

# Clearstream

## The collateral management practices of central banks: the case for modernisation

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## Key findings

The ability to obtain and post collateral eligible at a central bank is now an existential issue for banks. The shrinkage of the inter-bank funding markets since the financial crisis in 2007-08 means central banks now provide finance to banks on a much wider scale than they did before the crisis.

In addition, asset purchasing programmes have put the major central banks in command of large portfolios of high quality assets that rank as eligible collateral, at a time when regulatory reforms enacted in response to the financial crisis have both increased demand for eligible collateral and put pressure on the accessible global supply.

Today, the collateral central banks are willing to accept, the terms on which they accept it, and the collateral they are willing to make available to the market, have become the three largest influences over all forms of collateralised funding throughout the financial markets.

In fact, collateral eligibility has become the primary determinant of financial and monetary conditions as a whole, because the loans banks advance to borrowers in the real economy are to a large extent dependent on funding from the central banks. So it is surprising that the collateral management activities of central banks are not better integrated into the global eco-system of banks, investment banks, fund managers, investors, CSDs (Central Securities Depositories), CCPs (Central Counterparties) and payments systems that hold and consume collateral.

After all, central banks are no longer responsible just for banks, or for a single jurisdiction. The financial institutions they supervise or monitor now own and fund assets in multiple currencies and jurisdictions.

Central banks have a deep interest in ensuring those institutions can access and allocate eligible collateral efficiently, wherever it is held. As collateral takers, for the most part, central banks depend on an infrastructure that can deliver collateral efficiently and with good title, and facilitate its realisation expeditiously in an event of default.

For them, as for private sector institutions, collateral management is now a complex, cross-border and continuous activity. It has to overcome, on a daily basis, the jurisdictional and infrastructural barriers to the efficient movement of collateral around the world.

Yet the survey on which this paper is based found collateral managers at central banks do not even operate accounts at multiple CSDs, and rely largely on bi-lateral relationships with other central banks to move collateral across borders.

Half of the central banks that responded to the survey use at least one third party collateral manager, and some are using several. Yet most central banks have yet to exploit the full potential of tri-party services to help them keep pace with their enlarged role in the collateral markets.

Tri-party services can help central banks maintain flexibility in collateral eligibility criteria; calculate, adjust and readjust haircuts; value collateral intra-day; make and meet frequent margin calls; monitor concentration limits; manage collateral across currencies as well as borders; and broaden both the range of counterparties and the asset classes they accept, up to and including equities.

The survey found central banks are naturally and understandably conservative. They have a strong bias to high quality collateral, managing their collateral needs mostly in-house, asset safety, legal certainty, and market infrastructures over banks.

Yet the survey suggests that the conservative operational infrastructure of the central banks in the field of collateral management is adding rather than subtracting systemic risk. It is out of joint with the global activities of the financial institutions they monitor and supervise.

The procedures and systems that support the collateral management activities of central banks are falling behind those of tri-party providers able to spread the necessary investment over a high volume of business, rendering central banks vulnerable to potentially catastrophic operational and technological breakdown.

Above all, central banks are playing an increasingly important role in collateral markets, without being fully integrated into the infrastructure which supports the seamless sourcing, movement and allocation of collateral on a global scale. Unless that risk is addressed, the next financial crisis may be worse than the last.

The purpose of this paper is to contribute to an urgent debate on how both banks and central banks can adjust the global operational infrastructure to the realities of the collateral markets of today.

# Executive summary

## Why central banks manage collateral

Central banks manage collateral because they lend money to banks in the course of implementing monetary policy through repo transactions, maintaining liquidity in the financial system, operating payment systems, and managing reserves of foreign currency.

As lender of last resort, a central bank is an unusual participant in collateral markets. Unlike commercial counterparties, central banks use collateral to avoid distinguishing between banks as credit risks, and in financial crises relax rather than tighten their collateral eligibility criteria.

## Collateral eligibility criteria

Collateral eligibility criteria are the first collateral management tool wielded by central banks. Though the details vary between central banks, the range of financial assets they are prepared to lend against is generally confined to the highest rated tradeable debt instruments.

Assets eligible as collateral at a central bank tend to enjoy enhanced desirability and liquidity. Eligible assets tend to be easier to buy and sell, their price is usually higher and firmer than comparable assets, and these characteristics facilitate greater issuance.

Eligible assets also tend to become the benchmark assets for collateralising private transactions as well, further encouraging liquidity and firmness of price. The fact they can be pledged at the central bank ensures they are widely held by private sector institutions.

Assets eligible at a central bank also play an important part in determining the value of assets which are not eligible at a central bank, such as corporate bonds and collateralised debt obligations (CDOs), but which are used as collateral in private transactions.

The preference of central banks for a narrow range of stable and liquid debt instruments means that the majority of central banks do not accept equities, outside extraordinary market circumstances, chiefly on grounds of their price volatility, though they also dislike the additional servicing costs.

## Haircuts levied on eligible collateral

The second tool used by central banks to manage collateral is over-collateralisation, or the application of “haircuts” of different sizes to different assets. These influence the “haircuts” levied by private sector counterparties, though they value the acceptability of an asset more than its haircut.

There is wide variation in the haircuts applied to different assets, and limited compliance with the CPMI-IOSCO principles on haircuts. The variation reflects the range of calculation methodologies used by central banks and the characteristics – issuer, coupon, maturity – of different assets.

## Collateral valuation policies

The third tool used by central banks to manage collateral is valuation policy. To ensure that it always holds collateral of more than sufficient value to cover the credit it has advanced, every central bank values the collateral it holds at least daily, and calls for additional collateral if it identifies a shortfall.

The methods used to value collateral range from market prices to quantitative models, and include third party valuation agents. Reliable valuations minimise the additional costs of calling for more collateral or re-paying excess collateral, though calls are also subject to minimum price falls or rises.

The accuracy of a valuation is less important in determining the extent of a rise or fall in the price of an asset. The eligibility of an asset at a central bank, and its acceptability to a wide range of private sector counterparties, are more important factors.

## Management of margin in derivative contracts

One of the reasons central banks need to manage collateral is their use of collateralised OTC derivative transactions. In normal market circumstances, they use these to hedge the interest rate and currency risks they incur as holders of foreign currency reserves, or manage the exchange rate.

Collateralising derivative positions to hedge risk in foreign reserves is obviously a different form of collateralisation from lending to commercial banks unable to fund their assets by other means, but the acceptability of an asset as collateral in a cross-currency swap nevertheless enhances its value. In addition, in recent financial crises, such as those of 2001, 2007-08 and 2011, central banks have also used foreign currency swaps to supply liquidity to banks in their own jurisdiction or that of another bank. Some of these swap facilities between central banks have become permanent.

### Operational infrastructure

Managing collateral effectively requires not just risk management, but efficient operations to secure collateral quickly with sound legal title. One reason central banks accept the highest quality assets only is that they tend to be held and transferred through central securities depositories (CSDs).

The obvious operational shortcoming in collateral management today is the lack of efficient links between pools of collateral in different jurisdictions. At present, few central banks have accounts in foreign CSDs, and central bank correspondent arrangements are an unsatisfactory alternative.

### Use of third party collateral managers

Central banks do recognise the value of third party service providers, such as custodian banks, in overcoming the obstacles to the efficient movement of collateral across borders. However, the majority still rely mainly on internal rather than external resources to manage collateral.

Collateral management is now demanding enough for central banks to consider changing their existing service providers or appointing new ones. They have a strong bias to asset safety and a preference for appointing CSDs, international CSDs (ICSDs) and custodians over investment banks.

In their assessment of third party collateral managers, central banks prize operational efficiency over banking services (such as foreign exchange and cash management) and see value in innovative services (such as modelling of future collateral demands) only if they reduce operational risk.

Central banks remain reluctant to accept collateral that is unstable, illiquid, hard to value, or which incurs interest rate or currency risk. However, they are alive to the fact that the commercial banks they supervise operate on a global scale, and have to accept a broader range of collateral risks.

The increased demand for eligible collateral, notably as a result of regulatory measures such as centralised clearing of swaps and margining of non-cleared swaps, means the ability of commercial banks to source collateral efficiently is now a matter of systemic importance to central banks.

As a result, central banks are attracted to tri-party as a convenient means of bridging the infrastructural and legal barriers to the efficient movement, valuation, servicing and management of collateral in their own activities, and endorse more efficient services for the banks they supervise.

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### Methodology

This paper is based on a survey of central banks conducted in 2015. Respondents to the poll were asked about the activities that generated a need to manage collateral; whether they gave or received collateral, or both; how they managed collateral, and whether new demands warranted reorganisation; their use of derivatives and derivative clearing brokers; their use of custodian banks and central securities depositories (CSDs); their collateral eligibility criteria, valuation processes, and haircut calculation methods; their margin call procedures; the concentration limits they set; and their use (if any) of third party collateral managers. 27 responses were received.

## Why central banks manage collateral

There are three main reasons why central banks must manage collateral. The first is that they control the supply of money by requiring banks to hold a proportion of their deposits with them as reserves, and banks that undershoot their reserves target are lent money by the central banks against collateral. In fact, it is a universal axiom of central banking that loans to commercial banks of any kind must be secured by collateral of sufficient quantity and quality to make good any loss if the bank fails to repay the loan.<sup>1</sup>

The second reason central banks manage collateral is that they operate the real-time gross settlement (RTGS) payment systems that commercial banks use to settle net payments with each other through their reserve accounts. Most central banks provide unlimited intraday or overnight credit to any bank unable to meet its payment obligations, against collateral. The importance of this obligation to the standing of a bank means that securing payments in central bank money is usually the first use to which any commercial bank puts its highest quality collateral.<sup>2</sup>

The third reason central banks engage in collateral management is that they maintain reserves of foreign currency, which are invested mainly in securities. These are used chiefly to manage the rate of exchange, so they are not traded actively most of the time. This frees them to be lent to commercial banks against collateral, almost always denominated in the same currency.<sup>3</sup>

The reason for lending them is to increase the return on holdings of foreign currency assets, on which the interest payments tend to be low relative to the exchange rate risk of holding them.<sup>4</sup>

The management of the foreign exchange reserves generates further collateral needs when the currency and interest rate risks they incur are hedged in the OTC derivative markets through interest rate and currency swaps, since these are subject to margin calls.

These three activities are the principal reasons why central banks manage collateral, but there are of course other ones. In stressed markets, for example, such as those that have prevailed since the acute period of the financial crisis in 2007-08, central banks also buy and sell collateral to achieve specific macro-economic objectives, such as averting deflation or stimulating bank lending.

In the wake of the financial crisis, a number of central banks have pursued asset purchasing programmes, such as the large scale asset purchase programmes of the Federal Reserve, the asset purchase facility (APF) of the Bank of England, and the public sector purchase programme (PSPP) of the European Central Bank (ECB). Central banks have further enhanced the impact of these measures in injecting liquidity into the financial markets (quantitative easing) by lending the assets purchased to banks in securities lending programmes.<sup>5</sup> These securities are also lent against collateral.

However, Chart 1, which is based on the responses to a survey questionnaire completed by 27 central banks<sup>6</sup>, shows that normal monetary policy objectives and the primary tools used to implement monetary policy – namely, repo and reverse repo transactions, which central banks use to add or drain liquidity from the financial system – are easily the most important reasons why central banks have to manage collateral.

<sup>1</sup> For the European Central Bank (ECB) and the national central banks that make up the European System of Central Banks (ESCB), collateralised lending only is a mandatory requirement under Article 18.1 of the Protocol on the Statute of the ESCB.

<sup>2</sup> Central banks have sought to reduce the collateral consumption of RTGS systems by minimising the demand for credit by greater use of payment scheduling and offsetting mechanisms, and auto-collateralisation services.

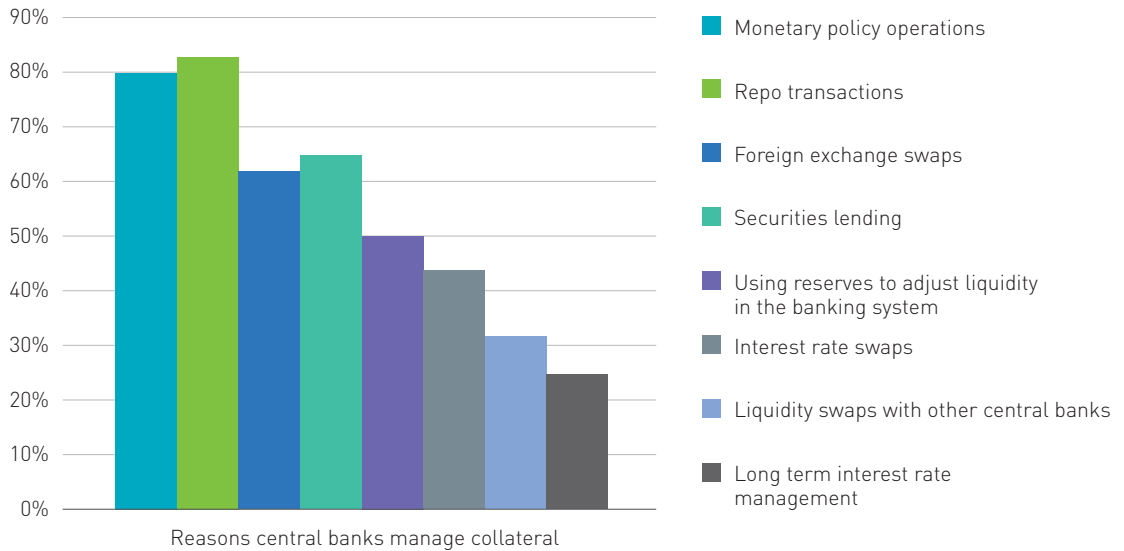
<sup>3</sup> Few central banks accept cross-currency collateral. However, in extreme circumstances – such as a damaging rise in the rate of exchange – a central bank might post, say, euro collateral, to obtain US dollars. See page 19.

<sup>4</sup> The reason foreign exchange reserves can be lent is that they are not traded actively. Reserves are acquired and held by central banks primarily to influence the impact of the rate of exchange on domestic monetary conditions. Selling domestic currency for foreign currencies tends to reduce the strength of the national currency, while selling foreign currencies to buy the national currency tends to strengthen it. This means foreign currency reserves are traded only at times a currency is under speculative attack, or its value on the currency exchanges is increasing so rapidly that it is damaging exports. Currency reserves also act as a form of savings, which can be used to cover a trade deficit.

<sup>5</sup> See page 8 and note 7.

<sup>6</sup> See page 5 above for a description of the methodology of the survey.

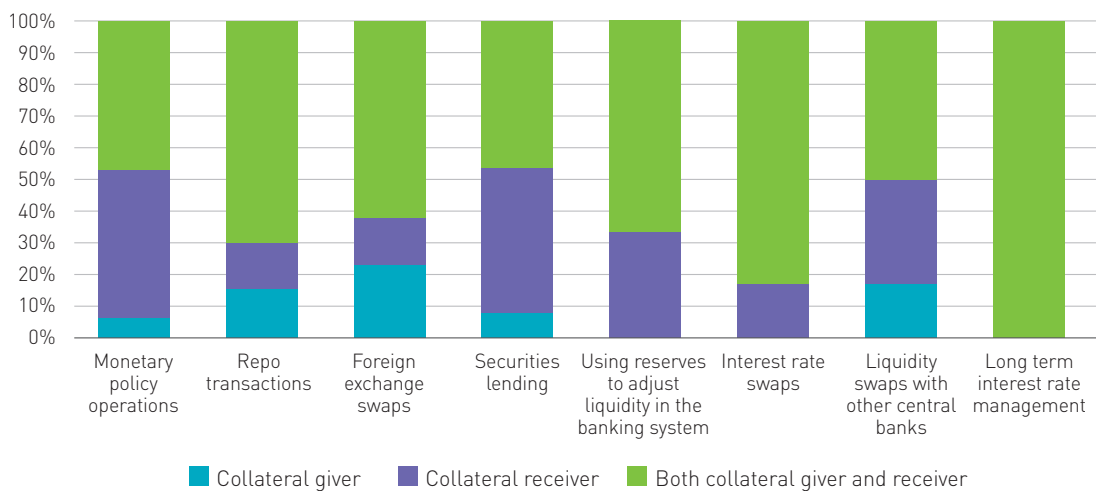
**Chart 1: Reasons central banks manage collateral**



Implementing monetary policy through repo and reverse repo transactions means central banks both give and receive collateral. They provide collateral to counterparties when seeking to reduce liquidity in the marketplace by entering into repo agreements for securities they hold, and receive collateral when seeking to add liquidity

to the market place by entering into reverse repo agreements for cash they hold. The loan to or by the central bank is collateralised by the securities being sold and repurchased in the repo transaction. As Chart 2 shows, the central banks which responded to the survey are in all of their activities both givers and receivers of collateral.

**Chart 2: Central banks both give and receive collateral**



What is common to all of the orthodox activities of central banks in normal market conditions is lending. The central bank is assuming a credit risk, which it seeks to mitigate by collateral. The rationale for central banks of never lending on an uncollateralised basis is clear. Their *raison d'être* is to achieve and maintain financial and price stability, not manage credit risk. Without insisting on collateral, it would be impossible for a central bank to deal promptly and fairly with any and all of the banks it supervises.

In this sense, central banks cannot be “normal” participants in the collateral markets. This becomes obvious in financial crises, such as those of 2007-08 or the more recent difficulties in the euro-zone sovereign debt market. In circumstances where commercial banks cannot fund themselves in the inter-bank markets, central banks relaxed their collateral eligibility criteria, not to provide finance at a profit, but to maintain the stability of the financial system. The creditworthiness of individual banks cannot, in these circumstances, be a consideration. What matters is the ability of the central bank to free up high quality collateral and restore confidence to the inter-bank markets.

In fact, the extraordinary measures taken by central banks since 2007-08 have transformed their impact on the collateral markets. Open market operations (in which central banks are seeking primarily to influence short term rates of interest) and even lender of last resort operations (lending against collateral to a distressed institution to halt a bank run) are trivial in scale by comparison with the large scale asset purchases associated with quantitative easing and the repo transactions designed to drain from the market the excess liquidity they create.

This is exactly the opposite reaction to that of commercial banks in a crisis. When inter-bank funding dries up, commercial banks become more conservative about counterparties and collateral, not less. A central bank, by contrast, ultimately has little control over the credit risks it is obliged to assume, which is why central banks insist on lending on a collateralised basis only. Importantly,

those risks are not eliminated by collateral. They are merely shifted from the counterparty to the collateral markets.

There, credit risk manifests itself as the ability of the issuer to meet payments, the stability of the value of the asset, and its liquidity in the marketplace if it becomes necessary to sell it. This is why the ability to manage collateral effectively is even more important to a central bank than a commercial bank. After all, when the realised value of the collateral proves insufficient to cover the value of the loan the central bank has advanced, the losses are absorbed not by shareholders but by the taxpayers of the country where the central bank is based.

Inevitably, central banks take that responsibility seriously. However, they have also to be mindful of the short and long term effects of their involvement in the markets for collateral. While loosening their collateral eligibility criteria in a crisis can free up higher quality collateral for use in commercial bank transactions, purchasing assets to supply liquidity runs the risk of abstracting useable collateral from the markets.

Quite apart from the ambition of central banks not to “sterilise” their quantitative easing programmes by selling purchased assets back to the banks in repo transactions, the sheer scale of the asset purchasing programmes of recent years has led to calls for central banks to avoid creating collateral shortages by lending the assets they have accumulated. A number of central banks do this where it does not undermine other policy objectives.<sup>7</sup>

This is in principle no different from a central bank lending its foreign currency reserves, but the scale is much larger. In fact, the effects of the quantitative easing programmes of central banks will take at least as long to dissipate as the seven years that have elapsed since they began in 2009. However, even as market conditions return to normal, and central banks cease to influence collateral markets by buying and selling securities on an unprecedented scale in pursuit of wider

<sup>7</sup> The European Central Bank (ECB) has lent assets purchased through its public sector purchase programme (PSPP) since 1 April 2015, primarily to provide liquidity to market makers and cover settlement fails, and always on a cash-neutral basis (i.e. repo transactions against cash collateral have to be sterilised by an offsetting reverse repo transaction).



economic objectives, central banks will continue to exert considerable influence on the behaviour of collateralised lenders and borrowers.

The assets they accept as eligible collateral even in normal market conditions influence the market directly (in reducing or expanding the stock of assets available to commercial counterparties) and indirectly (in setting expectations about the terms of collateralisation). This is because central banks are unique among counterparties in being virtually free of both credit (they are backed by taxpayers) and liquidity (they can create unlimited quantities of money) risk. In addition, a number of regulations treat transactions with central banks more favourably than equivalent transactions with commercial banks.

It follows that, as a giver or receiver of collateral, a central bank will never be subject to the same risk assessments as a commercial bank. Central banks pursue a much wider range of goals than the mere financing of assets. They have to combine extreme conservatism in normal market conditions with extreme flexibility in abnormal market conditions, in terms of which counterparties they are prepared to lend to, what collateral they will accept, and the terms on which they accept the collateral. All of the activities of the central banks in the markets for collateral – eligibility, valuation, haircuts, operations, monitoring and management – have to be seen and understood in the light of that consideration.

## Collateral eligibility criteria

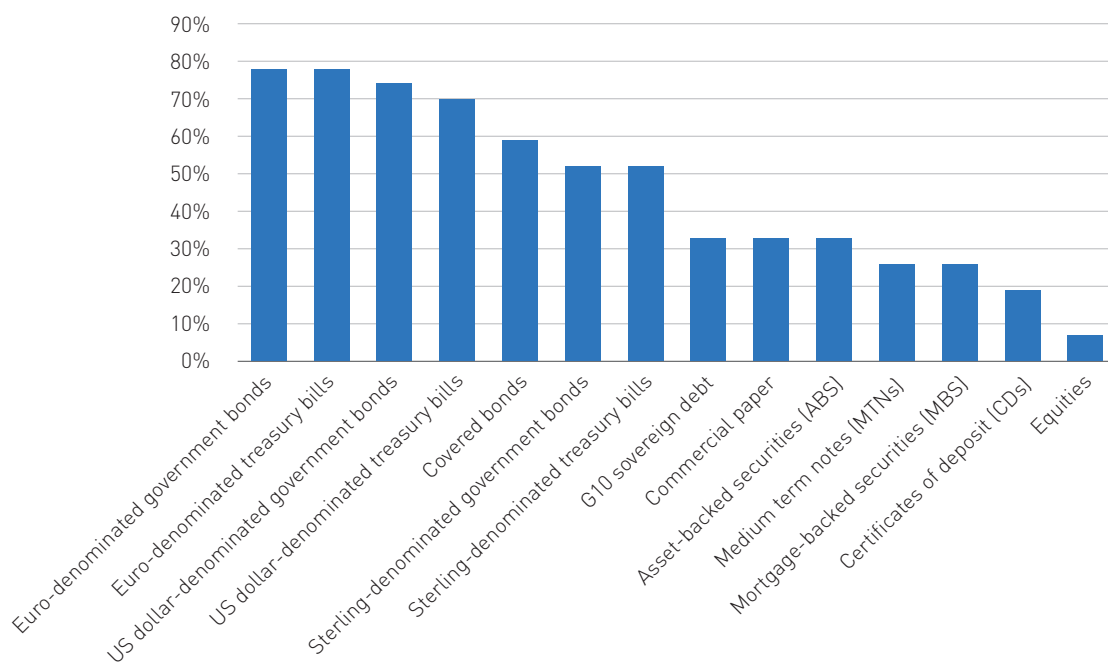
The tool which a central bank uses to manage collateral in both everyday and extraordinary circumstances is the same: its collateral eligibility criteria, or the list of assets it is prepared to lend central bank money against. The eligibility criteria aim to manage the most important risk created by holding collateral – namely, liquidity. This is the risk that the collateral held against a loan cannot be realised quickly enough to obtain value in time to cover the loan or, if the collateral has to be held to prevent a sale adding to market dislocation, that its value will decline with the passage of time.

This is why central banks will in most circumstances advance credit against a limited range of assets only. Chart 3 lists 14 broad categories of financial asset. It also depicts what proportion of the 27 central banks that responded to the survey agreed each of those 14 categories were eligible as collateral to obtain central bank money. As the chart shows, central banks have a strong preference for the highest-rated debt securities and money market instruments issued by governments. Other debt instruments are eligible to the extent that they are backed by other assets, such as mortgage payments.

The 14 categories constitute a predictable list of assets likely to be regarded as eligible by any central bank. They consist mainly of debt instruments issued by governments, plus other marketable securities backed by other assets, such as mortgages, and highly liquid money market instruments. Most will in practice have to meet additional criteria, such as a minimum credit rating or government guarantee, and avoid so-called “close links,” where the issuer of the collateral is closely related to the counterparty posting it.

There is variation only in the detail of how individual central banks deem an asset to be eligible, with some specifying a single list of securities eligible for all interactions with the central bank while others accept some assets for some purposes but not others. The national central banks that belong to the Eurosystem, for example, are expected to comply with the Eurosystem credit assessment framework (ECAAF), which defines the procedures, rules and techniques they can use to decide if an asset is eligible as collateral. It effectively creates a single list of eligible collateral for all operations. The Bank of England, by contrast, accepts a wider range of collateral in its long term repo financings and discount window operations than it does in real-time gross payments or short term money market operations.

**Chart 3: Collateral eligible at central banks**



A shorter list is not necessarily a sign of conservatism, however. The ECAF reflects the continuing fragmentation of government bond markets in Europe. The European Central Bank (ECB) has to permit a much broader range of securities to be offered, including fixed term deposits, retail mortgages and credit claims.

In a securities market as large and liquid as the United States, by contrast, the Federal Reserve is able to conduct its operations in normal conditions by accepting only three types of security – United States Treasuries, agency debt and agency mortgage-backed securities (MBS) – because the market in each is large and liquid. In other words, the structure of a capital market heavily influences the collateral policy of its central bank.

Central banks in other countries face different constraints on eligible collateral. These obviously include the degree of support from the government, since this shapes the risk appetite of a central bank. A central bank which lacks confidence in the willingness or ability of its government to absorb any losses it incurs will naturally adopt a more conservative approach to collateral.

Markets with governments that borrow little or rely on a small class of investors face another difficulty: highly rated government bonds may not be available in sufficient quantities because the government has limited borrowing needs or the assets are tightly held by a small number of institutions. Lastly, in some countries the markets in the alternative assets listed in Chart 3, such as asset-backed securities (ABS) and mortgage-backed securities (MBS), are not always sufficiently developed to be available as collateral.

In markets such as these, shortages of eligible collateral are likely to develop, leading other lenders to question the creditworthiness of the commercial banks active in the market because they are less able to fund themselves at the central bank if other sources of funding dry up. By insisting that it will provide liquidity against particular asset classes only, a central bank always risks distorting the market by driving up the price of eligible

collateral, or denying some banks access to central bank liquidity at all.<sup>8</sup> Yet the obvious solution, of accepting as wide a range of collateral as possible, not only affects perceptions of the strength of the central banks. It presents a central bank with the additional costs of valuing and managing a much wider and less predictable range of assets.

Even in markets with large and liquid government bond markets, and well-developed asset-backed securities markets, the eligibility of an asset to obtain credit from a central bank has wide implications for the market as a whole. It enhances the overall marketability and liquidity of an eligible asset, increasing its price and lowering its yield. The eligibility of an asset at a central bank also tends to set the benchmark for what commercial lenders seek in collateral terms too.

This gives a central bank the power to influence the market for different classes of asset, and even increase the amount in issue if banks attach an eligibility premium to particular securities. In fact, with central banks continuing since the acute phase of the financial crisis to provide finance to commercial banks against collateral on a much greater scale than they did prior to 2007-08, the assets which are eligible at a central bank become an important determinant of the money supply, since the ability of commercial banks to fund loans depends to a greater extent on their holdings of eligible assets. Any change in eligibility can affect monetary conditions directly.

It follows that the categorisation of any particular asset as eligible collateral is bound to vary by time and jurisdiction. Even if the essential characteristics of an asset that can be pledged to a central bank are unchanging – it has to be easy to value and amenable to legal segregation – the size of the pool of assets eligible as collateral is also driven by the decisions of market participants to issue and hold them (the central bank is only one participant) and exogenous factors (such as the size of the government debt market). But eligibility never changes more rapidly than in markets that have ceased to function normally.

<sup>8</sup> In the euro-zone, national central banks are forbidden from holding on their balance sheets the debt of their national governments, in order to prevent the monetisation of national debt. Fortunately for quantitative easing, purchases in the secondary market are excluded from this restriction.

In times of financial crisis, the sheer scale of the finance required to prevent banks becoming insolvent tends to dwarf all other considerations, and central banks relax their collateral eligibility criteria, or reduce mandatory reserve requirements to free up eligible collateral for use in other transactions, or swap high quality assets for lower quality ones in so-called “collateral transformation” trades. This can reduce the strain of demand on the pool of high class collateral, making it more likely that commercial banks will have enough acceptable collateral to be prepared to fund each other against it.

In such markets, central banks are also forced to support lesser financial institutions, which may not hold the currently eligible assets at all. This is problematic, in that central banks cannot privilege the holders of a particular asset class by failing to relax eligibility criteria to accommodate banks which do not hold the assets it prefers.

In the crisis of 2007-08, central banks lowered their collateral eligibility criteria, but were also careful not to discriminate between banks. The classic instance of this was when the Federal Reserve, for example, forced all major American banks to accept funding from its Troubled Asset Relief Programme (TARP) in return for equity warrants. In Europe, the ECB opted to lend money at a single rate to any commercial bank that sought it, on the sole condition that they provide some sort of collateral.

By accepting lesser forms of collateral in distressed markets, a central bank always aims to encourage providers of commercial funding to return to the market by freeing up higher class collateral. The risk it incurs in doing this is moral hazard. Commercial banks may choose to hold all manner of assets, confident that they can always be financed in the last resort by the central bank.

This is one reason why, in normal market conditions, it is prudent for central banks to adopt a conservative approach to eligible collateral. This can be easier for commercial banks too, since they can make sure they always hold at least some assets eligible at the central bank. However, every central bank has to monitor its eligibility list continuously, and make adjustments to it if necessary. This is why most central banks publish and distribute lists of collateral they deem to be

eligible, so that market participants can readily check whether an asset is useable or not.

One asset most central banks have resolutely refused to include on their lists of eligible collateral is equities. As Chart 3 shows, central banks are much less ready to accept equities than their commercial bank counterparties, at least in normal market conditions. This is superficially surprising since, in the crisis of 2007-08, equities held their value better than bonds, and proved more liquid. However, these considerations are less important to central banks. They can wait – indeed, must wait in a crisis when selling assets to banks reduces liquidity in the market as a whole – to realise the value of an asset.

Central banks are also concerned that, if they were to accept equities, they would be restricted to an exceptionally narrow range of blue chip equities – and that this would create concentration risk. Though it can be overcome by outsourcing the additional work to a third party provider, the operational cost of holding equities, especially in terms of servicing corporate actions, is another disincentive to holding equities as collateral, especially for central banks which do not outsource their collateral management operations.

But the principal objection to central banks accepting equities as collateral is the potential volatility of equity prices, and especially their sensitivity to company-specific news. This would result in frequent and disruptive calls for additional collateral in downturns, or equally frequent re-payments of excess collateral in upturns. Above all, equity price volatility would necessitate heavier discounts to the value of the collateral posted, or what are called “haircuts.”

## Haircuts levied on eligible collateral

“Haircuts” – or insisting on the posting of collateral of a value greater than the value of the loan, or what is sometimes called over-collateralisation – are closely linked to collateral eligibility criteria. This is made plain by the fact that a central bank which levied a 100 per cent haircut on any asset would in effect be declaring that asset to be ineligible. Haircuts, like eligibility, are in this sense an important determinant of the tightness of monetary conditions, since eligible assets with low haircuts can secure access to central bank funding at lower cost.<sup>9</sup>

The haircuts on eligible assets do change, and they change because they are used by central banks to protect themselves against the risk of an adverse change in the value of the collateral. They ensure that the value of the assets on which the loan is secured has to fall at least that far below the value of the loan before the risk of default materialises.

Haircuts are also another way in which central bank policy influences the collateral markets. The haircuts imposed by central banks become the reference point for private transactions: if an asset can be posted at central bank, the central bank haircut can place a floor or a ceiling on the haircut in a private transaction.

The broader the range of collateral that is eligible at a central bank, the more widespread that influence becomes, and the greater the degree of differentiation in the haircuts levied. Moreover, the deeper a haircut, the more of the underlying asset that has to be posted to cover a loan. This reduces the quantity available for other purposes.

In setting haircuts, central banks have to be careful that they do not inadvertently make it cheaper to post one asset rather than another, though this is an opportunity which their counterparties seek constantly to exploit by identifying the asset that is cheapest-to-deliver. Calculating the size of a haircut is therefore an exceptionally important task for central banks, but neither a static nor a simple one, and one with widespread effects throughout the markets for collateral.

The first challenge confronting the central banks in determining a haircut is a technical one. The most widely accepted technique for deciding a haircut is value-at-risk (VaR). This measures the greatest loss that a lender can expect to incur in a particular period, within a given probability. The exact ingredients will vary between central banks, according to their appetite for risk.

However, the survey found that VaR was the choice of only two in five respondents. Other methods included internal, expected shortfall and multi-factorial techniques, including stress test and scenario analyses. While some central banks were content to leave the task to a third party provider, or negotiate on an ad hoc basis with the counterparty, the truth is that sophisticated central banks are reluctant to rely on any one methodology, and especially on VaR, which offers no reassurance about losses outside the normal parameters.

Securities that are thinly traded, denominated in foreign currencies, issued by the counterparty, or based on mark-to-model valuations, will always attract higher haircuts. In the survey, the variations in haircuts applied by central banks to different asset classes varied from 1-2 per cent on high quality debt instruments to 15-16 per cent on ABS and MBS.

Though central banks do publish haircut schedules, the heterogeneity of the eligible securities makes direct comparisons between central banks difficult. The haircuts levied by central banks vary by issuer, maturity and coupon (fixed, floating and zero). At the ECB, short-dated, AAA-rated securities are discounted at 0.5 per cent, while a lowly rated, long-dated zero coupon bond will suffer a haircut of 22.5 per cent. Long-dated BBB-rated assets are haircut at 44 per cent, and credit claims of an equivalent rating at up to 65 per cent.<sup>10</sup>

At the Bank of England, by contrast, haircuts on sovereign debt range from 0.5 per cent to 15 per cent, and on long dated MBS they can be as high as 37 per cent.<sup>11</sup> At Norges Bank, haircuts range from 1 per cent on short-dated, AAA-rated government bonds or money market funds to 22 per cent on long-dated covered bonds from lowly rated Norwegian issuers.<sup>12</sup>

<sup>9</sup> See pages 12 above.

<sup>10</sup> European Central Bank, Haircut schedule for assets eligible for use as collateral in Eurosystem market operations.

<sup>11</sup> Bank of England, Sterling Monetary Framework, *Summary of haircuts for securities eligible for the Bank's lending operations*, 14 August 2015.

<sup>12</sup> Norges Bank, Guidelines for pledging securities and fund units as collateral for loans in Norges Bank.

Comparing central bank haircuts with haircuts charged by commercial banks is difficult, because private sector counterparties accept a different and wider range of instruments than central banks. However, in tri-party transactions the haircuts charged by commercial counterparties range from 2.3-2.5 per cent on government and public agency bonds to 11.7 per cent on convertible bonds. Equities, which central banks rarely take, attract a haircut of just 6 per cent, lower than corporate bonds (6.6 per cent), MBS (11.2 per cent) and CDOS (7.0 per cent).<sup>13</sup> Besides, central banks can and must be more generous on haircuts than market infrastructures, whose narrower responsibilities oblige them to match assets and liabilities as closely as possible at all times.

This is unsurprising. Central banks are bound to be more conservative than commercial banks. Nine out of ten respondents to the survey said they would never relax their collateral eligibility criteria in normal market conditions, even if an alternative asset was available immediately. Only one was prepared to consider levying a higher haircut on collateral that is immediately available.

What is surprising, given that they are operators as well as regulators of financial market infrastructures, is that the survey indicates among respondents a low level of knowledge of the principles for setting and enforcing haircuts published in 2012 by the Committee on Payments and Market Infrastructures (CPMI) of the Bank for International Settlements, in conjunction with the International Organisation of Securities Commissions (IOSCO).

Central banks which operate payments market infrastructures, for example, do provide intra-day credit to banks against eligible collateral. And Principle 5 of the CPMI-IOSCO principles favours highly conservative haircuts.<sup>14</sup> Yet a clear majority of respondents to the survey are unsure if their collateral policies match the principle, and one in six is confident that they do not. This is not yet problematic. Monitoring of the implementation of the CPMI-IOSCO principles shows the financial market infrastructures, at which the principles are aimed directly, are not yet compliant either.<sup>15</sup> However, as principle 5 also points out, the effective application of haircuts ultimately depends on the soundness of the valuation of the collateral.

<sup>13</sup> International Capital Markets Association, European repo market survey, June 2015.

<sup>14</sup> Principle 5 advocates “appropriately conservative haircuts ... haircuts that are regularly tested and take into account stressed market conditions ... stable and conservative haircuts that are calibrated to include periods of stressed market conditions, to the extent practicable and prudent.” See the Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO), *Principles for financial market infrastructures*, April 2012.

<sup>15</sup> The Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO), *Implementation monitoring of PFMI: Second update to Level 1 assessment report*, June 2015.

## Collateral valuation policies

Having chosen the collateral it deems to be eligible, and applied the haircuts it judges to be appropriate, a central bank then has to value the collateral continuously to ensure it maintains its value relative to the size of the loan. This is because one of the risks which central banks incur when lending to commercial banks is market risk: the risk that the value of an asset held as collateral will fail to maintain its anticipated value, on a mark-to-market or mark-to-model basis, or when it is sold in the marketplace after a default by a counterparty.

What methods central banks use to value collateral, and how often they use them, varies. There is no shortage of service providers offering to value collateral, and central banks make some use of them. As Chart 4 shows, most central banks rely on an internal methodology to value collateral. Though central banks also make use of valuations prepared by their custodian banks and tri-party agents, and even their counterparties, these are clearly for supporting purposes only. This reflects the fact central banks regard the confidentiality of their valuation methodologies as essential to their effectiveness, especially in stressed markets. Just one of the central banks that responded to the survey uses an independent collateral valuation agent.

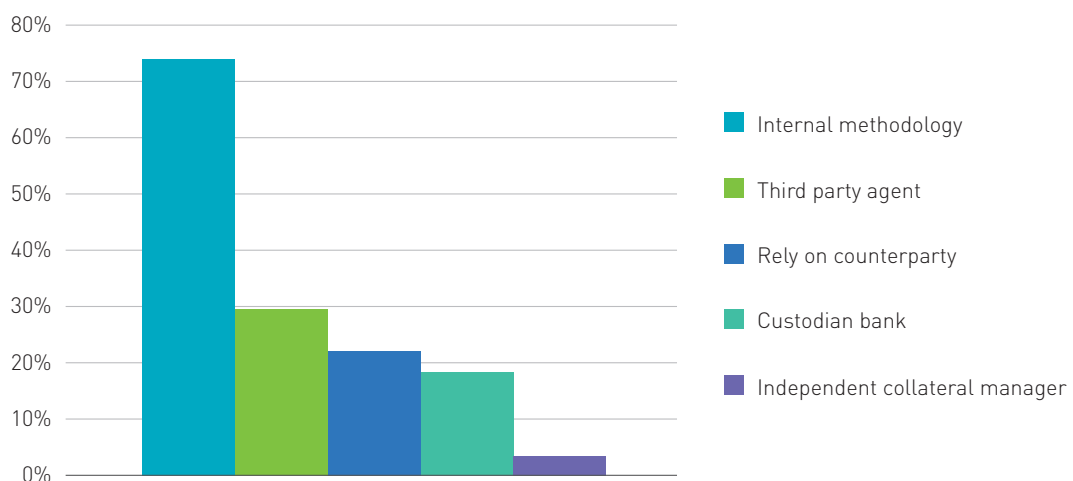
In terms of the frequencies at which they value collateral, central banks need to strike a balance between the risk of being surprised by a low valuation, and the costs of conducting frequent

valuations. The overwhelming majority of the central banks that responded to the survey strike that balance at a daily valuation, but a minority re-value on an intra-day basis. Intra-day valuations obviously incur additional costs – either internally, or through the use of an independent valuation agent capable of providing intra-day valuations – but a minority of central banks clearly believe the marginal improvement in risk management is worthwhile.

In deriving the actual valuations, central banks make use of the simplest technique, which is to use market prices. All central banks participating in the Eurosystem, for example, have since 2012 used a Common Eurosystem Pricing Hub that collects market prices and defines the most reliable one on a daily basis. Market prices are available and reliable in the most liquid instruments, and the majority of collateral managed by central banks consists of assets of exactly this quality.

For less actively traded assets, central banks use discounted cash flow to value fixed income securities, historical data to value asset-backed securities, and quantitative models to assess the value of assets that are not actively traded at published prices in the market at all, but which they nevertheless hold as collateral. The Eurosystem Pricing Hub, for example, calculates theoretical prices for assets that lack a reliable market price, or relies on the outstanding amount.

**Chart 4: Methods used by central banks to value collateral**



Another relatively simple source of valuations is the opinion of the private sector rating agencies or independent data vendors, which assess a vast array of securities for their creditworthiness, and these sources are widely used by central banks (see Chart 5). Both counterparties and custodians that hold assets on behalf of central banks can also assist in valuing collateral. However, as Chart 4 indicated, central banks are not content to rely on the opinions of third parties.

Naturally, in their role as regulator, central banks have access to information about issuers that is not available to private sector agencies. But this is not the only reason four out of five central banks that responded to the survey rely primarily on an internal methodology. Chart 5 also shows central banks like to model the value of collateral themselves, using in-house and third party methodologies, and to use straightforward net present value calculations.

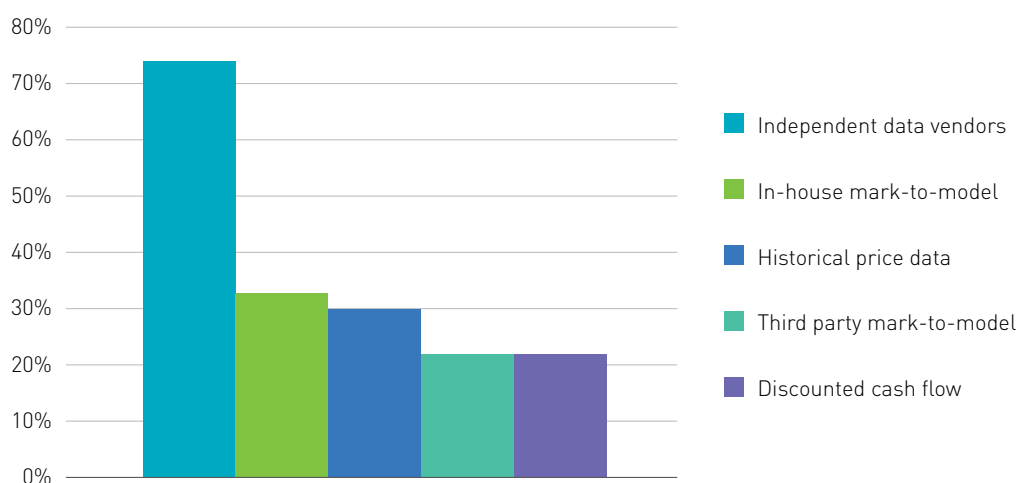
This preference for multiple methods of valuation reflects the importance of collateral to central banks. However carefully it chooses eligible collateral, a central bank is always exposed to the risk that the securities it holds will fall in value, or prove illiquid. If the counterparty defaults, the realisable value of the collateral may be insufficient to cover the loss in a timely fashion.

This is of course why collateral is always subject to a “haircut”: to ensure, as far as possible, that the value of the collateral always exceeds the value of the loan by an agreed margin.

However, haircuts do sometimes prove insufficient and central banks have to call for additional collateral to be posted. To avoid unnecessary operational activity – and few central banks have outsourced margin calls to a third party collateral manager<sup>16</sup> – central banks make these calls only when the value of the underlying collateral has moved by a certain amount. Among the central banks that responded to the survey, there was variation in the size of the price declines which trigger a “margin call” of this kind (see Chart 6), though the conservatism of central banks is evident once again: none sets a high hurdle.

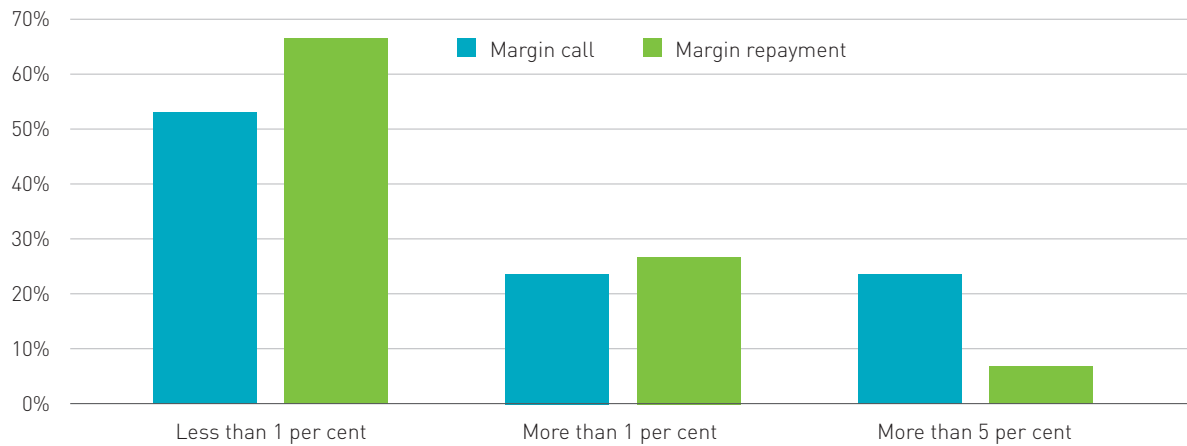
Since every margin call incurs an operational cost, it is clear that some central banks are more willing to pay for the additional security of frequent calls than others. Most of the central banks that responded to the survey make margin calls at the same frequency as they value collateral – namely, on a daily basis – though a minority bear the cost of intra-day or even real-time margin calls. Some central banks, all based in smaller or emerging markets, are making margin calls less than once a month.

**Chart 5: Sources of data for valuation methodologies**



<sup>16</sup> See page 26.



**Chart 6: Margin call and excess margin repayment triggers**

The decision to make margin calls on an intraday basis obviously depends on the ability to mark the assets held as collateral to market (or model) in real-time, or at least every few minutes or hours, and the fact that only a minority of central banks that responded to the survey are valuing their collateral more frequently than once a day precludes this option for the majority. Yet even where assets are re-valued only once a day, it can still make sense to issue a margin call, since the ratings of assets change continuously, and haircuts change with them. This is why third party collateral managers conduct intra-day eligibility checks every 15 minutes or so. It is the reluctance of central banks to rely on third party collateral managers, which can mark assets to market intraday, which makes intraday margin calls impossible.

This relative lack of operational efficiency helps to account for a less conservative approach to margin calls than to initial postings of collateral. Although respondents to the survey voted overwhelmingly in favour of insisting in normal market conditions on eligible collateral, seven out of ten respondents do not insist that a margin call be met with assets of exactly the same type as were posted initially. These positions are not contradictory – the margin call must still be met with eligible collateral – but they do suggest a willingness to be less conservative in day-to-day operational matters.

Similarly, Chart 6 shows that the central banks which responded to the survey adopt a more generous policy on the triggers for margin repayments, where central banks permit counterparties to reclaim some of the “excess” collateral they have posted. The more relaxed approach may reflect the fact that most of the operational costs will fall on the bank requesting repayment, rather than the central bank, for any movement of collateral certainly imposes an operational cost. These costs become significant when meeting margin calls on OTC derivative positions.

## Management of margin in derivative contracts

Users of both cleared and non-cleared OTC derivatives are facing a significant increase in the speed, volume and complexity of margin calls. Central banks have in recent years become significant participants in the OTC derivatives (or swap) markets. However, the major central banks have not traditionally had to post either initial margin or variation margin to their swap counterparts, on grounds that these are either another central bank or because their own creditworthiness is unquestioned.

In addition, the central banks of the United States and the European Union were exempted from compliance with the provisions of both the Dodd Frank Act in the United States and the European Market Infrastructure Regulation (EMIR), both of which forced other users of swaps to collateralise their positions at central counterparty clearing houses (CCPs). Central banks are also exempt from compliance with the rules on the margining of non-cleared swaps published by the Basel Committee on Banking Supervision (BCBS) and the International Organisation of Securities Commissions (IOSCO).<sup>17</sup>

However, not all central banks are based in major jurisdictions, and counterparties to swap transactions do not treat all central banks as equal. There are also sound operational reasons – such as adding or subtracting liquidity from the financial system, providing supervised banks with foreign currency funding, lending domestic currency to foreign markets via other central banks, managing the exchange rate, or hedging interest and currency risks in foreign reserves – even for sophisticated central banks to enter into swap agreements.

Foreign exchange swaps can be undertaken for other reasons, but after both 9.11 and again in the aftermath of the financial crisis that began in 2007-08 one of the measures taken by central banks to alleviate illiquidity in their domestic banking markets was foreign exchange swaps. The Federal Reserve, for example, established temporary swap arrangements with the Reserve Bank of Australia, the Banco Central do Brasil, the Bank of Canada, Danmarks Nationalbank, the Bank of England, the European Central Bank, the Bank of Japan, the Bank of Korea, the Banco de Mexico,

the Reserve Bank of New Zealand, the Norges Bank, the Monetary Authority of Singapore, the Sveriges Riksbank, and the Swiss National Bank.

Likewise, the European Central Bank has had a standing liquidity swap arrangement in place with the Bank of England since December 2010. This facilitates the provision of multi-currency liquidity to banks (and CCPs) which cannot fund their assets in commercial bank money. On 31 October 2013, the Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Federal Reserve and the Swiss National Bank also made permanent the temporary bi-lateral liquidity swap agreements they had put in place during the crisis in 2007-08.<sup>18</sup>

The swap arrangements between the six central banks make it possible for any of the central banks to provide liquidity in any one of five currencies foreign to any one of the six jurisdictions. The Federal Reserve, for example, can swap dollars for sterling with the Bank of England, and the Bank of England can then on-lend the dollars to an American bank in London, on terms and against collateral that it (rather than the Federal Reserve) decides. In such an arrangement the Federal Reserve assumes no credit risk, or currency risk, since the dollar-sterling exchange rate at the beginning and the end of the swap is fixed. As in any foreign exchange swap, the obligation to re-pay serves as the collateral, so no additional collateral is posted either at the outset or during the life of the transaction.

But liquidity provision to banks in stressed markets is not the only reason central banks enter currency swaps. In markets with a relatively small number of government bonds in issue, making it more difficult for commercial banks to obtain eligible collateral, central banks also use foreign exchange swaps to make currency reserves available as collateral to domestic banks. These transactions are collateralised, almost always with eligible securities rather than cash, which is more expensive to post to central banks paying minimal interest.

These practices explain why nearly half the central banks which responded to the survey

<sup>17</sup> Basel Committee on Banking Supervision (BCBS) and the International Organisation of Securities Commissions (IOSCO), *Margin requirements for non-centrally cleared derivatives*, March 2015.

<sup>18</sup> Board of Governors of the Federal Reserve System, press release, 31 October 2013.

use foreign exchange swaps, and nearly one in three of those that addressed the question have a swap agreement in place with another central bank to receive or provide liquidity (see Chart 1). While most of the users of swaps are drawn from smaller or emerging markets, the group includes sophisticated central banks based in Europe. Although substantial minorities chose not to answer the questions about swaps, only one major central bank asserted that it did not make use of OTC derivatives at all.

Importantly, the majority of users of both types of swaps posted as well as received collateral (see Chart 2). Unsurprisingly, the emerging market central banks were more likely to post collateral only. The overwhelming majority of the central banks that answered a direct question about whether they post as well as receive collateral agreed that they moved it in both directions. The group giving as well as receiving collateral included central banks from major jurisdictions.

This explains why, despite the understandable perception that central banks not used to posting collateral in derivatives transactions are poorly equipped to give collateral – as opposed to receive it – only a minority of respondents say they will need to re-organise to support two-way exchanges. Naturally, central banks already sell securities and receive cash (and vice-versa) in the repo and reverse repo transactions that characterise open market operations. Even the central banks that do expect to re-organise will do so by counterparty, and not by asset class or region.

This is an interesting finding. In theory, central banks cannot discriminate between counterparties or in favour of particular asset classes, especially in the challenging market conditions which have prevailed since the acute phase of the financial crisis in 2007-08. The importance of central bank financing since the shrinkage of the inter-bank market in the wake of the crisis means the range of counterparties a central bank is willing to accept has a major impact on financial stability and the money supply, in the sense that banks that cannot fund themselves cannot lend money.

This is now a global issue too. The decision to make swap arrangements between central banks permanent is a measure of the globalisation of

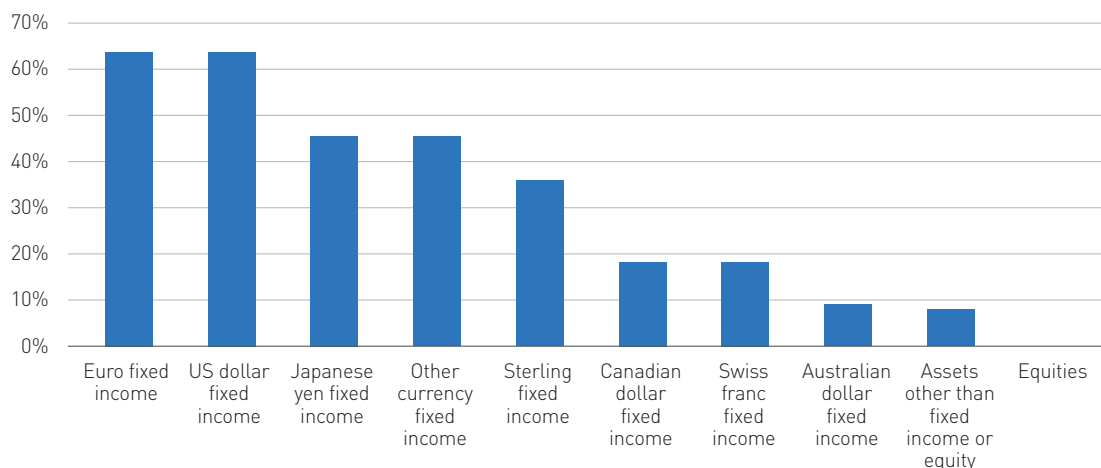
bank financing – and, more particularly, of central bank financing. Major commercial banks now own and fund assets in multiple currencies. Through their own use of the swap markets, they often fund assets denominated in one currency with borrowing in another. In stressed markets – such as those that prevailed during the euro-zone sovereign debt crisis in 2011, when European banks struggled to fund US dollar assets – banks may find commercial funding withdrawn. The permanent swap facilities set up by the central banks are intended to cover that risk.

The parties to that arrangement are far from random. As Chart 7 shows, central banks that responded to the survey tend to accept as collateral mostly the five currencies that are the subject of the permanent swap agreement between six central banks in October 2013. Indeed, central banks are understandably reluctant to assume wider cross-currency risks in collateralised transactions, even in such extreme circumstances as those which prevailed in 2001, 2007-08 and 2011.

Naturally, they prefer in normal market conditions to post and accept collateral in the currency of the underlying loan only. This reflects not only the increased market and legal risks of cross-currency collateralisation, but the potential distortion of the foreign exchange markets if a central bank advances credit secured on assets denominated in another currency. But in stressed markets central banks do accept these risks in a limited range of currencies. The palpable reluctance to accept equities indicates that currency risk is yet another inhibiting factor. After all, the equity of all but a handful of the largest multinational corporations trades in the domestic currency denomination.

However, central banks do use foreign exchange swaps in less extraordinary times and for normal reasons, chiefly to hedge currency and interest rate risk in their foreign reserves. In these cases, their counterparty is not another central bank but a commercial bank. So it is not surprising that the survey respondents that are using swaps are also interacting with a significant number of counterparties. Although a sizeable proportion of central banks were not willing to disclose the number of swap counterparties, more than two in five were dealing with at least two and some with more than 15 (see Chart 8).

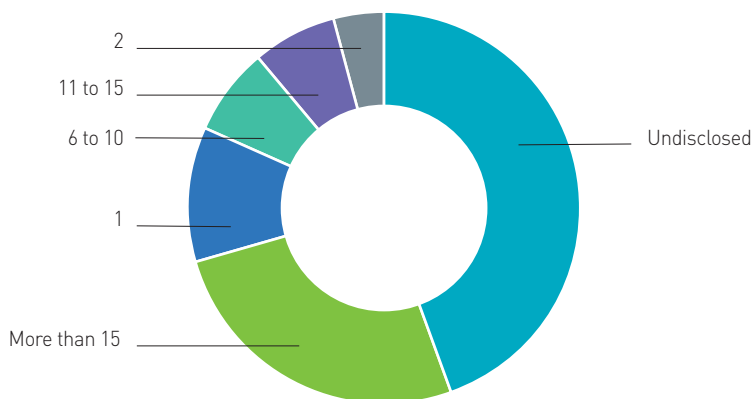
**Chart 7: Currency denominations of assets central banks are prepared to accept as collateral**



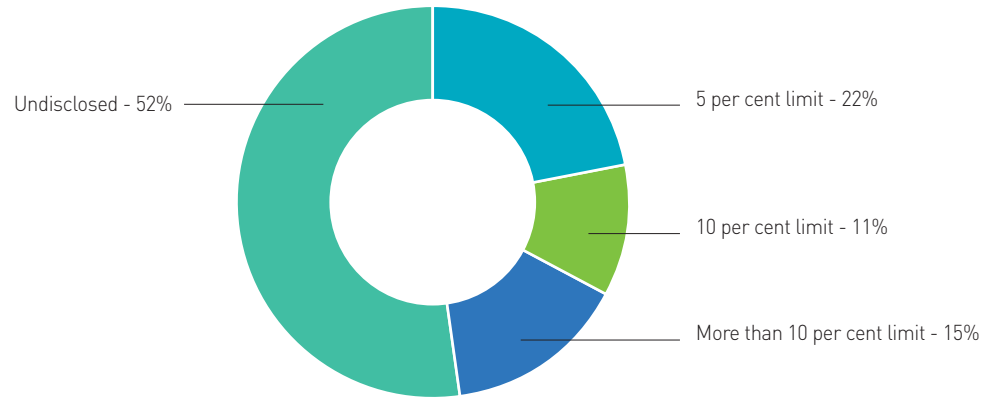
This multiplication of counterparties represents a prudent diversification of risk.<sup>19</sup> In fact, central banks actively manage counterparty risk as a central aspect of their collateral management activities. They also impose “concentration” limits on counterparties as well as collateral. This reflects the special status of a central bank. Imposing limits on the quantity of a particular type of collateral it was prepared to accept would inevitably discriminate against counterparties that offered the collateral of the same quality, but only after a ceiling was breached.

As Chart 9 shows, a majority of central banks are not willing to disclose the “concentration” limits they apply. This is understandable, because central banks do not always have the luxury of operating to concentration limits in their capacity as lender of last resort. Of those central banks that did respond, half set the counterparty concentration limit no higher than 5 per cent, and three quarters avoided any concentration higher than a tenth of their collateral portfolio.

**Chart 8: Number of OTC derivative counterparties of central banks**



<sup>19</sup> The number will in some cases include clearing brokers that central banks interact with in both exchange-traded and cleared swaps, but only a minority of central banks that responded to the survey were prepared to disclose any details of the clearing brokers they use to intermediate trades with CCPs and bi-lateral counterparties and calculate margin calls. However, only one central bank asserted that it did not use a clearing broker at all.

**Chart 9: Counterparty concentration risk management**

These concentration limits are a reminder that collateral is not a completely dependable mechanism for insuring against counterparty credit risk. If the issuer of the securities held as collateral fails or defaults, the collateral may be worthless. This is why central banks place limits on their exposure to particular issuers. If a counterparty defaults, the collateral may prove difficult to sell for full value, or take longer than expected to sell. This is why central banks also limit their exposure to particular counterparties, and not just in OTC derivative contracts.

## Operational infrastructure

The majority of the tools used by central banks are designed to manage the risk that the collateral they receive is of poor quality, over-valued, or hard to sell. But accepting collateral also entails incurring a risk that has nothing to do with the collateral itself. This is operational risk, or the risk that the central banks will incur losses not because they are under-collateralised, or the assets are hard to sell, or the issuer or the counterparty defaults, but because operational systems, processes, procedures or people fail to work properly.

The most likely way in which operational risk will manifest itself is the failure by a counterparty to deliver collateral with good legal title to the account of the central bank. Such failures are a routine aspect of the bond and especially of the repo markets, and usually result from an easily rectifiable operational error, such as keying the wrong data into a system. However, failures of this kind are bound to increase when the quality of the infrastructure that underpins the movement of collateral is poor. This matters because, if transactions in any security cannot be settled reliably, it makes central banks reluctant to accept that class of asset.

In fact, this is one reason central banks tend in normal conditions to accept as collateral assets of the highest quality only. Such assets are almost invariably held in dematerialised form in CSDs where they can be transferred electronically from

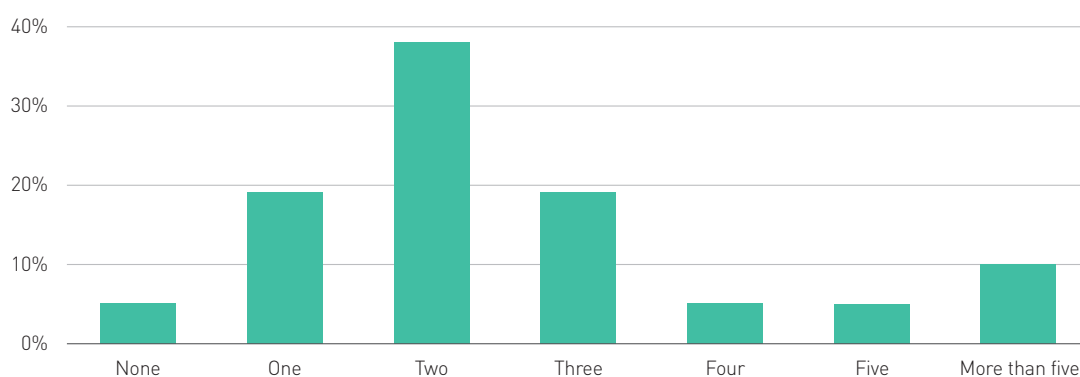
the account of the counterparty bank to the account of the central bank advancing the credit. Legal ownership is generally transferred to the central bank simultaneously. Though pledge mechanisms are also used, the goal is always to eliminate legal uncertainty about the ability of a central bank to dispose of the collateral when necessary.

Since many central banks also accept non-domestic securities, and these are held by CSDs in different jurisdictions, the simplest way for a central bank to take delivery of such collateral would be to open an account at the CSD in the other country. However, as Chart 10 shows, the central banks that responded to the survey operate relatively few such accounts. Although one respondent to the survey operates accounts at 18 CSDs, a clear majority maintained no more than three.

Almost every central bank will have an account at their domestic CSD – the Bundesbank, for example has an account at Clearstream Banking AG in Frankfurt – but cross-border accounts are rarer. This doubtless reflects a limited amount of cross-border traffic. In normal circumstances, central banks try to avoid cross-currency risk.<sup>20</sup>

Accounts at foreign CSDs would be useful, especially in extraordinary market conditions such as those of 2001, 2007-08 and 2011, and have proved to be so. After 9.11, for example,

**Chart 10: Number of CSDs at which central banks maintain accounts**



<sup>20</sup> See page 19 above.

Clearstream opened accounts in its depository for the Federal Reserve, and European banks were able to borrow US dollars in the United States against collateral posted to those accounts at a time when the financing infrastructure in New York was not operating. The survey results do not suggest there is strong appetite among central banks to build on these direct account links.

That reflects the availability of a cheaper alternative to operating accounts at multiple CSDs. This is for one central bank to appoint the central bank in another country as their “correspondent” central bank. This works in the same way that commercial banks use “correspondent” banks to complete transfers of value in other countries. A domestic central bank takes receipt of domestic collateral into its account at the CSD, and holds it on behalf of the non-domestic central bank granting the credit to a commercial bank in its own country.

However, correspondent banking is an obsolescent solution to the problem of transacting business across borders, especially as the volume of cross-border business is rising. Most commercial banks are reducing the number of correspondent banking relationships, mainly to reduce the burden of anti-money laundering (AML) and Know Your Client (KYC) compliance,<sup>21</sup> but there is a long term expectation of direct links between domestic payment infrastructures that will allow banks active on a global scale to make payments across borders directly.

The RTGS that are the ultimate payments market infrastructures in every domestic market are all owned and operated by central banks, so the lack of progress in cross-border linkages is to some extent the responsibility of the central banks. The survey certainly suggests that there is as yet a limited recognition by central banks that they are part of an extended infrastructural eco-system that encompasses CSDs and CCPs as well as RTGSs. CCPs and RTGSs consume collateral, as well as move it. Yet they are not well-connected across borders.

One result is that the day-to-day activities of central banks in the collateral markets are not well integrated into the global financial system as a whole. A good example of this is the history of the Correspondent Central Bank Model (CCBM), which the central banks of the euro-zone have operated since the advent of the single European currency in 1999.

It was designed to facilitate the transfer of domestic collateral to non-domestic central banks in a single currency area in which domestic bond markets – the chief source of eligible collateral – remain fragmented. Re-launched in 2006 as a single technology platform that was theoretically capable of ensuring that any and all eligible collateral was available to any and all counterparties to access central bank credit, irrespective of where the assets or the counterparty are situated, its use was undermined by a “repatriation” obligation.<sup>22</sup>

Under the “repatriation” obligation assets had to be transferred to the CSD into which they were originally issued before they could be transferred to a national central bank to obtain credit. This clumsy requirement was not removed until May 2014. Since then, euro-denominated assets in any CSD, including CSDs outside the euro-zone, can in theory be used to secure credit at the national level from any national central bank without the need for transfer to the domestic CSD first.

It is little used. Correspondent central banking links of this kind are bound to be inferior to opening accounts directly at CSDs. Unlike CCBM, such accounts can be used easily and efficiently by third party collateral managers to move assets between any euro-zone central bank on behalf of any central bank.<sup>23</sup> Correspondent central banking services such as the CCBM can still play a useful supplementary role in facilitating the transfer between central banks of less marketable assets of the kind that are not held in CSDs, such as loans or mortgage-backed securities (MBS).

<sup>21</sup> Committee on Payments and Market Infrastructures, consultative report, correspondent banking, Bank for International Settlements, October 2015.

<sup>22</sup> The need for this reflected the fact that, despite the single currency, European capital markets are not fully integrated, nor are banks fully consolidated across European borders, and there is no single issuer of government debt because fiscal policy is not consolidated either, so collateral could not be managed as a single pool, and liquidity had to be supplied at the level of the national central banks.

<sup>23</sup> See pages 22 below.

However, direct links between CSDs have yet to develop on a regional, let alone a global, scale. Likewise, the modified CCBM has yet to evolve into a single collateral platform for the euro-zone. There are longer term expectations that TARGET2-Securities (T2S), the single settlement platform for Europe, could eventually offer a single, centralised collateral management network. This is because T2S is creating a single, centralised settlement system in which the provision of credit to settle transactions in central bank money has to be supported by a single, centralised, pool of collateral.

A single pool makes it much simpler and faster to move collateral from where it is to where it needs to be, although realising the full value of its benefits will depend on the national central banks of Europe harmonising their collateralisation techniques and procedures. At present, collateralisation techniques (repo, pledges, assignments and floating charges) and collateral holding methods (pooled and earmarked systems) vary between European countries.

There are important lessons from the European experience for other regions looking to create better integrated cash, securities and collateral markets. Chief among them is the need to ensure the legal and operational infrastructure is in place to support a single capital market as soon as a single currency is attempted. Facilitating the transfer of collateral between jurisdictions is the major advantage of giving priority to such an infrastructure, because collateral management is not a one-off transaction but a continuous activity.

Once collateral is transferred, it has to be serviced as well. If the value of the collateral falls below that of the loan, the central bank has to call for additional margin from its counterparty. If it rises above the value of the loan, the central bank has to re-pay the excess. If a counterparty wishes to retrieve collateral for a more profitable use, a substitution has to be made. Across borders, such additional movements of collateral do of

course have to use the same combination of direct accounts or correspondent central banking networks. The more efficient these are, the lower the transaction costs, and the greater the volume of activity.

However, the ultimate test of the operational efficiency of a central bank as a collateral manager is not its ability to move collateral efficiently, either domestically or across borders. It is to realise the value of the collateral it holds in an event of default by a counterparty.

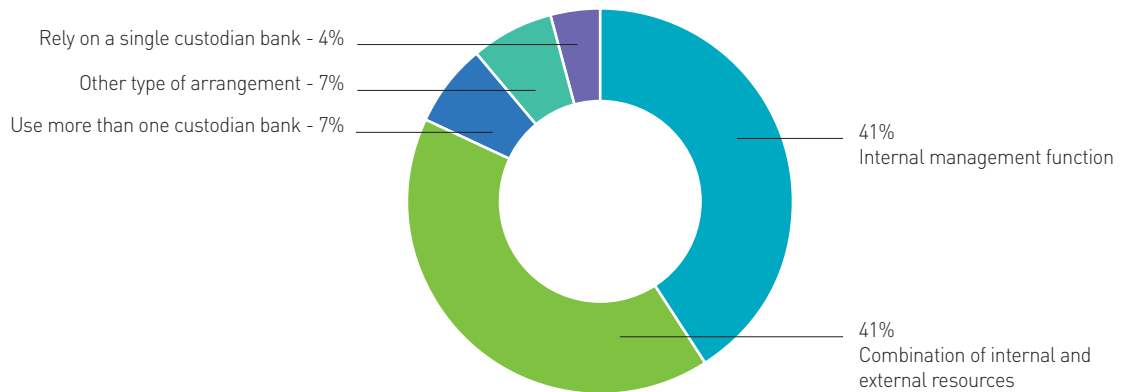
The circumstances under which a central bank will seek to realise the value of collateral it holds are bound to differ from those of a commercial bank. Commercial banks can realise collateral in the wake of a default without disturbing the market as a whole. But if a commercial bank has defaulted on an obligation to a central bank, the entire market is bound to be disordered. In these circumstances, central banks can maintain a position much longer than a commercial bank, because they have access to unlimited amounts of liquidity.

However, there will nevertheless be circumstances under which a central bank can sell collateral without exacerbating the market instability that is bound to follow a default by a commercial bank. This decision will generally be executed by the dealing desk which all central banks maintain to conduct open market operations, though these vary considerably in their operational scope and responsibilities. The Open Market Trading Desk at the Federal Reserve in the United States, for example, deals with a small group of so-called “primary dealers” only.<sup>24</sup> The ECB, on the other hand, admits a much broader range of financial institutions as counterparties.

The overwhelming majority of central banks rely on a single collateral trading desk. Even the minority that maintain operations in other time-zones give centralised management control. An even smaller minority claim to make use of “another arrangement,” which will generally be a third party

<sup>24</sup> Bank of Nova Scotia, New York Agency, BMO Capital Markets Corp., BNP Paribas Securities Corp., Barclays Capital Inc., Cantor Fitzgerald & Co., Citigroup Global Markets Inc., Credit Suisse Securities (USA) LLC, Daiwa Capital Markets America Inc., Deutsche Bank Securities Inc., Goldman, Sachs & Co., HSBC Securities (USA) Inc., Jefferies LLC, J.P. Morgan Securities LLC, Merrill Lynch, Pierce, Fenner & Smith Incorporated, Mizuho Securities USA Inc., Morgan Stanley & Co. LLC, Nomura Securities International, Inc., RBC Capital Markets, LLC, RBS Securities Inc., SG Americas Securities, LLC, TD Securities (USA) LLC, UBS Securities LLC. See: [www.newyorkfed.org/markets/pridealers\\_current.html](http://www.newyorkfed.org/markets/pridealers_current.html). The Federal Reserve offers liquidity to a broader range of financial institutions, totalling 7,500 in all, via its discount window facility.



**Chart 11: How central banks organise collateral management**

collateral manager. This is a valuable service, since a desk which has a consolidated view of the collateral position of the central bank is better placed to manage the collateral efficiently than multiple desks divided by geography or asset class.

As Chart 11 shows, 59 per cent of the central banks that responded to the survey do recognise the value of working with third party service providers. One obvious advantage of using a third party service provider is a reduction in the most obvious operational risk of all: a catastrophic failure of systems, as a result of natural disasters, loss of essential services such as electricity, terrorist attacks, sabotage, data corruption, human error or cyber-attack. Central banks obviously put in place back-up and contingency plans, but adding the capabilities of a third party using different technology is a further form of risk management.

That said, the principal reason to use a third party service provider is to take advantage of their superior network or technology. Few central banks have an incentive to invest in sophisticated collateral management systems. As the survey found, the number of direct accounts central banks maintain with CSDs in other jurisdictions is limited, and correspondent central bank relationships are not designed to support high levels of continuous daily movements of collateral across borders or between currencies. It is in bridging these gaps that a third party collateral manager is most valuable.

## Use of third party collateral managers

If collateral can be mobilised from anywhere and posted anywhere else, at low transaction costs, it will reduce rather than increase systemic risk. Central banks certainly understand this logic. After all, they rely on smoothly functioning collateral markets to implement monetary policy and promote financial stability. They demonstrably value the ability of third party collateral managers to overcome the infrastructural and jurisdictional fragmentation of the global collateral markets because 50 per cent of the survey respondents make use of at least one (see Chart 12).

The fact that a number of central banks are using more than one third party collateral manager reflects two principal factors. First, the diversity of the currency reserves a central bank holds, since it makes sense to appoint different managers for different currencies. Secondly, multiple appointments maximises the number of potential counterparties and minimises concentration risk.

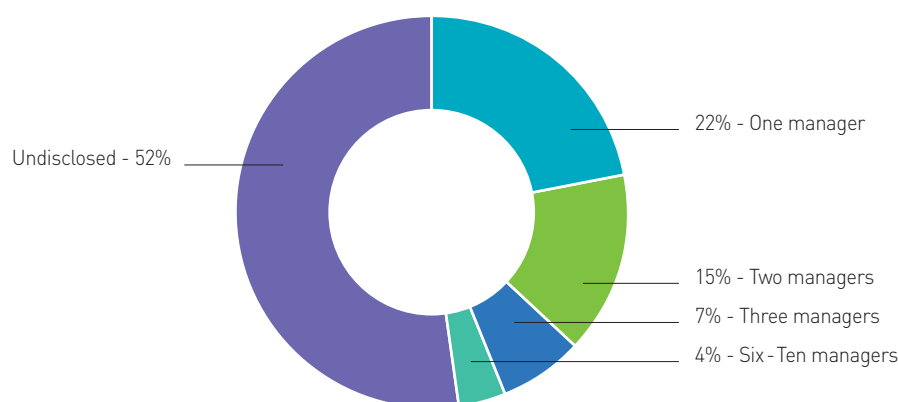
Many of the institutions identified in the survey as third party collateral managers are really providing the central bank with no more than safe custody of assets.<sup>25</sup> But the importance of providing a more sophisticated service, such as administering eligibility criteria, marking assets to market or model, and applying haircut and concentration schedules, is increasing. As Chart 13 shows,

nearly two out of five of the central banks that addressed the question in the survey thought collateral management capabilities were important enough for them to consider or actually initiate a change of custodian.

However, central banks are likely to adopt a predictably conservative approach to any new third party collateral management service providers they appoint. The central banks that responded to the survey have a strong preference for entrusting collateral management to infrastructural entities such as CSDs and international CSDs (ICSDs) and established custodian banks rather than investment banks.

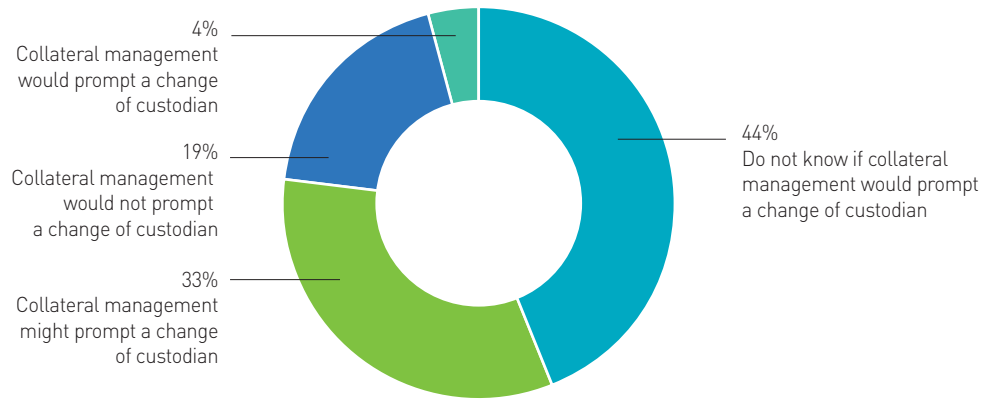
The criteria central banks use to assess potential providers are equally conservative (see Table 1). The top three criteria – credit rating, regulatory status and bankruptcy remote arrangements – indicate that the maintenance of the safety of assets is the paramount concern. Table 1 implies that central banks expect third party collateral managers not just to have high credit ratings, but to abjure any lien over their assets, segregate their collateral at every level, indemnify them against losses of cash and securities occasioned by sub-custodians and operational errors, and have balance sheets strong enough to absorb those losses.

**Chart 12: The number of third party collateral managers used by central banks**



<sup>25</sup> See pages 27-29.

**Chart 13: Importance of collateral management to a custody relationship**



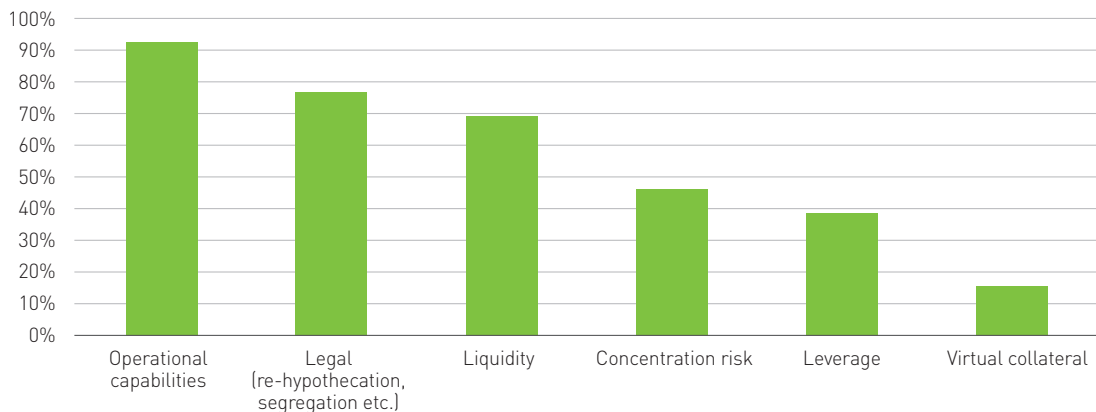
**Table 1: Criteria central banks use to assess third party collateral managers in rank order\***

1. Credit rating
2. Regulatory status
3. Bankruptcy remote solution
4. Links to financial market infrastructures
5. Stress test performance
6. Lack of conflicts with custody business
7. Lack of conflicts with trading business

Creditworthiness is the prime consideration in their appointment of a third party collateral manager. Once an appointment is made, central banks attach more importance to operational efficiency than innovative services. As Chart 14 shows, the ability to move collateral efficiently (operational capabilities), guarantee good title (legal (re-hypothecation, segregation etc.)) and ensure the value of the collateral can be realised quickly (liquidity) are seen as significantly more important by central banks than the ability to provide a holistic “virtual” collateral management service.

The lack of interest in “virtual” collateral management services is telling. In a virtual service,

**Chart 14: Services by which central banks assess third party collateral managers**



\*Factors are weighted in order of importance.

a single third party collateral manager would have responsibility for deploying all of the collateral of a central bank on the basis of an aggregated overview of all of the assets it owns and liabilities it owes, while leaving them in custody with any number of other banks. The limited number of respondents that considered this approach helpful suggests most central banks do not yet believe such an aggregate overview and management service is either necessary to meet their needs, or operationally viable even if it did. The survey respondents vote unequivocally for operational efficiency.

Maximising operational efficiency in collateral management is as natural a goal for a central bank to pursue as any commercial bank. It means any third party collateral manager seeking business from a central bank must value collateral frequently and accurately using multiple pricing sources and methodologies, apply haircuts promptly, exchange and substitute collateral efficiently, meet margin calls automatically, reinvest any cash collateral accepted safely, and solve margin disputes quickly. A successful provider will also have to report at least intra-day (and perhaps in real-time) on the detail of positions and transactions in multiple formats.

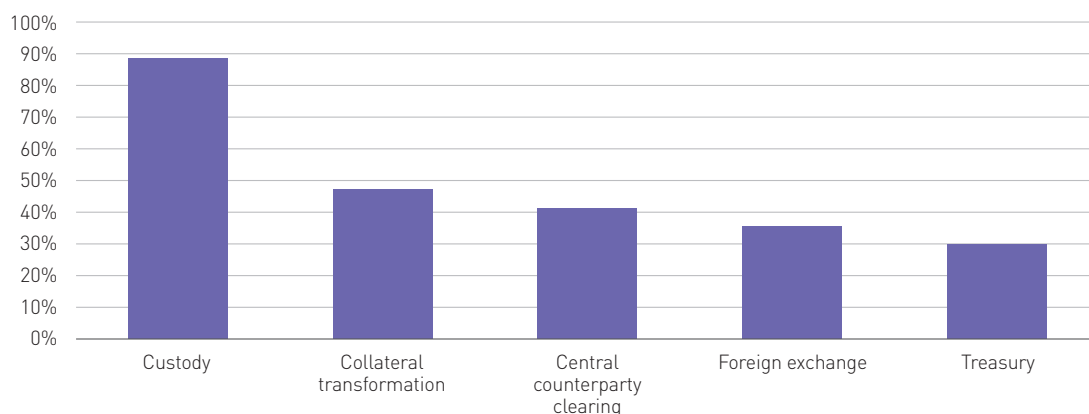
All these tasks can be expedited by a tri-party collateral management agent, and the survey suggests central banks rank custody ahead of value-added services such as CCP clearing, foreign exchange and cash management (see Chart 15).

The surprisingly high level of interest in collateral transformation services – the exchange of lower quality collateral for higher quality collateral, usually in a short term transaction such as a repo or securities loan – is chiefly a measure of their willingness to make the high quality assets in their own portfolios available to banks holding low quality assets but in need of funding in stressed market conditions. It does not measure their own desire to use such services directly in normal market conditions.

If central banks see collateral transformation services as useful in markets that are disrupted, the survey found they are also interested in collateral management services that can model the robustness of the market in different forms of eligible collateral and predict future collateral demands. More than two out of three respondents who addressed the question thought that collateral modelling was at least quite important.

However, the focus of the minority of respondents that considered modelling could help them manage risks was firmly on factors that might affect the value of the collateral they held, such as adverse movements in price (market risk) or a rise in interest rates that undermined the value of fixed income securities (interest rate risk). Even operational risks such as missing an interest payment (asset servicing risk) ranked well ahead of models designed to optimise the use of available collateral (see Chart 16).

**Chart 15: Services central banks expect of a third party collateral manager**



**Chart 16: Types of modelling central banks seek from third party collateral managers**

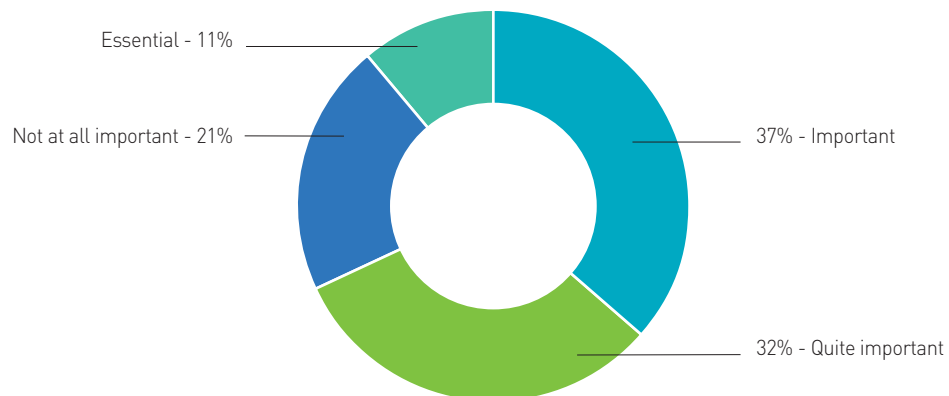


This reflects the fact that central banks are mainly receivers of collateral, rather than givers, so they are not under pressure to, say, find the asset that is cheapest-to-deliver against the eligibility and concentration criteria set by the counterparty. As systemically important market participants, central banks are also less concerned to establish the true economic value of a piece of collateral after taking market demand, tax and transaction costs into account. In fact, it is significant that more than half of the central banks that took part in the survey did not reply to the questions on collateral modelling at all and, of those that did, none thought collateral modelling essential.

However, the survey does suggest that central banks are now persuaded that they operate in globalised markets, and that third party collateral managers have a role to play in bridging the infrastructural, legal and jurisdictional barriers to a truly global market in collateral. As Chart 17 demonstrates, four out of five respondents see global coverage by a third party collateral manager as somewhere between quite important and essential.

This is an important finding. At the height of the financial crisis, central banks discovered that at times of market-wide liquidity stress, the demand

**Chart 17: The importance of global coverage by a third party collateral manager**



for collateral eligible at a central bank can rise rapidly. Having a global infrastructure in place that enables banks to mobilise eligible collateral – or, indeed, any collateral at times when central banks have relaxed their eligibility criteria – in multiple jurisdictions quickly and efficiently could make a major contribution to the stability of the financial system. As the survey respondents recognise, this is precisely the role which tri-party collateral managers can play.

The regulatory response to the crisis has increased reliance on collateralised funding, and so further intensified the demand for collateral management services that can overcome the fact that many collateral markets remain primarily domestic, and therefore highly fragmented. In particular, the diversion of an increasing proportion of cash and derivatives business into CCPs means that demand for high quality collateral is rising rapidly on a global scale.

Moving collateral across borders to meet this rising demand obviously increases the risks, not least because the rights of the counterparty posting or receiving the collateral may be attenuated by comparison with posting collateral in their domestic market. However, the risks of collateral shortages developing, even as eligible collateral remains unused because the infrastructure is inadequate, is far greater.

Chart 17 shows that central banks grasp that the principal value to them of a third party collateral

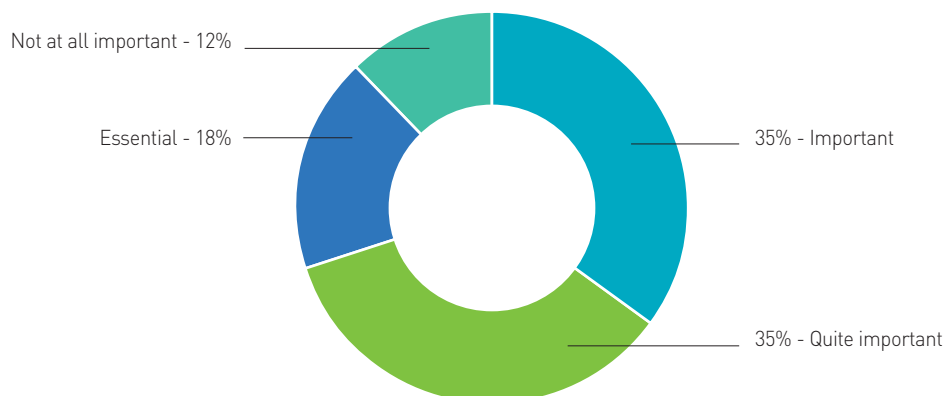
manager is its ability to manage collateral across borders despite the complexity of cross-border collateral movements and the fragmented settlement infrastructure. The survey finds that this understanding is especially strong among the smaller central banks in less developed markets that do not benefit from either direct accounts at foreign CSDs or extensive correspondent central banking networks.

The tri-party agents – entities to which central banks would outsource the selection, settlement, custody and management of collateral – are the only third party collateral managers with a credible cross-border collateral management capability. So it is not surprising that the survey identified a widespread recognition by central banks of the importance of tri-party services, with less than one respondent in eight deeming them unimportant (see Chart 18).

Despite this recognition of the value of tri-party services, the level of adoption by central banks is not high. As the survey found, central banks are at present running mainly internal collateral management operations in their domestic markets, while the commercial banks they supervise and lend to are operating on a global scale.

Of course, the legal obstacles (essentially, confidence among collateral receivers that they will secure good title to collateral) and operational challenges (such as agreement on what collateral is eligible) to a single global market in collateral

**Chart 18: The importance to central banks of a tri-party capability**



remain formidable. Even within the European Union, all efforts to harmonise securities law have so far failed.

Tri-party services are not a substitute for legal harmonisation, but they can facilitate the cross-border movement of collateral by harmonising the systems that are used to manage collateral in different jurisdictions. For central banks, they represent a convenient and low cost method of keeping up with the globalisation of the markets.

The commercial banks the central banks supervise, and the sources of the collateral they post, and the reserves which the central banks themselves hold, are increasingly global. The continuing reliance of the central banks on bi-lateral rather than tri-party relationships is making the global financial system more vulnerable to serious disruption in a crisis. Central banks themselves have expressed concern that operational complexity in collateral management is increasing, and that this is adding to operational risk. As a recent CPMI report notes, "collateral management services may reach a level of criticality that make them a systemically important activity."<sup>26</sup>

Regulatory reforms have increased demand for eligible collateral. Collateralised loans consume less regulatory capital. Banks are obliged to hold more high quality assets for liquidity purposes. Centralised clearing of some OTC derivatives, and the margining of the non-cleared alternative, have added to longstanding demands for high quality collateral to support cash payments and repos. Coupled with limits on the re-use of collateral, the increased demand for cash and high quality collateral is putting pressure on the accessible global supply.

In these circumstances, an efficient operational infrastructure capable of accessing, using and re-using collateral on a global scale could make a major contribution to the stability of the international financial system. Tri-party services are not a complete solution, but they can overcome many of the infrastructural and operational obstacles to the mobilisation of collateral on a global scale.

<sup>26</sup> Committee on Payments and Market Infrastructures, *Developments in Collateral Management Services*, Bank for International Settlements, September 2014, page 23.







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