage of outliers from rates on the BrokerTec and MTS automatic repo trading systems.
- The *Secured Overnight Funding Rate (SOFR)* launched by the Federal Reserve Bank of New York (FRBNY) in April 2018 as the US virtually risk-free rate. This is a transaction-weighted average of

overnight repo rates for US Treasury securities on the US tri-party repo market, the GCF market operated by DTCC (which is one of the US CSDs) and the bilateral market cleared by the DVP Service operated by FICC (which is the CCP for US Treasuries and Agency securities). SOFR is the authorities' contender to replace US dollar LIBOR.

- *SARON*, which is the overnight repo member of the family of Swiss Reference Rates developed by the Swiss National Bank (SNB) and the Swiss Exchange. *SARON* is a weighted-average of transaction prices and quotes on the SIX Repo ATS operated by the Swiss Exchange. It has been adopted as the Swiss virtually risk-free rate to replace Swiss franc LIBOR.

Unlike the FRBNY and SNB, the Bank of England has not adopted a repo-based virtually risk-free rate. It has instead reformed the unsecured sterling overnight index SONIA by taking control of its fixing and using transaction rates reported under its money market reporting regime. The decision to reform SONIA was driven by market objections to the transition cost of switching to a secured benchmark (something to which the Swiss market was not exposed). The Bank of Japan has retained the Tokyo uncollateralised overnight call money index, TONAR. The ECB is proposing to replace EONIA with a new unsecured index called the Euro Short-Term Rate or ESTER.

39. How do MiFID II and MiFIR apply to the repo market in the EU?

MiFID II is the EU's second Market in Financial Instruments Directive and MiFIR is the Market in Financial Instruments Regulation. MiFID's objective is to harmonize investment services across the EU in order to increase competition and consumer protection. MiFID II came into effect in July 2014 and extends the scope of the first Directive into fixed income markets. MiFIR came into effect at the same time. The regulatory technical standards (RTS) and implementing technical standards (ITS) for MiFID II and MiFIR were implemented in 2018.

When MiFID II and MiFIR were published, it was unclear which provisions would apply to repo and other securities financing transactions (SFT). It has been argued that the authors of the legislation did not seem to be aware of the existence of repo. Some questions about the application of the legislation to repo still remain to be answered. At this stage, the sections of MiFID II and MiFIR relevant to repos would seem to be as follows:

Pre- and post-trade transparency (trade reporting) obligations under MiFIR Article 1

This requires *trading venues and systematic internalizers (SI)* to continuously publish current bid and offer prices, the depth of trading interest and of actionable indications of interest (requests for quotes), and data on executed trades in fixed income securities. **However, an amendment to MiFIR in June 2017 exempted repos and other SFT.**

Transaction reporting under MiFIR Article 26

There is a requirement to report each MiFID/MiFIR-regulated transaction in detail to the relevant regulatory bodies. However, MiFIR excludes transactions that are to be reported under the Securities Financing Transaction Regulation (SFTR). But, as SFTR does not require the reporting of repos transacted with the European System of Central Banks (ESCB), such **central bank repos have to be reported under MiFID/MiFIR**. This will present a challenge as the MiFID reporting template is not designed for repos.

Best execution reporting under MiFIR RTS Articles 27 and 28

Under RTS Article 27, *execution venues* are required to publish a wide range of relevant statistics on the quality of execution of client orders including price, costs, speed and likelihood of execution. Repos and

other SFTs are exempted from this publication requirement but, as SFTs are subject to best execution rules, **proof of best execution must still be collected for SFTs, even though it does not have to be reported.**

Under RTS Article 28, *investment firms* are required to annually publish summaries of the volumes of each type of client order and quality of execution on their top five execution venues. **Best execution data for repos and other SFTs does have to be reported.**

Costs and charges disclosure under MiFID Article 24

Investment firms are required to report to each client the total execution costs charged for orders transacted on their behalf, whether the firm was acting as agent or principal, when it executed the order and an itemisation of costs. **It is unclear how cost and charge disclosure will apply to repo and other SFTs.**

Disclosure under MiFID Article 32

In a provision that mirrors the information and consent provisions applied by Article 15 of SFTR to the re-use of collateral, MiFID requires **investment firms are required to highlight to clients the risks involved and the effect on the client's assets of repos and other title transfer collateral arrangements.**

Protection of client assets under MiFID Article 16

MiFID prohibits the use of repo and other title transfer collateral arrangements with retail clients, including local authorities.

There is also a requirement under MiFID Article 6 that **investment firms should consider the appropriateness of repo and other title transfer collateral arrangements for non-retail clients.**

Record-keeping under MiFID Article 16

MiFID requires firms to 'maintain relevant data relating to all orders and all transactions in financial instruments which have been carried out, on own account and on behalf of a client' for at least five years. **Record-keeping requirements apply to repo.**

Special articles

40. Mapping the interdealer European repo market (January 2019)

The European interdealer repo market can be usefully structurally differentiated at three stages of a transaction's life:

- **trading** --- the negotiation and execution of transactions (the formation of contracts);
- **clearing** --- the netting by counterparties of (1) in the normal course of business, opposite obligations to deliver the same collateral security (same ISIN) to each other on the same day and opposite obligations to pay cash in the same currency to each other on the same day to produce a smaller residual delivery and payment obligation; and (2) after a default, all mutual obligations to produce a single exposure for immediate settlement --- which can be bilaterally or across a *central counterparty (CCP)*;
- **collateral management** --- the selection of specific security issues to deliver as collateral and the maintenance of the value of that collateral and the processing of other events such as income payments on the collateral.¹⁶

There is a fourth stage in the life-cycle of a transaction --- the **settlement** of collateral securities transfers and sometimes related cash **payments** --- but, as there is a considerable and increasing choice available to trading venues, clearing systems and collateral management agents about which settlement and payment systems they can use, differences between the settlement and payment systems used by dealers are not a particularly useful way of analysing the European repo market.^{17 18}

¹⁶ Collateral maintenance involves: regularly revaluing the collateral; calling agreed variation margin from or delivering to the other party, or performing agreed repricing/adjustments, whenever a material uncollateralised exposure arises or in order to preserve haircuts/initial margins; responding to the occurrence of income payments, corporate actions and other events on the collateral; and responding to valid requests for the substitution of collateral.

¹⁷ This will certainly be the case in the EU once MiFID II/MiFIR and the CSD Regulation (CSDR) have been fully implemented. At the moment, there are exclusive links between some trading venues, clearing systems, collateral management agents and settlement/payment systems. For example, Eurex Repo's Euro GC Pooling Market only connects to Eurex Clearing for clearing and Clearstream for collateral management and settlement/payment (although discussions being mediated by the ECB and ICMA's European Repo and Collateral Council (ERCC) have been taking place to allow tri-party 'interoperability', which means users of Euro GC Pooling would be able choose Euroclear Bank or another collateral management agent). Access to some settlement systems is also difficult for foreign clearing systems.

¹⁸ Settlements of securities transfers take place across the **securities settlement systems (SSSs)** operated by (1) domestic **central securities depositories (CSDs)** or (2) **international CSDs (ICSDs)**, between accounts in the name of and managed directly by dealers or, on their behalf, by settlement agents called **custodian banks**. ICSDs are true CSDs for eurobonds but are really cross-border custodian banks for other securities. The method of payment for securities depends on whether settlement is across a CSD or an ICSD. In the case of CSDs, the SSS is connected or integrated with the domestic large-value payment system operated by the central bank (typically operating on the basis of real-time gross settlement (RTGS) and often referred to as RTGS systems). In the eurozone, the separate national central bank-operated payment systems have been connected by the ECB-operated TARGET 2 payment system. In the case of ICSDs, the SSSs are connected to several domestic payment systems, directly or through agent **correspondent banks**, but the bulk of the transactions settled by each ICSD are between its own customers, which allows transfers of securities and related payments to be made internally, ie between accounts on the books of the ICSD in commercial bank money. Many domestic investors prefer to hold accounts and settle at the national CSD, either directly or through agent custodian banks, whereas many dealers prefer to use an ICSD, as it allows them to concentrate the settlement of their cross-border and multi-currency business. The use of national CSDs means payments are in risk-free central bank money, as opposed to commercial bank money.

There is also a fifth stage, although this actually occurs between trading and clearing --- the post-trade, pre-settlement **verification** of transaction details and settlement/payment accounts --- but this also is not a useful way of structurally differentiating repo activity. Verification of repos can take the form of 'confirmation' and also 'affirmation'.¹⁹ The process of confirmation and affirmation is one of 'matching' the records of the counterparties as soon as possible after execution in order to identify mistakes or misunderstandings. Confirmation and affirmation are important for risk management. Matching also takes place at CSDs, ICSDs and custodians but only of settlement details and only near the end of the post-trade process (too late for risk management purposes).

Finally, there is an important sixth stage in the life-cycle of a transaction --- the regulatory reporting of transactions, increasingly via a trade repository --- but this also is not a useful way of structurally differentiating repo activity.

The trading map

Repo can be traded through a variety of old and new technologies:

- **Telephone or electronic messaging systems.**
 - The use of telephones or electronic messaging systems is called **direct trading**, in that the technologies do little more than allow parties to communicate directly, by voice or in free-form text.
 - Telephones and electronic messaging systems are also used by **voice-brokers**. These are arrangers who collect prices from dealers by phone or online, then select and broadcast back the best bids and offers. Voice-brokers can display prices (and other information) to dealers on the screens of the commercial networks operated by information vendors such as Bloomberg and Thomson Reuters but restricted to the voice-brokers' customers. Some voice-brokers also operate their own networks to collect and display prices. If one of the connected dealers wishes to accept a price displayed by a voice-broker, he contacts the voice-broker by telephone or online. The voice-broker reveals the identity of the quoting party and, if the names are acceptable to each other, puts the two parties in touch. This allows the parties to negotiate further and to organise settlement between themselves. A voice-broker charges a pre-agreed commission to both counterparties on completed transactions. The major repo voice-brokers in Europe are BGC (Partners), GFI (Group), Tradition and Tullett Prebon ICAP.²⁰
- **Automated trading systems.** Some voice-brokers operate networks of interactive screens. Dealers can enter prices directly and the voice-brokers can enter transactions that have been negotiated by telephone into the systems. These systems are automated but not automatic, in that transactions cannot be executed and settlement cannot be initiated and completed automatically simply by

¹⁹ Affirmation is performed by counterparties either (1) directly between each other by telephone or e-mail or (2) online across a third-party agent. Third-party affirmation systems with some repo functionality currently include the TRAX II service of Xtrakter Ltd, which is owned by MarketAxess Holdings Inc. The Euroclear Trade Capture and Matching System (ETCMS) performs a similar function for repos, albeit not fully automated that are being submitted to the central clearing counterparty (CCP), LCH. Affirmation is the verification of the key terms and settlement instructions of selected higher-risk transactions that has been developed by the market to mitigate the risk arising from the lack of capacity to confirm all transactions. 'Confirmation' is the contractual requirement to verify all the economic terms of a transaction as well as settlement instructions. Affirmation is also different from 'trade-matching' or 'settlement matching', which is the matching by a CSD or ICSD of settlement instructions received from two counterparties on the day before the settlement date. Affirmation compares a wider range of data than trade-matching (some of which is not necessary for settlement) and should take place on the transaction date in order to allow the maximum time for mistakes and misunderstandings to be resolved.

²⁰ Tradition is the interdealer broking arm of the Swiss-based Compagnie Financière Tradition. Tullett Prebon bought ICAP, which was the voice-broking subsidiary of NEX Plc, in 2016 to form Tullett Prebon ICAP.

clicking on a screen. Additional action is required from the counterparties before transactions can be consummated, eg credit approval, further negotiation on terms such as collateral haircuts and the despatch of settlement and payment instructions. Automated trading systems run by firms who are not voice-brokers (eg Tradeweb Markets and GMLX) are also available in repo and increasingly used by dealers to connect to non-dealer customers. Such systems usually employ a trading technique called request-for-quote (RFQ), in which, a customer typically advertises an order to several dealers, who can respond with prices from which the customer can select a quote and either execute a transaction or engage directly in further negotiation.

- **Automatic trading systems (ATS).** These are dedicated networks of interactive screens on which prices are displayed for orders in repo of various tenors, amounts and types of collateral (individual issues or classes or special baskets of securities). ATS are automatic in that transactions can be executed and settlement can be initiated and completed automatically simply by clicking on an interactive screen (this straight-through processing is possible because of operational and legal links between the ATS and the entities in the next stages of the clearing and settlement process, ie CCPs, collateral management agents, and CSDs or ICSDs).²¹ The ATS operating in Europe are:
 - **BrokerTec**, which is based in the UK and owned by NEX Markets; it is the leading ATS in Europe for repo other than of Italian securities;²²
 - **Eurex Repo**, which is based in Germany and part of Eurex Exchanges, owned by Deutsche Borse AG; Eurex Repo operates three repo market segments:
 - the Euro Repo Market
 - the Swiss Franc Repo Market, formerly a joint venture with the Swiss exchange SIX
 - the Euro GC Pooling Market.
 - **MTS Repo** (sometimes known as the *Telematico*), part of MTS Group, which is based in Italy but majority owned by the London Stock Exchange Group; claiming a 90% share of the Italian repo market, with small volumes in other markets;²³
 - **SENAF**, which is based in Spain and owned by the BME Group, with a largely domestic membership; since 2011, it has seen no volume in repos.²⁴
 - **SIX Repo**, which was carved out of the joint venture Eurex Repo Swiss Franc Repo Market in May 2014 as an independent platform.

²¹ ATS can instruct (if there is no CCP involved) collateral management agents or (if there is no CCP or collateral management agent involved) CSDs/ICSDs, acting on the basis of powers of attorney given to the ATS by the counterparties. If CCPs are involved, they will have power of attorney to instruct collateral management agents or (if no collateral management agent is involved) CSDs/ICSDs on the same basis. If there is no CCP involved, collateral management agents instruct CSDs/ICSDs.

²² BrokerTec and Eurex Repo are classed as Multilateral Trading Facilities (MTF) under MiFID.

²³ MTS is Mercato Titoli di Stato. MTS Repo is the business name for the repo markets operated by MTS Group. MTS Group is controlled by MTS SpA, which itself is majority owned by the LSE Group. MTS Group operates MTS Italy, whose business includes repos in Italian government securities, and incorporates EuroMTS Ltd, a UK company, whose business includes repos in European government securities other than Italian. MTS Italy is a Regulated Market under MiFID. Euro MTS is classed as a Multilateral Trading Facility (MTF) under MiFID.

²⁴ SENAF is the Sistema Electronico de Negociacion de Activos Financieros (Electronic Trading System of Financial Assets). It is owned by the BME (Bolsas y Mercados Españoles) Group. SENAF trades Spanish government securities, repos in these securities and certain non-government securities (currently, 14 bank bonds) registered on the BME Group's AIAF (Asociación de Intermediarios de Activos Financieros or Association of Financial Assets Intermediaries), which is the regulated secondary market in Spanish corporate debt. SENAF is classed as a Multilateral Trading Facility (MTF) under MiFID.

The clearing map

Repos can be:

- **Uncleared** --- this would now be unusual for dealers, given that netting is a standard feature of bilateral repo master agreements.
- **Bilaterally-cleared** --- in the normal course of business, a party nets opposite mutual delivery and payments obligations separately with each of its counterparties under a master agreement, to produce a set of smaller residual single daily delivery and payment obligations with each counterparty (one in each security and one in each currency) and, in the event of a default by a counterparty, results in a single exposure in the same currency for immediate settlement.
- **Multilaterally-cleared**²⁵ --- at the inception of a transaction between member firms or shortly after execution, a central counterparty (CCP) is inserted into the middle of each transaction to (1) become the high-quality buyer to the seller and the high-quality seller to the buyer and (2) net opposite delivery and payments obligations between itself and each member firm which, in the normal course of business, results in a set of smaller residual single daily delivery and payment obligations between the CCP and each member firm (rather than a separate set between each pair of member firms) and, in the event of a default by a member firm, results in a single exposure for immediate settlement between the CCP and the defaulting member firm (rather than an exposure between the defaulting member firm and each other member).

The CCPs which are currently clearing repos in Europe are:

- **CC&G**, which is based in Italy but owned by the London Stock Exchange; its repo clearing business is drawn entirely from MTS and is limited to Italian government bond collateral.²⁶
- **Eurex Clearing**, which is based in Germany and owned by Deutsche Börse AG; it only clears repos transacted across Eurex Repo (which in turn only uses Eurex Clearing).
- **LCH Ltd**, which is based in the UK and part of LCHGroup, which is majority owned by the London Stock Exchange; its repo clearing business covers a wide range of European government securities.
- **LCH SA**, formerly called Clearnet, which is based in France and part of LCH Group; its repo clearing business has traditionally been in French government bond repo and, to a lesser extent, Italian and Spanish government bond repo but, with the creation of T2S and the possibility of netting between connected CSDs, as well as uncertainties over access to LCH Ltd after Brexit, is expanding into other Eurozone government bonds; it operates a link to CC&G.
- **BME Clearing Repo** (formerly MEFFClear and MEFFRepo), which is based in Spain, is the business name for the fixed-income clearing segment of BME Clearing, which is the CCP owned by the BME Group; its repo business is limited to Spanish bond repo transacted across SENAF or arranged through voice-brokers and registered with the CCP post trade.^{27 28}

There has been talk of repo CCPs being established in the Nordic region (by Nasdaq OMX) and Poland (by KDPW_CCP), but there is little evidence so far of substantive progress.

²⁵ 'Multilateral clearing' is not the correct legal term for clearing across a central counterparty. This should be called **centralised bilateral clearing**.

²⁶ CC&G is the Cassa di Compensazione e Garanzia.

²⁷ MEFF was Mercado Español de Futuros Financieros.

²⁸ MEFFClear was formerly a central counterparty, but not a central clearing counterparty, in that it stood between parties as a high-quality buyer to every seller and a high-quality seller to every buyer, but it did not net mutual delivery and payment obligations.

The collateral management map

Collateral management is a choice between:

- **Bilateral** collateral management, in which the counterparties themselves select the securities in their accounts which are to be delivered as collateral in settlement or maintenance of a repo, and perform all the other functions of collateral management.
- **Tri-party** collateral management, under which the function is outsourced to an agent ([see question 24](#)). Once correctly and consistently notified of a transaction between two users, the tri-party agent selects securities from the account of the seller that fall within eligibility criteria pre-agreed between the parties (the set of eligible securities is usually known as a ‘collateral basket’) and delivers the selected securities to the buyer against simultaneous payment. The tri-party agent then maintains the value, quality and performance of the collateral.²⁹ The tri-party repo agents currently operating in Europe are:
 - **Bank of New York Mellon** (whose system is called *RepoEdge*); which is also the sole tri-party agent in the US; and has a sizeable global tri-party equity repo business;
 - **BP2S** based in Lisbon --- owned by BNP Paribas;
 - **Citibank**;
 - **Clearstream Banking Frankfurt**, the German CSD --- owned by Deutsche Börse AG;
 - **Clearstream Banking Luxembourg**, one of the ICSDs --- owned by Deutsche Börse AG;
 - **Euroclear Bank**, the other ICSD;
 - **Euroclear UK and Ireland**, often called CREST, the UK and Ireland CSD, operates a special tri-party collateral management functionality called **Delivery By Value (DBV)** --- a subsidiary of Euroclear;
 - **JP Morgan**;
 - **Monte Titoli**, the Italian CSD (whose tri-party system is called *X-COM*) --- this service was launched in 2012, and is currently limited to collateral management with the Bank of Italy in support of ECB operations;
 - **SIX SIS**, which is based in Switzerland and owned by the SIX Group; it is operationally integrated with SIX Repo.³⁰

Clearstream and Euroclear integrate their tri-party agencies with their securities settlement and payment services. Indeed, tri-party collateral management services are currently only available to the custody clients of the tri-party agents, because of the close operational linkages needed between custody and collateral management services in order to operate a tri-party service.

Where a tri-party collateral management agent is involved in the post-trade processing of repos, the business being supported is often described as ‘basket trading’. This is because the parties negotiate only the amount, tenor and rate of the repo, and delegate the selection of collateral to the tri-party agent, who will automatically pick, from the account of the seller, one or more of the securities that are listed in a pre-agreed basket of eligible securities. The contents of baskets will have been agreed by the parties or, if the trading is electronic, prescribed by the ATS or, if transactions are being cleared,

²⁹ In addition to collateral maintenance ⁽¹⁶⁾, delegated collateral management requires the agent to manage the substitution of any securities that: drop below the eligibility criteria of the buyer (eg due to a ratings downgrade); are due to make coupon or dividend payments that will be subject to a withholding tax; are required by the seller in order to sell off in the normal course of his business; have failed to be delivered; or can be replaced by newly-received securities that are of lower quality than the current collateral allocation but still meet the eligibility criteria of the buyer (this is called ‘optimisation’). Collateral management agents also manage the life-cycle of the repo, eg refixing the repo rate on open or floating-rate repos.

³⁰ SIX SIS also classifies itself as an ICSD. Bank of New York Mellon is setting up a new ICSD.

prescribed by the CCP. Given that collateral selection is delegated to the tri-party agent, tri-party repo is a type of GC repo or ‘cash-driven’ repo (see question 8). Basket trading, when execution is electronic and there is clearing by a CCP, is known as **GC financing**.

Three-dimensional mapping

The three key mapping stages above can be linked ‘vertically’ in a variety of configurations, which are summarised in the table below. The key vertical interdealer linkages in the European repo market are:

- ATS + CCP + bilateral collateral management --- this is the principal business model in Europe. BrokerTec and MTS each link to several CCPs and allow the use of either ICSD or any of several CSDs, whereas Eurex Repo is exclusively linked to Eurex Clearing for clearing.
- Direct trading + bilaterally clearing + bilateral collateral management --- this is the traditional pre-electronic market.
- ATS + CCP + tri-party collateral management --- this is the GC financing model of Eurex Repo’s Euro GC Pooling Market and the market in the LCH’s £GC and EuroGC+ baskets offered for trading on BrokerTec and managed by tri-party agents Euroclear Bank and Clearstream Banking Luxembourg.

Note that it is not (currently) possible to trade directly with a party, then register transactions post trade with a CCP and outsource collateral management to a tri-party agent.

Table: links between repo trading, clearing and collateral management

trading	direct trading on telephone or online		voice-broker on telephone or online		ATS		
	uncleared or bilateral	multilateral (post trade registration with CCP)	uncleared or bilateral	multilateral (post trade registration with CCP)	uncleared or bilateral	multilateral (automatic registration with CCP)	
clearing							
collateral management	bilateral	tri-party	bilateral	bilateral	bilateral	tri-party	
examples	traditional interdealer business	all tri-party repos except Eurex Euro GC Pooling & LCH’s £GC & EuroGC+	some direct & voice-brokered business	traditional voice-brokers	Spanish business cleared through MEFRepo	so-called ‘bilateral’ markets on BrokerTec & MTS	Swiss Repo, MTS Agency Cash Management
							most BrokerTec markets
							Eurex Euro GC Pooling, LCH £GC & EuroGC+

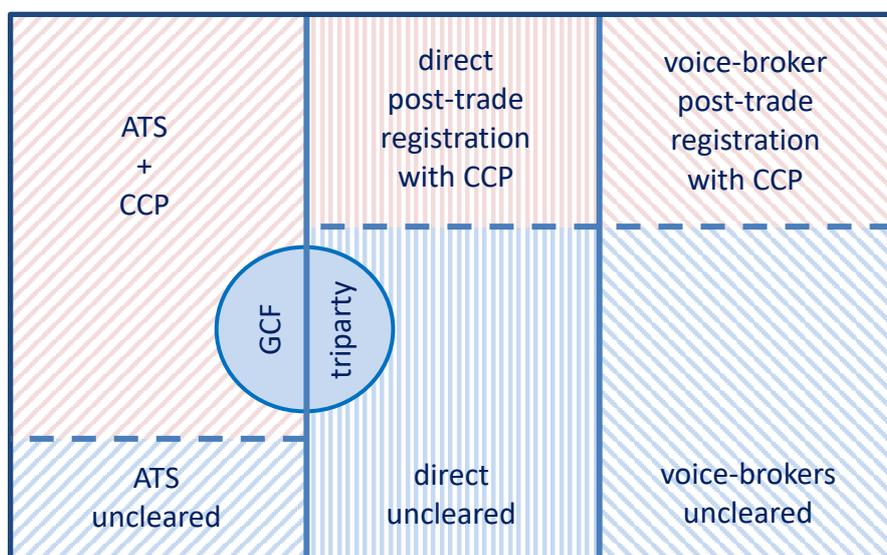
Source: R Comotto (2018)

Market shares

In the ICMA's semi-annual European repo market survey and the now-discontinued ECB Money Market Survey, the various alternative combinations of trading, clearing and collateral management are grouped into:^{31 32}

- **Direct**, which is connected to either **bilateral** or **tri-party** collateral management. Direct trading accounted for about 61% of outstanding repo business measured by the ICMA survey in June 2018 (the total for which was EUR 7,351 billion). About 6% of direct business was tri-party and another 6% was registered post-trade with CCPs. The final ECB Money Market Survey suggested that about 20% of turnover in 2014 was traded directly and some 10% was tri-party.
- **Voice-brokered** accounted for about 10% of outstanding repo business measured by the ICMA survey in June 2018, and over 15% of turnover in 2014 in the ECB Money Market Survey.
- **Electronic** (ATS only). Electronic trading accounted for some 29% of outstanding repo business measured by the ICMA survey in June 2018. Some 28% of the total outstanding business was cleared across CCPs (most of it electronic). The ECB Money Market Survey suggested that two-thirds of turnover in 2014 was traded on ATSS and a similar proportion was cleared across CCPs. GC financing, in the form of Eurex GC Pooling, had outstanding business of about EUR 67 billion in June 2018 (there was little or no trading in other CCP-defined GC baskets), compared with a total of some EUR 1,220 billion for all ATSS.³³

Chart: ICMA survey analysis of the European repo market



Source: R Comotto (2014)

³¹ See <https://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/repo-and-collateral-markets/icma-ercc-publications/repo-market-surveys/>.

³² See <http://www.ecb.europa.eu/stats/money/mmss/html/index.en.html>.

³³ The ICMA analysis is complicated by the fact that Eurex's Euro GC Pooling and the trading of LCH.Clearent Ltd's €GC basket on BrokerTec are simultaneously tri-party and electronic repos.

The market interfaces between dealers and between dealers and customers

In terms of the value of outstanding contracts, it is generally thought that interdealer business accounts for about one-half of the European repo market, although the share of customer business varies widely between market segments and dealers. 'Customers' include:

- smaller commercial banks (with insufficient repo business to justify the expense of joining an ATS and/or linking to a CCP)
- central banks conducting investment operations (ie repos not driven by monetary policy)
- international financial institutions (eg multilateral development banks) investing cash balances or lending securities from their investment portfolios
- other official investment institutions, such as sovereign wealth funds and debt management offices (DMOs)
- non-bank financial institutions (eg pension funds, insurance companies, money market and other mutual funds, securities lending cash collateral reinvestment agents, hedge funds, other alternative investment funds and other asset managers) investing cash balances, covering short-term liquidity needs (including cash for variation margin for their derivative hedges) and leveraging their portfolios (often as part of the hedging of long-term liabilities)
- a few non-financial institutions (eg large corporate treasuries) investing cash balances
- retail investors in countries such as Italy, Scandinavia and Spain investing savings.

Hedge funds access the repo market through prime brokers (principally for fixed-income financing or borrowing). These are specialized divisions of large investment banks which offer funding, securities lending and other services such as execution, risk management, custody, reporting, clearing and settlement to hedge funds.

Virtually all parties transacting on ATSS and/or clearing across CCPs are currently dealers (with the exception of Eurex's ISA Direct facilities). This reflects past membership rules and the scale and type of business needed to justify membership of these financial market infrastructures (two-way business in the case of CCPs). However, CCPs have been launching 'client-clearing' schemes, which offer non-dealers 'sponsored' access to clearing under the aegis of an existing dealer member or limited membership. Client access does not require the client to underwrite the dealer members of the CCP (the so-called 'mutualization' of risk) and allows them to delegate many operational functions. The traditional dealer members of CCPs hope client-clearing will allow them to enhance the efficiency of their netting by including client positions in order to reduce their exposure to regulatory costs.

The voice-brokered repo business is entirely interdealer.

Tri-party repo in Europe is largely between, on the one hand, investment banks (as sellers) and, on the other hand, commercial banks, central banks conducting investment operations, multilateral development banks and money market mutual funds (as buyers or cash investors). Some central banks allow commercial banks to use tri-party systems to manage the selection, delivery and maintenance of collateral for monetary policy transactions (eg Germany, France and Italy) and a system is being developed by the ECB for the eurozone.

There are electronic trading systems which connect dealers to customers but these customer-to-dealer systems are automated and not automatic. Some dealers offer proprietary **bilateral** automated trading systems to their customers (eg Deutsche Bank's *Autobahn* or Barclay's *STRAX*) on which customers can see or request price quotes only from the dealer operating the system.

There are also commercial **multilateral** automated trading systems, connecting individual customers to panels of competing dealers who are signed up to support the system by providing competing price

quotes. Typically, a customer makes a request for quotes (RFQ) and dealers on the panel respond without seeing competing quotes. The customer accepts the best quote or can negotiate. Examples of such multilateral systems are:

- **Bloomberg Repo Electronic Trading** system, launched in 2005, is part of the Bloomberg Professional service, operated by Bloomberg LP. It is described as a customer-to-dealer multi-bank RFQ electronic trading system for repos.
- **GC Pooling Select**, launched in 2012, **ISA Direct Select Invest**, launched in 2013 and **ISA Direct Select Finance**, launched in 2016, by Eurex Repo. Select and Select Invest allow investors to negotiate reverse repos with dealers (lending only) on the telephone or to enter an RFQ to one or several banks directly into the GC Pooling system. Select Finance allows repo or reverse repo to be transacted (borrowing and lending) with dealers on either the GC Pooling or main Eurex Repo systems. Once an offer from the bank has been agreed by the customer, the transaction is entered into the system by the bank. The cash payments to and from the customer are via Deutsche Börse Group, which acts as principal intermediary between the customer and the bank. The matching transactions between Deutsche Börse Group and the bank are cleared by Eurex Clearing and collateral management is delegated to Clearstream.
- **Tradeweb** is part of Tradeweb Markets LLC, which is majority-owned by Thomson Reuters, with shares also held by Goldman Sachs, JPMorgan, Morgan Stanley, Citigroup, Bank of America, Credit Suisse Group, Deutsche Bank, UBS, Royal Bank of Scotland Group and Barclays. Tradeweb was launched in 1998 but has offered a customer-to-dealer RFQ trading system in repo in Europe since 2011. Customers can request up to five quotes at one time.

As new regulation has weighed on the balance sheets of repo dealers, wholesale customers such as pension funds, insurance companies and mutual funds have experienced occasional difficulty in transacting repo, often at end-year. The balance sheet constraints on dealers have led to a new wave of innovation seeking to connect such customers directly with each other across specialised electronic trading platforms. These so-called 'all-to-all' or 'peer-to-peer' systems offer GC financing, usually with collateral management delegated to tri-party collateral management systems. The most prominent examples are currently Elixium and GMLX.

International Capital Market Association (ICMA) and European Repo and Collateral Council (ERCC)

ICMA represents financial institutions active in the international capital market worldwide. ICMA's members are located in over 60 countries. ICMA's market conventions and standards have been the pillars of the international debt market for over 50 years, providing the framework of rules governing market practice which facilitate the orderly functioning of the market. The ICMA European Repo and Collateral Council (ERCC) is a special interest group established under the auspices of ICMA to represent the major banks active in Europe's cross-border repo markets.

www.icmagroup.org

These FAQs have been written by Richard Comotto, Senior Visiting Fellow at the ICMA Centre at Reading University.