

Frequently Asked Questions on Repo

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Understanding repo and the repo market

1. What is a repo?

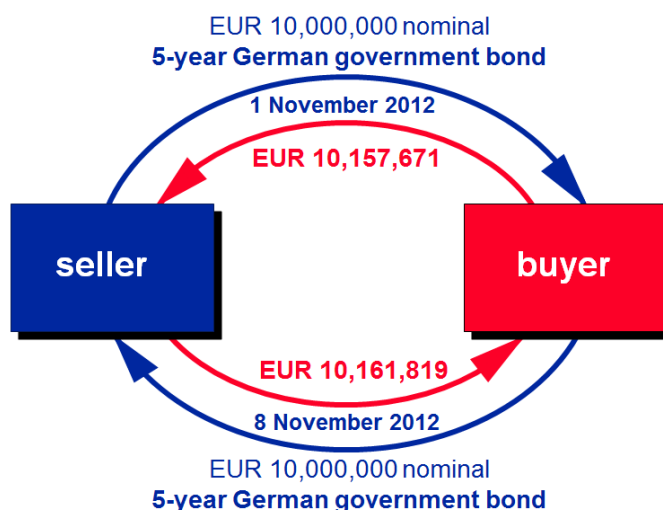
Repo is a generic name for both *repurchase agreements* and *sell/buy-backs*.¹

In a repo, one party sells an asset (usually fixed-income securities) to another party at one price at the start of the transaction and commits to repurchase fungible assets 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 assets are sold outright at the start of a repo, the commitment of the seller to buy back fungible assets in the future means that the buyer has only temporary use of those assets, while the seller has only temporary use of the cash proceeds of the sale. Thus, although repo is structured legally as a sale and repurchase of securities, it behaves economically like a collateralised loan or secured deposit (and the principal use of repo is in fact the 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 agreements, this return is quoted as a percentage per annum rate and is called the *repo rate*. Although not legally correct, the return is usually referred to as *repo interest*.

An example of a repo is illustrated below.



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

¹ Repos are sometimes known as 'sale-and-repurchase agreements'. In some markets, the name 'repo' can be taken to imply repurchase agreements only and not sell/buy-backs. Repurchase agreements are also known as 'classic' repo. Repo, along with securities lending, is a type of 'securities financing transaction' (SFT).

² In the Global Master Repurchase Agreement (GMRA), fungible assets are described as 'equivalent' assets. Fungible or equivalent means an asset that is economically but not necessarily legally identical (usually the same bond issue but not the same part of the issue).

A repo not only mitigates the buyer's credit risk. Provided the assets being used as collateral are liquid, the buyer should be able to refinance himself at any time during the life of a repo by selling or reposing the assets to a third party (he would, of course, subsequently have to buy the collateral back in order to return it to his repo counterparty at the end of the repo). This right of use therefore 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.

2. How is repo used?

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 and earn interest against the security of the asset provided as collateral --- safe investment.
- 2 The counterparty can borrow cash in order to finance a long position in the same asset, in amounts and at prices that reflect the security 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 12](#)) --- yield enhancement for securities investors.
- 4 The counterparty can borrow an asset in order to cover a short position ([see question 28](#)) --- 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.
- The buyer can diversify his credit risk by taking collateral issued by a third party whose credit risk is uncorrelated with the credit risk of the seller.
- Collateralisation can not only reduce the credit risk arising from lending but can also mitigate the liquidity risk. Where a buyer is given liquid collateral, he can meet any unforeseen 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 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.

For lenders of securities (repo sellers), repo offers a means of generating incremental income, as in the securities lending market ([see question 12](#)).

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

Central banks use repo to conduct routine monetary policy operations and to provide emergency liquidity to the market in times of crisis. Repo mitigates their credit risk and connects them to an active interbank repo market through which liquidity can be efficiently redistributed to other banks and non-banks.

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

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 it and backing it back, but will lose the income.

Although repo can be used to finance standalone long positions in a security or to cover standalone short positions, it is often used to fund and cover positions that have been created to hedge, arbitrage or trade against opposite positions in another security or in a derivative such as an interest rate swap or bond future. Repo consequently plays a pivotal role in the accurate pricing and smooth functioning of almost all financial markets.

Repo is essential in the primary securities market. It allows dealers to fund their bids at bond auctions and underwriting positions in syndicated bond issues at reasonable cost, as well as to hedge their underwriting risk by taking short positions, thereby providing cheaper and less risky access to the capital markets for issuers. In the secondary securities market, market-makers need repo to fund their inventory and, where there is no inventory or it has been exhausted, to cover the temporary short positions created by sudden customer purchases. Repo also helps to overcome settlement failures caused when securities to be delivered to one customer or other counterparty are being sourced by a delivery from another but the inward delivery is late, perhaps because of operational errors or market infrastructure inefficiencies. The security can be borrowed in the repo market until it arrives from the second customer or counterparty.

3. Why is the repo market so important and why has the use of repo grown so rapidly?

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

- **Providing an efficient source of money market funding.** By (1) offering deposits secured against high-quality liquid assets, (2) by diversifying the credit exposure of cash investors beyond the banking sector and (3) by disintermediating traditional but less competitive financial channels, the repo market mobilises cheaper and deeper funding for financial intermediaries, which in turn lowers the cost of financial services to investors and issuers. In contrast to the unsecured deposit market, the European repo market can also provide longer-term funding and has proved much more resilient during episodes of market turbulence.
- **Providing a secure home for liquid investment.** The capacity of repo, collateralised by high-quality liquid securities, to mitigate risk is particularly valued by risk-averse end-investors seeking a secure and liquid investment for temporary cash balances and working capital.
- **Broadening and stabilising the money market.** The collateralised nature of repo allows a wider array of borrowers and lenders into the wholesale money market than just commercial banks. The resulting diversification creates a deeper and more robust market, which facilitates liquidity management between financial intermediaries and reduces systemic risk. In a financial crisis, the repo market also mitigates risk by providing more reliable and longer-term funding, particularly through CCP-cleared repos, whereas unsecured longer-term funding (to the extent it exists) tends to evaporate. 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 helped to avoid total and unsustainable dependence on central bank liquidity.⁵
- **Facilitating central bank operations.** The repo market provides a ready-made collateral management framework without which central banks would not be able to implement monetary

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.

policy so efficiently under normal market conditions or act as lenders of last resort so swiftly during periods of market turbulence. Central bank repo feeds seamlessly into the interbank repo market.

- **Hedging primary debt issuance.** In the primary debt market, repo allows dealers to fund their bids at bond auctions and underwriting positions in syndicated bond issues at reasonable cost, thereby providing cheaper and less risky access to the capital markets for issuers. Primary dealers and other underwriters also rely on the repo market to hedge the underwriting risk on new debt. Thus, a long position in a new issue can be hedged by taking an off-setting short position in an existing issue with similar risk characteristics. The delivery of securities into the short position is covered by borrowing in the repo market. Alternatively, a long position in a new issue can be hedged by taking a short position in an existing issue or in a related derivative instrument such as a bond future or interest rate swap, which will ultimately be hedged by someone else borrowing in the repo market. Without hedging, bond issuance would be riskier for underwriters and therefore more expensive for issuers. The primary market function of repo will become increasingly important over the next few years, given the quantity of debt which European governments and banks are expected to have to issue, not to mention the aim of the EU to reduce the reliance of the real economy on bank funding by encouraging greater use of securities financing.
- **Ensuring liquidity in the secondary debt market.** Liquidity in the secondary market for securities depends upon primary dealers and other market-makers being willing to quote prices continuously to investors.
 - To quote selling prices continuously to investors, market-makers often hold inventory from which to sell to investors on demand. But if an investor wishes to buy an issue which market-makers do not hold in their inventory, and if market-makers cannot or do not wish to purchase immediately from someone else in the market, their ability to deliver to the investor depends on being able to borrow that issue in the repo market. 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, which would raise the cost of market-making and therefore the cost of debt to issuers and investors. Several debt management agencies offer special repo facilities to market-makers to allow them to borrow whenever the available supply in the market is inadequate.
 - To quote buying prices continuously to investors, market-makers rely on their ability to hedge temporary accumulations of long positions by taking short positions in issues with similar maturities, which means borrowing in the repo market, or in a related derivative instrument such as a bond future or interest rate swap, which will ultimately be hedged by someone else borrowing in the repo market. Without the ability to cover the temporary short positions taken to hedge temporary long positions, market-making would be constrained to a rigid matched-book style of activity (only buying when there is a seller and vice versa) and secondary market liquidity would suffer. Portfolio management by investors would be made more difficult and debt securities would become a less attractive investment, raising the cost of debt to issuers.
- **Hedging and pricing derivatives.** The use of repo to fund long positions and cover short positions in underlying securities is fundamental to the hedging and pricing of derivatives, which are the essential tools of risk management for both financial intermediaries and end-users of the financial markets, including official debt and reserve management agencies. Indeed, an active repo market is an absolute 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.
- **Fostering price discovery.** The enhanced liquidity generated by repos in the primary and secondary markets for securities fosters the trading and arbitrage which helps equilibrate imbalances between the supply and demand of securities, and facilitates their correct valuation, which generates the smooth and consistent yield curves that are essential for the accurate pricing of other

financial instruments, and thus the efficient allocation of capital by financial markets. 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 true value of a security.

- **Preventing settlement failures.** Repo plays a mundane but nonetheless critical role in supporting the day-to-day operational efficiency of securities markets by allowing issues to be borrowed. Borrowing is needed in order to ensure timely onward delivery, where short positions have arisen unintentionally, usually because of unexpected lags between inward and outward deliveries of securities, infrastructure frictions or a tight secondary market for particular issues. And changes in repo rates in response to the demand to borrow securities help to attract new supply. The facility to overcome delivery failures is important in Europe because of the persistence of national barriers to efficient cross-border clearing and settlement.
- **Preventing market ‘squeezes’.** By allowing the borrowing of securities, repo helps to prevent or contain the ability of individual institutions to ‘squeeze’ individual securities by cornering supply and thereby exacerbating imbalances between supply and demand. Squeezes can lead to settlement failures and disorderly markets. They can also fuel the volatility of yields, as well as creating large and persistent distortions in the yield curve, which would deter investors and intermediaries from participation in the market and confuse price discovery. Frequent settlement fails could lead to ‘buy-ins’ being exercised against intermediaries, the cost of which might cause them to cease providing liquidity to the market.⁶
- **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. Faster settlement leaves less time for delivery problems to be corrected and therefore requires an efficient source of securities borrowing to prevent delivery failures. Securities settlement periods in the EU changed from T+3 to T+2 in October 2014.
- **Allowing more efficient collateral management.** The trading of securities in the repo market is key to the valuation and management of collateral, and allows collateral resources to be more fully mobilised and efficiently allocated. Collateral management is becoming ever more important. Demand for collateral for use in payments and settlement systems, as well as in the exchange-traded and OTC derivatives markets, is being compounded by regulatory pressure on market users to hold larger liquidity reserves and make greater use of (collateralised) central clearing counterparties (CCPs), at the same time as a loss of confidence in some sovereign debt is creating uncertainty over the future supply of high-quality collateral.
- **Allowing more efficient employment of capital.** The global economic impact of the increasing regulatory risk capital charges introduced since the 1980s was mitigated by the more efficient use of capital that was allowed by the underlying shift from unsecured to secured financing. The capital efficiency of repo will become even more important in the future as regulators increase capital charges and impose new liquidity requirements.

4. How big is the repo market?

There are large repo markets in Europe and the US, and rapidly emerging (although still relatively small) repo markets in China and a number of African countries. The ICMA’s semi-annual survey of the European repo market in December 2014 produced a figure of about EUR 5.5 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

⁶ A ‘buy-in’ is a process whereby a buyer of a security that has not been delivered by the seller, appoints a third party to buy in the security on his behalf. Any cost over and above the original purchase price is charged to the failed seller.

90% of the US market) as almost USD 4.6 trillion (about EUR 4 trillion). The ICMA Centre at Reading University has suggested that the global commercial market, although it has contracted since 2007, may be up to EUR 15 trillion in size.

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](#) (see also question 36).

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 (broker-dealers or investment banks) and leveraged investors such as hedge funds seeking funding. On the buyers' side, the principal traditional users have been large commercial banks and cash-rich and often very risk-averse investors, such as central banks investing foreign currency reserves, and international financial institutions and money market mutual funds seeking secure investments. Since the 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 as such sovereign wealth funds, pension funds, insurance companies, endowments and corporate treasuries.

Most central banks rely on the repo market as the main channel for the transmission of monetary policy implementation 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. 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 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, are bonds issued by creditworthy central governments. The ICMA's semi-annual survey of the European repo market estimates government bond collateral to account for about 80% of EU-originated repo collateral. In the US, Treasury securities may account for about two-thirds of that repo market (and much of the rest 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 repos are 'high grade' bonds issued by supranational institutions such as the IBRD, 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. 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. They include:

- Corporate bonds, typically senior unsecured debt issued by investment-grade banks and non-financial companies.
- Equity, particularly baskets reproducing market indexes such as the FTSE-100, CAC and DAX.

- 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 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 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 resecuritisations (CDO, CLO, CLN, etc), which are held off the balance sheet of the originator of the underlying assets and ring-fenced contractually within bankruptcy-remote special purposes vehicles (SPV). Most investors require a AAA-rating on such assets. This type of asset also suffered during the crisis, because of contagion from securities backed by collateral pools which included sub-prime mortgages or MBS.
- Money market securities such as treasury bills and, in some countries, certificates of deposit (CD) and commercial paper (CP).
- 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. Because they are not traded, parties have to estimate the value. Bank loans are seen as a deep pool of high-quality collateral assets that could help to alleviate a possible global shortage of collateral.
- Gold. This is a very specialised type of collateral but its use has been boosted by the interest in gold generated by the crisis.

Assets that pose material credit and/or liquidity 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 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](#)).

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. The US repo market is mainly overnight, but the maturity distribution of the European market is longer and has been lengthening. This was happening before the crisis that erupted in 2007 but has since accelerated, partly in response to regulatory pressure on banks to lengthen the duration of liabilities. The ICMA's semi-annual survey of the European repo market shows that the proportion of *short-dated repos* (terms of one month or less) have decreased from some two-thirds of the outstanding value of repos to about half. In addition, *forward repos*, which often start one or more months in the future, account for about 8% of the survey. Repo with only one day to maturity is less than 20%. For more information, see the results of the [ICMA's surveys](#).

8. What is the difference between a repurchase agreement and a sell/buy-back?

Repurchase agreements and sell/buy-backs both function (outside the US --- [see question 9](#)) by means of the legal sale of collateral but behave economically like secured loans/deposits ([see question 1](#)). The principal difference between these two types of repo stems from the fact that a repurchase agreement is always evidenced by a written contract, whereas a sell/buy-back may or may not be documented.

Because repurchase agreements and documented sell/buy-backs have written contracts, they are legally more robust and commercially more flexible than undocumented sell/buy-backs.

Because an undocumented sell/buy-back is not documented, its sale and repurchase legs are considered to be separate contracts. The lack of a contract between the parties to an undocumented sell/buy-back, other than on the first and last day of the transaction, means that it is not possible for one party to make a legally-enforceable margin call on the other in order to eliminate differences that might 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 mutual obligations following a counterparty default is less certain. These deficiencies make undocumented sell/buy-backs riskier.

There are some other (operational) differences between repurchase agreements and sell/buy-backs, eg the way that margining is performed in repurchase agreements compared with the equivalent process in documented sell/buy-backs, and what happens when a coupon, dividend or other income payment is paid on collateral in repurchase agreements compared with either documented or undocumented sell/buy-backs.

Some markets predominantly use repurchase agreements (eg US, UK, France, Belgium, Netherlands and Switzerland). Other markets predominantly or even exclusively use sell/buy-backs (eg Italy, Spain and most emerging markets), usually because aspects of repurchase agreements such as margining can pose legal difficulties in those jurisdictions.

9. 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 is difficult. Instead, collateral is pledged but exempted from certain provisions of the US Bankruptcy Code that normally apply to pledges, in particular, 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 general right of use of collateral. Consequently, the resulting rights are deemed to be much the same as those achieved by an outright sale.

Repo agreements under New York law also include a fall-back provision to re-characterise repo as secured lending in the event that a buyer's rights to collateral proves not to be enforceable in law. Such a fall-back provision does not work under English law.

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 party, whereas it is around 10% of the European market. Moreover, there are fundamental differences between the European and US tri-party repo markets ([see question 24](#)).

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.

10. What is 'rehypothecation' of collateral?

'Rehypothecation' is an alternative name for 're-pledging'. In other words, a party who receives a pledge of collateral makes a pledge of the same collateral to a third-party. In the derivatives market, rehypothecation is sometimes also called 're-use'. However, the term 're-use' is used in the repo market for the outright sale of collateral by the buyer to a third party. This has caused some confusion (and elsewhere in these FAQs, we therefore employ the term 'use' when talking about repo).

There is an important legal distinction between rehypothecation on the one hand and the 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. When the right of rehypothecation is exercised, the collateral-giver loses his title to the collateral, which is transferred to the third party to whom the collateral has been rehypothecated. Instead, the collateral-giver is given a contractual right to the return of fungible collateral but this is 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 typically has a contractual right of set-off of all mutual obligations against 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 law 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. Moreover, 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 liability to the prime broker. In many other markets, there are no such limits.

11. What is general collateral (GC) repo?

General collateral or *GC* is the range of assets that are accepted as collateral by the majority of intermediaries in the repo market, at any particular moment at the same or a very similar repo rate --- the *GC repo rate*. In other words, the repo market as a whole is indifferent between general collateral securities. They are close substitutes for each other. GC assets are high quality and liquid, but none is subject to exceptional specific demand compared with very similar assets. The GC repo rate is therefore driven purely by the supply of and demand for cash (not by the supply of and demand for individual assets). In other words, GC repo can be said to be cash-driven. As such, the GC repo rate should be closely correlated to other money market rates, eg LIBOR, EURIBOR, etc, although trading at a spread representing the lower credit and liquidity risks in repo.

In practice, there will often be a narrow band of several repo rates for securities which all qualify as GC. The differences between these rates is due to operational features such as the method of custody and settlement ('hold-in-custody' or HIC repos pay higher rates) and whether there is an agreed right of substitution (in which case, there should also be a higher repo rate). The convention is to take the highest repo rate for comparable collateral as the GC repo rate.

When negotiating GC repos, parties agree the term, size and price of such transactions first and the collateral last. The seller has some choice about which security to deliver as collateral.

In the eurozone, the financial crisis which erupted in 2007 has 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, a French GC market and so on, but there is no longer a eurozone GC market, except for one-day repos, where credit risk is minimal.

It is possible to create 'GC baskets' for the purposes of facilitating trading. A GC basket is a list 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 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 delivery instructions by the CCP. Where a GC basket is defined by an ATS, sellers decide which issues they deliver.

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

A *special* is an asset that is subject to exceptional specific demand in the repo and cash markets compared with very similar assets. This causes potential buyers in the repo market to compete for the asset by offering cheap cash in exchange. A special is therefore identified by a repo rate that is lower than the GC repo rate ([see question 11](#)). The demand for some assets can become so strong that the repo rate on that particular asset falls to zero or even goes negative. The repo market is the only financial market in which a negative rate of return is not unusual.

Bonds trading 'on special' in the repo market will also be subject to exceptional specific demand in the cash market.⁷ Indeed, demand in the cash market is usually the reason why bonds trade on special in the repo market. Market-makers and other dealers will use the repo market to borrow bonds that are in strong demand in the cash market (and therefore sometimes scarce) in order to fulfil delivery commitments on sales of those bonds in the cash market. Where a bond is on special in the repo market, it will be more expensive to buy in the cash market compared to very similar issues.

When negotiating special repos, parties agree the collateral first and then the term, size and price of such transactions. The seller has no choice about which security to deliver as collateral.

One of the most common reasons for a bond to go special is when it 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

⁷ 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.

parties will be forced to borrow the bond in the repo market and they may have to bid aggressively to secure the bond, including sometimes offering negative repo rates.

The term 'special' is often used incorrectly to describe any single security issue that the seller and buyer in a repo agree to use as collateral, as opposed to issues selected from a GC basket. This is not correct. A special is identified only by the fact that its repo rate is below the GC repo rate. Not all security issues specifically agreed as collateral between sellers and buyers 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.

Note that the GC baskets created by an automatic repo trading system (ATS) or a central clearing counterparty (CCP) are not precise reflections of what is actually GC in the market. Because the contents of such baskets are fixed (or only infrequently changed), they are likely to contain issues that have gone special. On the other hand, they will not contain all the securities that are trading GC.

13. What is an open repo?

An open repo (also known as *on demand* repo) is a repurchase agreement that is agreed without fixing the maturity date. Instead, the repo can be terminated on any day in the future by either party, provided they give notice before an agreed daily deadline.

Until an open repo is terminated, it automatically rolls over each day. 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 all the time, accumulated interest is typically paid off every month. The initial repo rate on an open transaction will be close to the overnight repo rate, but it will not subsequently change until the parties agree to re-set the rate. Open repo is used to invest cash or finance assets where the parties are not sure how long they will need to do so.

14. 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 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. 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 though he is taking legal title of the security.

The collateral in securities lending can either be other securities or cash (securities lending against cash collateral looks very much like a 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 most repo is for general collateral (GC) and is therefore motivated by the need to borrow and lend cash ([see question 11](#)), whereas securities lending is typically driven by the need to borrow securities. There is therefore an overlap between securities

lending and the 'specials' segment of the repo market, which is also driven by the demand to borrow particular securities ([see question 12](#)).

Another important difference 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 securities lending transfers not only the legal ownership of equities, 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 a right of recall by the lender, so that he can recover securities if he wishes to exercise his voting rights or respond to corporate actions. In contrast, unless a right of substitution is specifically agreed between the parties at the point of trade, repo does not allow a seller to recall his securities during the life of a transaction.

The repo market in Europe is represented by the *European Repo Council (ERC)* of the *International Capital Market Association (ICMA)*, which publishes the most widely-used model legal contract for international 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 legal contract for international securities lending, the *Global Master Securities Lending Agreement (GMSLA)*.

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 across clearing and settlement systems, efficient collateral management (particularly margining) and legal certainty about ownership of collateral.

- Careful selection of counterparties is vital to the performance of repo. This is because the value of even the best assets will fluctuate and the liquidation of collateral in response to an event of default can be delayed by unexpected operational and legal problems. Moreover, collateralisation does not change the probability of default of a counterparty, so collateral taken from risky counterparties is likely to be tested by a default and may turn out to be worth less than expected. Consequently, collateral should be treated only as insurance against the default of the seller, not as a substitute for his credit risk. This means that the primary exposure in a repo remains counterparty credit risk. Consequently, repo does not replace 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 and 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, 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 meets both criteria. However, the sources of high quality and liquid collateral have recently been reduced by the sovereign debt crisis, although possible alternatives are being investigated by the market, including covered bonds and bank loans.
- 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 has a fragmented securities clearing and settlement infrastructure. Great strides have been made in integrating the European infrastructure 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 margin to compensate for fluctuations in the value of collateral ([see question 20](#)). It may also be helpful to adjust the initial market value for some types of collateral by applying a haircut or initial margin ([see question 21](#)), in order to cover the gaps between margining and take account of the potential cost of liquidation following a default. Guidance on efficient margining is set out in the [Guide to Best Practice in the European Repo Market](#) published by the European Repo Council (ERC) of the ICMA.
- Legal certainty about a buyer's right to collateral and the right of a non-defaulting party to net mutual obligations in the event of a default depend 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 should not make lenders indifferent to the identity of their counterparties. This is because collateral is not perfect. The value of even the best assets fluctuates and the liquidation of even the best collateral in response to an event of default, particularly an insolvency, can be delayed by

unexpected operational and legal problems. Moreover, collateralisation does not change the probability of default of a counterparty, so collateral taken from risky counterparties is likely to be tested by a default and may turn out to be worth less than expected. Consequently, collateral should be treated only as insurance against the default of the repo seller, not as a substitute for his credit risk. This means that the primary exposure in a repo remains counterparty credit risk. Consequently, repo does not replace 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 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 credit to that counterparty, not that the decision on whether to extend credit to a counterparty is taken after the decision to use repo and is dependent on the use of repo.

17. Who regulates the repo market?

The use of repo is subject to a range of laws and regulations enforced by regulatory agencies. For example, in Europe, repo is impacted directly by laws and regulations implementing the EU Financial Collateral Directive and by the Short Selling Regulation, 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 Regulations (MiFIR), the Bank Resolution and Recovery Directive, the CSD Regulation, 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 purpose of collateralisation is to secure a lender (ie mitigate his credit risk) by giving him the right to liquidate collateral provided by the borrower in the event that the borrower becomes insolvent or defaults in another way. In traditional secured lending, this right is established as a *pledge* or other type of *security interest* on the collateral. In repo, security is established (outside the US --- [see question 9](#)) by a transfer of legal title to the collateral. In order to ensure that courts will enforce a lender's right to collateral, it is usually mandatory (in the case of pledges) or prudent (in the case of transfer of title) to provide a written agreement as evidence of the intentions of the parties to give the lender the right to liquidate the collateral.

In the case of repo, the evidence provided by a written agreement should help to ensure that a court will not invalidate the transfer of title to the collateral and re-characterise 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 nor would they have performed any of the formalities normally required to establish a pledge. The lender would therefore find himself an unsecured creditor.

Other legal reasons for having a written agreement are:

- To set out the procedure to be followed in the event of a default by one of the parties. This is essential in minimising the disruption that a default can cause to the business of non-defaulting parties as well as to the rest of the market.

- To reinforce the right, in a default, 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 *netting* rights can eliminate or dramatically reduce the loss caused by the default of a counterparty. There needs to be sufficient flexibility in terms of timing and method of valuation to accommodate less liquid collateral and difficult market conditions.
- To set out how 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 agreement and its margining provisions are the minimum regulatory conditions for recognition of the risk mitigation impact of collateral in the calculation of regulatory risk capital requirements under Basel III.

Written agreements for financial transactions such as repo frequently take the form of a *master agreement*, such as the 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 each transaction 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.
- 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 payments and collateral transfer netting.
- 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 harmonisation of market practice.

Written agreements also allow the terms of a repo to be varied, 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.

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 the GMRA each year in over 60 jurisdictions for transactions with banks 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 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 global 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 during the crisis, including 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 GMRA consists of a pre-printed master agreement that contains standard provisions, which are generic to the market and should not need further negotiation by the parties, and Annex I, which lists specific choices that need to be made by the parties (eg 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 terms and conditions of the business relationship between the parties. 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 fixed-income European government bonds that take the form of repurchase agreements between principals under the law of England and Wales. To apply the GMRA to repos of equities or money market instruments, repos by or with an agent, or repos in the form of sell/buy-backs, it is necessary to amend the master agreement by signing the Equity, Bills of Exchange, 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, there are also a number of country annexes.

To ensure that the GMRA remains effective, the ICMA commissions legal opinions every year on the enforceability of the whole agreement, its transfer of title provisions and its mechanism for netting in insolvency in over 60 jurisdictions for transactions with banks and other companies, and in many countries, transactions with various types of non-bank financial institutions.

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 in the calculation of regulatory capital requirements.

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 stable in value. In addition, collateral issued by a party whose credit risk is uncorrelated with that of the repo counterparty will diversify exposure and avoid so-called *wrong-way risk*, which is the danger of the collateral value falling as the creditworthiness of the counterparty deteriorates.

Whatever collateral is accepted, buyers then need to value that collateral as accurately as possible. They also need to anticipate potential problems in liquidating less liquid collateral in the event of a default, by applying a risk adjustment to its market value in the form of a haircut or initial margin.

Once the terms of a repo have been agreed, both parties should revalue the collateral frequently (at least daily) and as accurately as possible. When the value of collateral in a repurchase agreement falls, the buyer should promptly call for margin from the seller to top up the collateral and ensure the urgent delivery of that margin. Guidance on efficient margining is set out in the [Guide to Best Practice in the European Repo Market](#) published by the European Repo Council (ERC) of the ICMA. In the case of sell/buy-backs, an alternative mechanism is employed that achieves the same result as margining ([see question 8](#)).

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 any circumstance and to net his exposures to the defaulter swiftly as well as flexibly in terms of the timing and method of valuation to accommodate less liquid collateral and difficult market conditions.

21. What is a haircut?

A haircut is the difference between the market value of an asset and the purchase price paid at the start of a repo. An initial margin is an alternative to a haircut. A haircut is expressed as the percentage deduction from the market value of collateral (eg 2%), while an initial margin is the 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 perfect collateral would be certain, meaning that it would be easy to sell for a 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 bond issued by a creditworthy central government.

Assets that pose material credit and/or liquidity risks can be used as collateral but not for their full market value. Instead, a risk-adjusted value is calculated, which is less than the market value. Either a haircut is deducted from the market value of collateral or the purchase price is multiplied by an initial margin.

The haircut or initial margin represents the potential loss of value due to (1) price volatility between regular margining dates (in case there is a default between a calculation of a margin call and the payment or transfer of margin in response to that margin call) and (2) the probable cost of liquidating collateral following an event of default, as well as (3) inconsistencies between the valuation methodologies used in margining and for a default. There are three broad issues: delays in liquidation, price volatility and the potential price impact of a default by the issuer of the collateral asset. Time delays include: how long it takes to respond to a margin call (operational risk); the likelihood of a delay in liquidation due to a legal challenge to the non-defaulting party's title to the collateral asset or his right to net (legal risk); and how quickly the entire holding of a collateral asset could be liquidated without a significant market impact or how far might the price fall or be forced down by faster selling (liquidity risk). 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 loss by a non-defaulting party is a function of the collateral and collateral management rather than the credit of the counterparty (ie a matter of loss-given-default rather than probability of default). 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. Nevertheless, in practice, many parties do factor in the credit risk of their repo counterparties.

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 Council (ERC) of the ICMA.

22. Who is entitled to receive a coupon, dividend 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 and he is entitled to any benefits of ownership. This means he should receive any coupon, dividend 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 at a fixed price in the future (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 received the return, including coupons, dividends or other income. To satisfy the seller, under the GMRA, the buyer agrees to pay him compensatory amounts equivalent to any income payment received on the collateral. In the UK, these are called *manufactured payments*.

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

During the term 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, this 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. It is unacceptable market practice to use repo to buy equity solely in order to exercise the voting rights.

Also 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, where the security is being used as collateral in a repo, the decision rests entirely with the buyer. However, while the seller cannot dictate what decision the buyer makes on the collateral sold to the buyer at the start of the repo (assuming the buyer is still holding that collateral when a decision has to be made), the seller has the contractual right to specify the form of the fungible collateral to be sold back to him at the end of the repo ([see question 1](#)). This would include the result of exercising any option. As a practical matter, this may determine the decision of the buyer on the corporate action.

24. What is tri-party repo?

Tri-party repo is a transaction for which post-trade processing --- collateral selection, payment and settlement, custody and management during the life of the transaction --- is outsourced by the parties to a third-party agent. Tri-party agents are custodian banks. In Europe, the principal tri-party agents are Clearstream Luxembourg, Euroclear, Bank of New York Mellon, JP Morgan and SIS. In the US, there are only two: Bank of New York Mellon and JP Morgan.

Because a tri-party agent is just an agent, use of a tri-party service does not change the relationship between the parties, as the agent does not participate in the risk of transactions. If one of the parties defaults, the impact still falls entirely on the other party. This means that parties to tri-party repo need to continue to sign bilateral written legal agreements such as the GMRA.

Nor does the tri-party agent provide a trading venue where the parties can negotiate and execute transactions. Instead, once a transaction has been agreed --- 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 automatically select, from the securities account of the seller, sufficient collateral that satisfies the credit and liquidity criteria and concentration limits pre-set by the buyer. The selected collateral will be delivered against simultaneous payment of cash from the account of the buyer, subject to initial margins pre-specified by the buyer. Subsequently, the tri-party agent

manages the regular revaluation of the collateral, 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 and substitution at the request of the seller.

There are currently 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 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 crisis), whereas US tri-party is focused on Treasury and Agency debt (about two-thirds of that market).
- In European tri-party systems, there has always been true term repo, whereas term repos in US tri-party systems have traditionally unwound each morning, to be re-arranged in the afternoon (the same for open repos). This was intended to give sellers (who are usually broker-dealers) the daily opportunity to substitute collateral and adjust for price fluctuations (instead of margining with the other party), but it requires 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 margining. Concern about the systemic risk posed by the huge intra-day credit exposures taken by the US tri-party agents (JP Morgan and Bank of New York Mellon) have prompted reforms to the US tri-party market which have brought 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 account for almost two-thirds of the market. These investors have short-term liabilities and are required or prefer to invest in short-term assets such as repo. However, most tri-party repos are against medium or long-term securities. Provided there is no default, repo collateral does not appear on the balance sheet of the investor. But if there were to be a default on a repo, investors would receive the securities onto their balance sheets. Given that they cannot or do not wish to hold such collateral, they would be obliged or feel impelled to immediately sell the collateral. 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 Europe 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, if the seller fails to deliver; or at the end of a repo, if there is a failure to deliver by the buyer.

In the event of a failure by a seller to deliver collateral to the buyer at the start 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 as an event of default, the buyer could place the seller in default. However, putting a counterparty into default is a very serious step. It is important to be sure that his failure to deliver reflects credit problems and not temporary operational problems, infrastructure frictions or market illiquidity, which are all beyond the seller's control.
- The contract remains in force but the buyer withholds cash from the seller. This option allows the seller to deliver the collateral 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 whether or not the seller ever delivers the collateral, at the end of the repo, the seller will be obliged to pay to the buyer the repo interest for the full intended term of the transaction. This means that the seller is penalised for failing to deliver and the buyer is compensated.

- The buyer terminates the failed transaction (he can do this at any time). If he does, the seller will be obliged to pay whatever repo interest has accrued up to the date of termination.

In the event of a failure by the buyer to deliver collateral 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 as an event of default, the seller could place the buyer in default.
- The seller could call a *mini close-out*, which means he terminates the failed transaction (but no others), values the collateral in that transaction using the methodology set out in the GMRA for defaults ([see question 26](#)), offsets this against the cash he owes the buyer and settles 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, 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.
- 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.

In the event of a failure by the seller to deliver collateral 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. If the failing counterparty does not promptly return the cash, he risks being placed into default.

26. What happens to repo in a default?

If the defaulting party has documented its repo business under a master agreement, such as the ICMA's Global Master Repurchase Agreement (GMRA), default means that the party has triggered one of the Events of Default listed in the agreement. In the GMRA, the standard list 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 margin calls;
- making an admission in writing of one's inability to meet debts as they fall due;
- making materially incorrect or untrue representations;
- being suspended or expelled from a securities exchange or (under the GMRA 2000) from another self-regulatory organisation;
- being suspended for particular 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 innovative bodies established in the wake of the 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 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, the occurrence of either of two of the 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 (under the GMRA 2000, the precise moment is when the other party becomes

aware of the event but under the GMRA 2011, it is when the event occurs). For all other Events of Default, a party is not actually in default until its counterparty serves a default notice.

Default notices 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 (this includes e-mail).

Default starts when letters are delivered, telexes prompt an answerback from the recipient: faxes are received by a responsible employee in legible form; registered mail is either delivered or delivery is attempted; or when an electronic message is delivered. However, for many of these methods, it can be difficult to prove that delivery has occurred. 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 default.

Once a party is formally in default, the process of *close-out* starts. This has three stages.

- First, all outstanding obligations due on repos documented under the same GMRA are accelerated for immediate settlement and all margin held by the parties are called back.
- Second, the *Default Market Values* of the collateral are fixed and transactions costs added. 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 non-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.

The speed of the valuation stage of the close-out 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 date of default to complete the valuation (although this can be extended in exceptional circumstances). He has a menu of three valuation options. If he buys or sells collateral, he can use the actual dealing prices. Or he 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 illiquid --- which means the non-defaulting party cannot buy or sell the collateral or, acting in good faith, he cannot find market quotes, or he can find quotes but he believes they are not 'commercially reasonable' (eg they are for amounts much smaller than needed) or would not be commercially reasonable to use --- 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).

The non-defaulting party can charge interest on late payments but cannot use the close-out 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). Consequently, downstream losses caused by the default (those not immediately due to the default on repos) cannot be claimed.

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 crisis. Accordingly, the changes introduced by the GMRA 2011 were not substantial.

27. What does a CCP do? What are the pros and cons?

CCP is the acronym for *central (clearing) counterparty*. In some 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 process called 'netting by novation'), or is deemed to be an original party to the transaction (one transaction automatically generates two contracts --- a process called 'open order'), to become the buyer to every seller and the seller to every buyer. The CCP is AAA-rated, because it conservatively collateralises its exposures; is backed by reserves, a default fund and other safeguards; and the CCP can ultimately fall back on its members (risk is shared). CCPs therefore provide attractive low-risk counterparties.
- The CCP will net transactions between members on a multilateral basis (netting by a CCP is referred to as "clearing"). This means that a delivery of a security due to the CCP from parties A and B can be netted off against deliveries of the same security due on the same day from the CCP to parties C and D. The same applies to cash payments. This produces much smaller net exposures than bilateral netting, in which each party can only net transactions with the same counterparty.

The benefits offered by CCPs include:

- The reduction of risk exposure by providing a AAA-rated counterparty and by multilateral netting. This generates a consequent reduction of regulatory risk capital charges.
- More rigorous risk management practices than many market users.
- The reduction of balance sheets through netting.
- Operational efficiencies from the netting of payments and transfers.
- The potential for enhancing market transparency, given that CCPs collect data on transactions and are therefore in a position to publish aggregated price and volume data (eg the DTCC in the US publishes a repo rate index).

For these reasons, regulators wish to encourage the migration of as much financial activity as possible to CCPs in order to reduce systemic risk. However, there are a number of drawbacks to the use of CCP, which regulators will 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 clearing members, they will also have contingent obligations to help bail out the CCP should a default by another member or several other members exhaust the CCP's margins and default fund. 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 (eg 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.
- 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 scrutinise these methodologies, despite their critical dependence on them.

- Most financial assets are not eligible for clearing across CCPs. This includes most credit instruments.
- 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 on a bilateral basis.
- 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, ie intermediaries rather than end-investors. Many end-users are unused to margining and may be deterred from trading by the cost and effort of margining.
- Netting requires standardisation of financial instruments. Less customisation 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.
- CCPs accept a limited range of collateral assets, usually only cash in major currencies and top-quality government bonds. This may contribute to a systemic shortage of collateral.

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-Clearnet Ltd in the UK, LCH-Clearnet SA in France, Eurex Clearing in Germany, CC&G in Italy and 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 (the ECB's money market survey suggests in the order of 70%).

Most CCP-cleared repos are negotiated on automatic repo trading systems such as 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.

Topical issues

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

Short-selling is the sale of a borrowed security. In due course, the short-seller will have to buy the borrowed security back from 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 performs essential functions in the financial market:

- **Market-making.** Short-selling allows a market-maker to continuously quote prices for securities that he does not hold. 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 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 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 the underwriting of new bond issues and is therefore essential to primary market liquidity.
- **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 is therefore 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. Since the price of a security can only fall to zero, there is a limit to the possible capital gain on a short position. However, in theory, there is no limit to where the price of a security can rise, so the possible capital loss is potentially unlimited.
- **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. This differential is known as the 'cost of carry'.
- **Penalty cost.** A short-seller who is unable to buy back a security from the market and return it to the lender will be penalised for failing to deliver.

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. Unintentional uncovered short positions arise when it is 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.

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.

29. 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 (as well as 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 borrowing power.

30. 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, in aggregate, 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 fuel market exuberance.

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

This 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 34](#)). However, they based their hypothesis on a single set of data on collateral haircuts taken on structured securities by a single anonymous US broker-dealer. This type of collateral constitutes a very small part of the repo market. It is naïve to extrapolate events in this narrow sector 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 procyclicality mistakenly ascribed to haircuts and initial margins (as well as to reduce leverage). A detailed discussion of the role of [Haircuts and initial margins in the repo market](#) was published by the ICMA in February 2012.

31. 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 in US repo, where US Treasury and Agency securities are given as collateral through a pledge that 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 Europe and elsewhere, the legal form of a repo involves 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.

32. 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 asset 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.

Repo involves an outright sale of assets for cash. It therefore does not encumber a borrower's assets any more than any other outright sale of assets. In return for the asset, the borrower receives cash, a generally superior asset in terms of credit and liquidity risk.

The argument that repo entirely encumbers assets is illusory. Consider a bank with cash assets of 10 funded with liabilities in the form of 5 of equity and 5 of unsecured deposits. Assume it uses the cash to buy bonds worth 10. It then repos out the bonds for cash of 10. On its balance sheet, it now has 20 of assets in the form of 10 in bonds and 10 in cash and 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 has 20 of assets in the form of 20 in bonds and 20 of liabilities in the same form as before. The encumbrance argument would say that 10 of the bond assets are encumbered because they are held as collateral by the repo counterparty. However, in the event of a default by the bank, these assets 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 bonds) that it had at the start to cover the 5 of unsecured deposits. The bank's unsecured depositors are as well protected as before, even though the encumbrance ratio has risen from zero to 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 a fixed price at the end of the repo, which means that he 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 unhelpfully disguise his leverage (this is what Lehman Brothers and MF Global did). Under International Financial Reporting Standards (IFRS), assets sold as collateral are distinguished from other assets, so the situation is clearly explained to investors ([see question 37](#)).

The one occasion on which repos can encumber assets is when there is a haircut or initial margin imposed on the collateral (in addition, potential margin calls can be seen as contingent asset encumbrance). However, this is marginal encumbrance. And, in practice, haircuts and initial margins have been used selectively in the European market. Ironically, official proposals for a minimum mandatory haircut on collateral may make encumbrance a more material issue.

33. Is repo a source of unstable short-term funding?

One of the concerns expressed by policy-makers and regulators about ‘shadow banking’ (ie market finance) is the possible instability of the wholesale funding on which the shadow banking system is seen to rely. This includes repo ([see question 35](#)). The argument is that, while wholesale liabilities such as repo are like the deposits issued by traditional banks, they are riskier because:

- Institutions funding in the wholesale markets are seen as more dependent on these sources of financing than traditional banks are on deposits.
- Wholesale funding is considered less regulated.
- The wholesale market is 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, it is reliant on private sector balance sheets (eg back-up lines for ABCP, credit guarantees, and CDS provided by insurers, credit derivative product companies and credit hedge funds). In systemic crises, private credit and liquidity support could prove ineffective, as providers are unable to perform due to stress on their own balance sheets.
- The wholesale market mainly intermediates institutional cash balances, whereas the traditional banking system is more reliant on retail money. Institutional cash has been described as “well-informed, herd-like and fickle”.
- Regulators are concerned about the complexity of the financial market, because complex systems are in theory less transparent and may be inherently unstable.

Consequently, wholesale funding is seen as inherently fragile and prone to runs on confidence. It is often compared with the *free banking* system of the 19th and early 20th century US.

The proposition that repo is a source of wholesale funding is fundamentally misleading. The liquidity risk which is being identified is not intrinsic to the instrument but is largely a function of the asset and liability management strategies of borrowers (funding liquidity risk) and therefore largely an issue about the appropriate regulation of financial institutions.

Although the average term to maturity of repo has traditionally been short, this has merely reflected the character of supply and demand. The average term of repo has been lengthening. There is nothing inherent in repo that requires it to be short term. The ICMA’s semi-annual survey of the European repo market shows that the proportion of *short-dated repo* (terms of one month or less) have decreased from some two-thirds of outstanding value of repos to about half. In addition, *forward repos*, which often start one or more months in the future, account for about 8% of the survey. Repo with only one day to maturity is less than 20%.

It is also important to recognise that reliance on retail deposits and other sources of funding guaranteed or otherwise underpinned by official safety nets passes ultimate liability for ‘regulated’ markets to the public sector. In contrast, collateralised funding like repo, if prudently managed, in particular by selecting high-quality assets, is largely self-insured.

In addition, in practice, the repo market possesses important inbuilt stabilising mechanisms, in particular, widespread use of CCPs, which reduce risk exposures and liquidity-hoarding incentives by providing a creditworthy counterparty and by multilateral netting. The impact of CCPs in the repo market has been extended by access being opened through post-trade registration of transactions executed directly or via a voice-broker, rather than just electronically. Some 70% of European repo market turnover may be cleared through CCPs.

The proposition that complex systems can exhibit unstable behaviour is uncontentious. There is little doubt that the decomposition by the market of the process of credit intermediation, formerly monopolised by banks, into a chain of discrete operations has increased complexity in some parts of the financial market (at least to the extent of lengthening intermediation chains). However, 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.

Moreover, the interbank market, both secured and unsecured, may in fact have become less complex, as well as relatively less important. Since about 1996, there has been a sectorial shift in interbank markets such as Eurodollars, away from interbank lending (including repo) and into lending to non-bank customers such as US securities firms and other non-bank financial institutions. Interbank lending declined from 66-75% to below half. At the same time, the configuration of the interbank market has been simplified by the introduction of electronic trading in spot FX, bank mergers and the re-organisation of global liquidity operations into hub-and-spoke structures in which all dealing is booked through one centre. The case for greater interbank complexity is not proven.

Finally, it is worth noting that, during the global 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 & 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.

34. Was a ‘run on repo’ the cause of the financial crisis in 2007?

This term 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 pro-cyclicality of haircuts, spawning the idea of a minimum mandatory haircut.⁸ Unfortunately, there are fundamental flaws in the calibration of their model.

Gorton and Metrick argue that the financial crisis of 2007-08 was akin to a traditional banking panic but was precipitated by a run on the repo market, which they describe as being part of the “securitised

⁸ Gorton, Gary, & Andrew Metrick, *Securitized Banking and the Run on Repo* (9 November 2010).

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 Gorton and Metrick 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 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 structured securities (ABS, RMBS, CMBS, CLO and CDO). Gorton and Metrick 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 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 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 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.

While Gorton and Metrick’s analysis may have overestimated the impact of haircuts/initial margins in the US market, 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 is government securities. Structured securities are a small component. Most structured securities in the European market are managed as tri-party repos. ICMA data suggests such collateral accounts for no more than 10% of tri-party repo, which itself is 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, margin maintenance 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 margin maintenance is more significant and will mute the impact of margin calls.

It is therefore a serious mistake to extrapolate certain events in one part of US credit repo into the European 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.⁹ Even on the basis of conservative assumptions, the impact on the value of collateral of changes in haircuts/initial margins 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,

⁹ [Haircuts and initial margins in the repo market](#), ICMA (8 February 2012).

the difference is of an order of magnitude, which seriously calls into question haircut spiral models such as Gorton and Metrick's as a feasible explanation 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."¹⁰ 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.

35. Is repo a type of 'shadow banking'?

'Shadow banking' is an unfortunately pejorative term which has been applied, since the financial crisis, to 'market finance'. It is defined, for regulatory purposes, as traditional banking activity conducted by non-banks. However, 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 insurance or 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 intermediation and the creation of leverage on a scale that can 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. Moreover, it is argued that, because of the lack of safety nets, shadow banks have to rely on securities financing transactions, including repo, and that collateral is pro-cyclical (amplifying credit growth in booms and accentuating credit shrinkage in busts --- [see question 30](#)).

However, repo is not intrinsically a shadow banking instrument, as it is not used exclusively by so-called shadow banks. Thus, it is widely 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.

36. Is the repo market opaque?

This criticism has been applied at two levels: within individual institutions and across the financial system.

¹⁰ Krishnamurthy, Arvind, Stefan Nagel and Dmitry Orlov, *Sizing Up Repo*, Stanford University (November 2011).

At first glance, the accounting treatment of repo on the balance sheet of an individual institution can appear odd, but it is entirely logical when one recalls that balance sheets are intended to measure the value and risk of a company and not the legal form in which it has structured its transactions. In a repo, the seller in a repo commits to repurchase the collateral at a fixed future repurchase price, which means that the seller retains the risk and return on that collateral. Accordingly, the collateral must remain on the balance sheet of the seller, even though he has sold legal title to the collateral to the buyer. The logic of this treatment is confirmed by the consequence that, because the cash paid for the collateral and the corresponding repayment at maturity are added to the seller's balance sheet, 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 that some assets have been sold in a repo, the International Financial Reporting Standards (IFRS) require that securities out on repo are reclassified from 'investments' to 'collateral' and are balanced by a 'collateralised borrowing' liability.

At the level of the financial system, there are gaps in the measurement of repo, although arguably no greater than for unsecured deposits or many other financial instruments (eg it is extremely difficult to fix the size of the unsecured deposit market). Of course, it is desirable for regulators and market users to have adequate data on the structure and operation of the market.

Current sources of data on the European repo market include:

- the semi-annual [European Repo Market Survey](#) conducted by the ICMA since 2001.
- the ECB's annual European Central Bank *Euro Money Market Survey*
- the Bank of England's sterling money market survey
- turnover data from primary dealers collected by the Agence France Trésor
- turnover data on electronically-traded repo from automatic repo trading systems such as BrokerTec, Eurex Repo and MTS
- turnover data on repos cleared across CCPs published by MEFFREPO in Spain
- considerable volumes of highly-granular transaction data reported by banks to regulators.

In the US, repo market data sources include:

- data from primary dealers collected by the Federal Reserve Bank of New York (in the FR 2004/A/B/C Weekly Report of Dealer Positions, Transactions and Financing) and the tri-party repo systems operated by Bank of New York Mellon and JP Morgan
- very detailed transaction data, including investments in repo, is provided by money market mutual funds to the SEC on form N-MFP
- the Depository Trust & Clearing Corporation (DTCC), which operates the CCP for the US repo market, also publishes transaction-weighted overnight repo rate indexes for US Treasury, Agency and Agency MBS collateral (collectively called the GCF Repo Index) and the underlying turnover in that segment of the US repo market.

In addition, banks and other institutions publish accounts showing the outstanding value of their repos on reporting dates.

Regulators have expressed their intention to establish databases for repo and securities lending transactions. There may be one for each national market and, in Europe, one for the member states of the European Union. Some public authorities are proposing to collect a limited set of transaction variables that would allow them to identify concentrations of risk in collateral. Others are seeking a full trade repository to which all regulated institutions would report the entire set of details describing each transaction.

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, use was made of provisions specific to US Generally Accepted Accounting Principles (GAAP). These have been closed.

In Europe, such accounting options are not available and repo must be accounted for in the standard way. This follows the principle that balance sheets are intended to measure the value and risk of a company, not the legal form in which it has structured its transactions. In a repo, as the seller in a repo commits to repurchase the collateral at a fixed future repurchase price, 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 from "investments" to "collateral" and are balanced by a "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 chronic underlying problem of dwindling liquidity in longer-term unsecured interbank deposits. What were the sources of rates such as 6, 9 and 12-month LIBOR and EURIBOR, given the thin or non-existent trading in such tenors? The unsecured interbank deposit market had become increasingly illiquid since the 1990s and liquidity vanished entirely during the financial crisis that erupted in 2007. Illiquidity, even more than the manipulation of fixings, 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.

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 currently there is a fundamental obstacle to the construction of any meaningful interest rate benchmark. Such benchmarks are meant to measure the average cost of wholesale funding to banks. However, heightened anxiety about credit risk has resulted in the tiering of banks in terms of perceived creditworthiness and cost of funding, rendering the idea of any average cost of funding unrealistic.

But even under normal market conditions, a repo rate benchmark would be challenging to construct. Repo rates depend on the credit risk of the repo counterparty, the quality of the collateral and the correlation between the credit risks of the repo counterparty and collateral issuer. In order to minimise the influence of counterparty credit risk, the estimation of an 'average' repo rate for a benchmark would require that rates (actual or quoted) be taken from 'prime' banks, as they are for IBORs. In order to ensure the quality of collateral and minimise the problem of counterparty-collateral correlation, eligible collateral for the benchmark would have to be government bonds --- except for countries where bail-outs

of banking systems have established a strong correlation between governments and banks ('wrong-way' risk).

Ideally, repo rate indices should measure the general collateral repo rate ([see question 11](#)). However, in the Eurozone, diverging 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 particular bonds rather than the cost of repo funding ([see question 12](#)).

The influence of collateral on repo rates is minimal for one-day terms such as overnight, but become increasingly more significant as the term of repos extends. This is reflected in experience to date with repo rate benchmarks, with some overnight repo rate benchmarks succeeding but only one term benchmark showing any promise. Current repo rate indices include:

- *STOXX GC Pooling Indices* based on data from the Eurex Repo 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.
- 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 repo rate benchmarks for transactions against US Treasury, Agency and Agency MBS collateral in the inter-dealer brokered General Collateral Finance market compiled from actual repo rates and volumes over the day by the DTCC. This benchmark appears to be successful and a futures contract on the benchmark has been launched by NYSE LIFFE.
- *GovPX* owned by ICAP is a set of observations of overnight and term repo rates for US Treasury and Agency collateral and a transaction-weighted overnight US Treasury repo index published periodically throughout the day.
- The *RepoFunds Rate* published by ICAP and MTS since December 2012 is a family of three transaction-weighted overnight repo rate benchmarks for repos against French, German and Italian euro-denominated government bond collateral, and a general eurozone benchmark. This novel benchmark is based on a quasi-GC basket of collateral constructed by eliminating outliers from rates on the BrokerTec and MTS automatic repo trading systems.
- The *Repo Overnight Index Average (RONIA)* published by the London-based Wholesale Market Brokers' Association (WMBA) is a transaction-weighted overnight repo rate benchmark for sterling based on DBV (Delivery-by-Value) repos brokered by WMBA members. The emergence of a market in overnight indexed swaps (OIS) against RONIA has begun to establish a swap curve out to one year.

The manipulation of traditional indices such as LIBOR and EURIBOR has made the market cautious about the use of contributions from selective panels of banks. There is a preference for using rates from general 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 will depend upon the degree to which it is correlated with the rates at which banks actually fund themselves.

39. Has the CSD Regulation changed the settlement date for repos in Europe?

From 2015, most securities transactions in the European Economic Area (EEA) have been required to settle no later than two business days after their transaction dates. This T+2 deadline has been imposed

under the EU's Central Securities Depositories Regulation (CSDR). It applies to both cash transactions and the first leg of repo and securities lending transactions.¹¹

The imposition of a shorter maximum settlement period is intended to (1) reduce settlement risk, (2) minimise the possibility of confusion over settlement deadlines and (3) provide the fixed start date that is needed for the mandatory imposition of penalties for late delivery and buy-ins for extended failures to deliver.

The CSDR settlement deadline applies to all transactions that are:

- in 'transferable securities' regulated by the second EU Market in Financial Instruments Directive and the parallel regulation (MiFID II/MiFIR); and
- executed on a 'trading venue' regulated by MiFID II/MiFIR.

So the mandatory CSDR deadline does not apply to transactions executed in the over-the-counter (OTC) market, in other words, by telephone or electronic messaging. This includes voice-brokered transactions.¹²

Transferable securities include fixed-income and equity. Regulated trading venues include electronic trading platforms that are registered as Regulated Markets, Multilateral Trading Facilities (MTFs) or Other Trading Facilities (OTFs) under MiFID II/MiFIR. The main such trading venues for repo are BrokerTec, Eurex Repo and MTS Repo.

Although the T+2 deadline was not mandatory until 2015, most European trading venues decided to start observing the deadline from Monday, 6 October 2014, and European securities market associations, including ICMA and ISLA, recommended that their members voluntarily switch settlement of OTC transactions from T+3 to T+2 from the same date in order to avoid confusion and damage to the integrity of the market.

The T+2 deadline does not affect securities transactions in European securities like UK government bonds, which already settle on T+1. However, it has impacted eurozone markets, as the majority of cash transactions in eurozone bonds used to settle at T+3.

The main impact on the eurozone repo market will be a consequence of the movement of settlement in the cash market from T+3 to T+2. This is expected to lead to a voluntary shift in the settlement of most repos from T+2 to T+1. The reason is that the repos used by securities dealers to fund long positions or cover short positions are typically executed the day after the cash transactions that have created those positions. This is because the exact cash positions that need to be financed or covered are not finally known until after close of business on the transaction date. If cash transactions settle two business days after being executed, related repos that are executed on the next day have only one business day to settle.

There is also one significant direct impact on the European repo market. The CSDR does not allow forward repos to be executed on BrokerTec, Eurex Repo and MTS, as forward repo, by definition, settle beyond T+2.

The switch to T+2 settlement for cash transactions and to T+1 for many repo and securities lending transactions poses major operational challenges to users of the European securities markets, not least for

¹¹ In addition to the first leg of repo and securities lending transactions, the CSDR also applies to the first transaction involving a transfer of securities of any 'complex operations' composed of several transactions.

¹² Exemptions from the T+2 deadline also apply to transactions 'negotiated privately...but executed' on a regulated trading venue and to 'transactions executed bilaterally but reported' post-trade to a regulated trading venue.

their cash and inventory management operations, given that they have one day less to settle transactions subject to the new deadline and to resolve any settlement problems that might arise. It also has the potential to disrupt the settlement of transactions with counterparties in other time zones and with investors in Europe, some of whom may struggle to accelerate settlement.

40. 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 have, at times, become negative, albeit temporarily. Since 2014, negative rates have become more persistent and widespread. However, many cash investors have been reluctant to accept negative rates, including parties to repo transactions being remunerated on deposits of cash margin and on manufactured payments 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 asset is subject to exceptional borrowing demand and/or reduced supply in the repo market. In order to borrow these assets, buyers have to tempt 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 11](#)), that asset is said to have gone 'on special' ([see question 12](#)).

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 also became negative. This meant that most, if not all, GC securities in a particular currency were subject to exceptional demand. Typically, these securities were government bonds and were strongly sought after because they were seen as 'safe haven' assets.

Since 2014, negative rates have 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.

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 repo rates would only ever be positive. When repo rates are negative, problems arise:

- In the case of the early termination of a sell/buy-back following a default or in calculating the exposure on the transaction for the purpose of margin maintenance, where a manufactured payment has been triggered by the payment of a coupon, dividend and other income payment, that payment is assumed to have been reinvested at the repo rate on the transaction.
- 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.
- 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 manufactured payments arising from coupons, dividends and other income payments on collateral during the term of a sell/buy-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 obliged to make an equivalent payment to the seller, often called a ‘manufactured payment’ ([see question 22](#)). But in a sell/buy-back, this manufactured payment is deferred until the repurchase date and, in the interim, the buyer is obliged to reinvest the value of the payment. If (1) such a sell/buy-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 margin maintenance, a reinvestment rate has to be assumed in order to calculate the value of the manufactured payment. 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 sell-buy/back.

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

D Sell Back Differential (equivalent to repo interest)

IR amount of any 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 – ie income paid during the term of the repo

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 – ie the reinvestment income on the income payment calculated at the repo rate on the sell/buy-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 sell/buy-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

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 where that transaction is being

margined in isolation or a GC repo rate for portfolios of transactions being margined in aggregate. In either of these cases, if the agreed repo rate goes on special --- in other words, if it falls below the GC repo rate, perhaps becoming negative --- 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 the full amount of repo interest to the buyer at the repurchase date, even if he delivers the collateral late and therefore has delayed use of the cash, or even if he never delivers the collateral and therefore never has 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 on the repurchase date 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!¹³

To eliminate the perverse incentive arising from negative repo rates, the ICMA issued a recommendation in November 2004 on behalf of the 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.

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 sell/buy-backs.

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.

¹³ 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.

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 manufactured payments in sell/buy-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 manufactured payments in sell/buy-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 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 such as EONIA or overnight LIBOR. 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.

Special articles

41. Mapping the interdealer European repo market

The European interdealer repo market can be usefully mapped at three levels of activity:

- **trading** --- the negotiation and execution of transactions;
- **clearing** --- the netting by counterparties of (1) opposite obligations to deliver the same security (same ISIN) to each other on the same day and (2) opposite obligations to pay cash in the same currency to each other on the same day, which results in a smaller residual delivery obligation and a smaller residual payment obligation;
- **collateral management** --- the selection of specific security issues to deliver as collateral and the maintenance of that collateral.¹⁴

There is a fourth level of activity --- the **settlement** of securities transfers and any related cash **payments** --- but, as there is considerable and increasing choice available to trading venues, clearing systems or 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.^{15 16}

There is also a fifth level of activity --- the post-trade, pre-settlement **affirmation** of transaction details and settlement/payment accounts --- but this also is not a useful way of differentiating repo activity.¹⁷

¹⁴ Collateral maintenance involves: regularly revaluing the collateral; calling agreed margin from or delivering to the other party, or performing agreed repricing/adjustments, when a material uncollateralised exposure arises or in order to preserve haircuts/initial margins; responding to the occurrence of income payments and corporate actions; and responding to valid requests for the substitution of collateral.

¹⁵ This will certainly be the case in the EEA once MiFID II and the CSD Regulation have been fully implemented. At the moment, there are exclusive links between some trading venues, clearing systems, collateral management agents, and settlement and 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 Council (ERC) are taking place to allow 'interoperability', which means users of Euro GC Pooling would be able choose Euroclear Bank or another as an alternative collateral management agent). Access to some settlement systems is also difficult for foreign clearing systems.

¹⁶ 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 held and managed directly by dealers or, on their behalf, by agent **custodian banks**. 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 replaced by the ECB-operated TARGET 2 payment system. In the case of ICSDs, the SSS is 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. 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 choice between direct use of national CSDs, as opposed to indirect use through agents and use of ICSDs, means payments are in central bank money, as opposed to commercial bank money, which raises issues about payment risk.

¹⁷ 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 Pirum (Systems Ltd) and 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 to be submitted to the central clearing counterparty (CCP), LCH.Clearnet. Note that affirmation is different from 'trade-matching' or

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 agents who collect prices from dealers by phone or on screen, then select and broadcast back the best bids and offers. Voice-brokers display prices (and other information) to dealers on screens connected to 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 dealers wishes to accept a displayed price, he contacts the voice-broker by telephone or on screen. The voice-broker reveals and puts him in contract with the quoting party. This allows the parties to negotiate further and to organise settlement between themselves. A voice-broker charges a commission to both counterparties on completed transactions. The major repo voice-brokers in Europe are BGC (Partners), GFI (Group), ICAP, Tradition and Tullett Prebon.¹⁸
- **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 by 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.
- **Automatic trading systems (ATS).** These are dedicated networks of interactive screens on which prices are displayed for repos 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 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 clearing systems, collateral management agents, and CSDs or ICSDs.¹⁹ The ATS operating in Europe are:
 - **BrokerTec**, which is based in the UK and owned by ICAP Plc; it is the leading ATS in Europe for repo other than of Italian securities;²⁰
 - **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

'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.

¹⁸ Tradition is the interdealer broking arm of the Swiss-based Compagnie Financière Tradition.

¹⁹ ATS can instruct central clearing counterparties (CCPs --- see the section below on clearing) or (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 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 similarly instruct CSDs/ICSDs.

²⁰ BrokerTec and Eurex Repo are classed as a Multilateral Trading Facility (MTF) under MiFID.

- the Swiss Franc Repo Market, formerly a joint venture with the Swiss exchange SIX
- the Euro GC Pooling Market.
- **HDAT**, which is based in Greece and operated by the Bank of Greece; limited to Greek government bond repo; it suffered a collapse in volume in 2011, when the European sovereign bond crisis erupted.²¹
- **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;²²
- **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.²³
- **SIX Repo**, which was carved out of the joint venture Eurex Repo Swiss Franc Repo Market in May 2014 as an independent platform.

The clearing map

Repos can be:

- **Uncleared** --- this would now be unusual for dealers, given that netting is a standard feature of repo master agreements.
- **Bilaterally-cleared** --- a party nets opposite delivery and payments obligations separately with each of its counterparties, to produce a set of smaller residual delivery and payment obligations with each counterparty (one in each security and currency).
- **Multilaterally-cleared** --- at the inception of a transaction between member firms or shortly after execution, a **central clearing 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, resulting in one set of smaller residual single delivery and payment obligations between the CCP and each member firm (rather than a separate set between each pair of counterparties).

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.²⁴
- **Eurex Clearing**, which is based in Germany and owned by Deutsche Borse AG; it only clears repos transacted across Eurex Repo (which in turn only uses Eurex Clearing).

²¹ HDAT is the Electronic Secondary Securities Market. It is classed as a Multilateral Trading Facility (MTF) under MiFID.

²² 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 called as a Multilateral Trading Facility (MTF).

²³ 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 Espanoles) 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 (Asociacion 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.

²⁴ CC&G is the Cassa di Compensazione e Garanzia.

- **LCH.Clearnet Ltd**, which is based in the UK and part of LCH.Clearnet Group Ltd, which is majority owned by the London Stock Exchange; its repo clearing business covers a wide range of European government securities.
- **LCH.Clearnet SA**, which is based in France and part of LCH.Clearnet Group Ltd; its repo clearing business is in French government bond repo and, to a lesser extent, Italian and Spanish government bond repo; it operates a link to CC&G.
- **MEFFRepo** (formerly MEFFClear), 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.^{25 26}
- **CJSC JSCB National Clearing Centre (NCC)**, operated by the Moscow Exchange Group in Russia.

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

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.
- **Tri-party** collateral management, under which the function is outsourced to an agent. Once informed of a transaction between two users, the tri-party agent selects a basket of collateral from the account of the seller, the contents of which fall within eligibility criteria pre-defined by the buyer and delivers the selected collateral to the buyer against payment. The tri-party agent then maintains the value, quality and performance of the collateral.²⁷ The principal tri-party repo agents in Europe are:
 - **Bank of New York Mellon** (whose system is called *RepoEdge*); also one of the two tri-party agents in the US; with a sizeable tri-party equity repo business;
 - **Citibank**;
 - **Clearstream Banking Frankfurt**, the German CSD --- owned by Deutsche Borse AG;
 - **Clearstream Banking Luxembourg**, one of the ICSDs --- owned by Deutsche Borse AG;
 - **Euroclear Bank**, the other ICSD;
 - **Euroclear UK and Ireland**, the UK and Ireland CSD, operates a special tri-party collateral management functionality called **Delivery By Value (DBV)** --- a subsidiary of Euroclear;
 - **JP Morgan** (the other tri-party agent in the US);
 - **SIX SIS**, which is based in Switzerland and owned by the SIX Group; it is integrated with SIX Repo;
 - **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.

²⁵ MEFF is Mercado de Espanol de Futuros Financieros.

²⁶ MEFFClear was 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.

²⁷ In addition to collateral maintenance (see footnote 1), 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 (which may have unwanted tax consequences); are required by the seller in order to sell it 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 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.

Clearstream and Euroclear integrate their tri-party agencies with their securities settlement and payment services.²⁸ Indeed, tri-party collateral management services are currently only available to the custody clients of the tri-party agents (who are CSDs, ICSDs and custodian banks), 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 described as 'basket trading' or 'cash-driven' repo (as opposed to 'securities-driven' repo). 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. The contents of baskets will have been agreed by the parties or, if the trading is electronic, defined by the ATS or, if transactions are being cleared, by the CCP.²⁹ Basket trading is typically described as 'GC repo' (where GC means 'general collateral') and is also known as **GC financing**. However, many of the securities included in these baskets would not be recognised as general collateral in the wider repo market.

Three-dimensional mapping

The three mapping levels can be linked in a variety of ways, which are summarised in the table below. The key vertical linkages in the European repo market are:

- ATS + CCP + bilateral collateral management --- this is the principal business model in Europe. BrokerTec and MTS link to several CCPs and allow the use of either ICSD or several CSDs, whereas Eurex Repo is exclusively linked to Eurex Clearing for clearing.
- Direct trading + bilaterally cleared + 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.Clearnet Ltd €GC basket offered for trading on BrokerTec and managed by tri-party agent 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.

²⁸ SIX SIS also classifies itself as an ICSD. Bank of New York Mellon is setting up a new ICSD.

²⁹ For example, Eurex Repo's Euro GC Pooling Market trades two baskets containing about 8,000 and 23,000 ECB-eligible securities from about 20 countries, as well as some international (euro) bonds. About one-third are actively traded.

Table: links between repo trading, clearing and collateral management

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

Source: R Comotto (2014)

Market shares

In the ICMA's semi-annual European repo market survey and the ECB Money Market Survey, the various alternative combinations of trading, clearing and collateral management are grouped into:^{30 31}

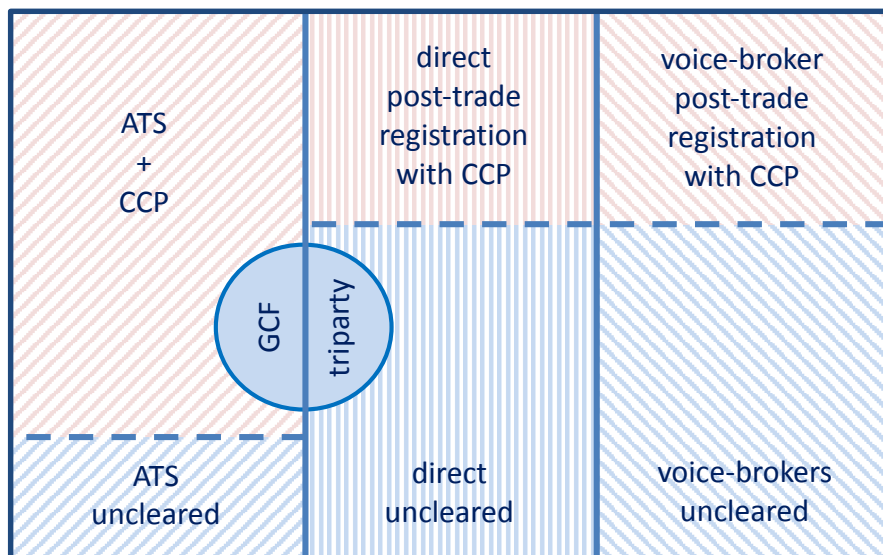
- **Direct**, which is connected to either **bilateral** or **tri-party** collateral management. Direct trading accounted for about 55% of outstanding repo business measured by the ICMA survey in December 2014. Just over 10% was tri-party and another 3% was registered post-trade with CCPs. The ECB Money Market Survey suggested that about 19% of turnover over 2012 was traded directly and some 10% was tri-party.
- **Voice-brokered** accounted for under 14% of outstanding repo business measured by the ICMA survey in December 2014, and some 18% of turnover over 2012 in the ECB Money Market Survey.

³⁰ See <http://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/short-term-markets/Repo-Markets/repo/latest/>.

³¹ See <http://www.ecb.europa.eu/stats/money/mmss/html/index.en.html>.

- **Electronic** (ATS only). Electronic trading accounted for some 32% of outstanding repo business measured by the ICMA survey in December 2014. Just over 27% of the business was cleared across CCPs. The ECB Money Market Survey suggested that 62% of turnover in 2012 was traded on ATSs and 62% was cleared across CCPs. GC financing, in the form of Eurex GC Pooling, had outstanding business of about EUR 160 billion in December 2014 (there was little or no trading in other CCP-defined GC baskets), compared with a total of some EUR 976 billion for all ATSs.³²

Chart: ICMA survey analysis of the European repo market



Source: R Comotto (2014)

The interfaces 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 may vary widely between dealers. 'Customers' include:

- smaller banks (with insufficient repo business to justify the expense of joining an ATS and a CCP)
- central banks conducting investment operations (ie not driven by monetary policy)
- international financial institutions (eg multilateral development banks)
- other official investment institutions, such as sovereign wealth funds
- non-bank financial institutions (eg pension funds, insurance companies, money market and other mutual funds, securities lending cash collateral reinvestment agents, hedge funds and other asset managers)
- a few non-financial institutions (eg large corporate treasuries)
- retail investors in Italy and Spain.

Hedge funds access the repo market through **prime brokers**. These are divisions of large investment banks which offer funding, securities lending and other services such as execution, risk management, custody and settlement to hedge funds. Repo is a key funding tool.

All parties transacting on ATSs and/or clearing across CCPs are currently dealers (with the exception, in theory at least, of GC Pooling Select). This reflects membership rules and the scale of business needed to justify membership of these financial market infrastructures (two-way business in the case of CCPs).

³² The ICMA analysis is complicated by the fact that Eurex's Euro GC Pooling and the trading of LCH.Clearnet Ltd's €GC basket on BrokerTec are simultaneously tri-party and electronic repos.

The voice-brokered repo business is also 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).

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:

- **MTS-Newedge Agency Cash Management (ACM)** platform, launched in 2012. Unlike the traditional RFQ model of other customer-to-dealer trading systems, ACM operates its RFQ as periodic auctions. Several times a day, potential buyers (cash investors) can request quotes for any cash they wish to invest. Sellers (borrowers) can make offers for the cash. An offer takes the form of a repo rate and one of over 30 pre-agreed collateral baskets. The contents of each basket vary by currency (EUR, GBP, USD and CHF), country and type of security and, in some cases, by credit rating or term (eg there are baskets of Italian government securities, UK corporate bonds rated at least A, European equities and US Treasuries). If an investor accepts an offer, the tri-party collateral management service of Euroclear Bank selects securities that are listed in the agreed basket from the account of the seller, delivers the securities to the buyer's account and pays cash to the seller's account, and then manages the collateral on behalf of the buyer for the duration of the repo.
- **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, by Eurex Repo. It allows investors to negotiate repos with dealers on the telephone or to enter a RFQ to a particular bank directly into the system. 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 Borse Group, which acts as principal intermediary between the customer and the bank. The matching transactions between Deutsche Borse Group and the bank are across the Eurex Repo GC Pooling Market, so they 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 only offered a customer-to-dealer RFQ trading system in repo in Europe since 2011. Customers can request up to five quotes at one time.

International Capital Market Association (ICMA) and European Repo Council

ICMA represents financial institutions active in the international capital market worldwide. ICMA's members are located in 50 countries. ICMA's market conventions and standards have been the pillars of the international debt market for over 40 years, providing the framework of rules governing market practice which facilitate the orderly functioning of the market. The ICMA European Repo Council 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 compiled by Richard Comotto, Senior Visiting Fellow at the ICMA Centre at Reading University.