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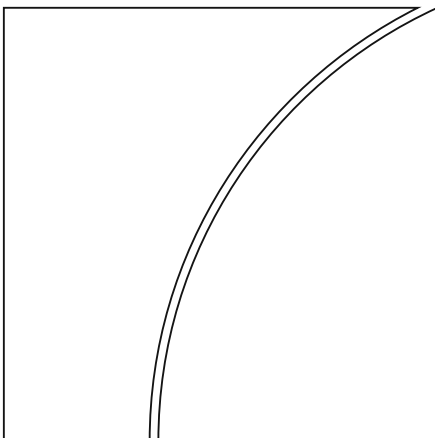
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Asset encumbrance, financial reform and the demand for collateral assets

Report submitted by a Working Group established by
the Committee on the Global Financial System

The Group was chaired by Aerd Houben, Netherlands
Bank

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Preface

Given that the demand for collateral assets is increasing, the Committee on the Global Financial System (CGFS) in May 2012 established a Working Group (chaired by Aerd Houben, Netherlands Bank) to explore the implications of this trend for markets and policy. This report presents the Group's findings from a system-wide perspective and draws broad conclusions for policymakers.

The report presents evidence of increased reliance by banks on collateralised funding markets in recent years for some regions, with the increase being most pronounced in Europe. Regulatory reforms and the shift towards central clearing of derivatives transactions will also add to the demand for collateral assets. But there is no evidence or expectation of any lasting or widespread scarcity of such assets in global financial markets. Temporary supply-demand imbalances, however, may arise in some cases, as the supply of collateral assets varies widely across jurisdictions and institutions.

Endogenous private sector responses, such as collateral transformation activities, will help to address these supply-demand imbalances if and when they emerge. While this will mitigate collateral scarcity, these activities are likely to come at the cost of increased interconnectedness, procyclicality and financial system opacity as well as higher operational, funding and rollover risks. Hence, monitoring these developments and designing measures that limit any resulting adverse market implications for financial market stability should be an important focus of policy.

The concepts and policy implications described in this report are a timely contribution on an important topic. I hope that they will inform ongoing discussions among policymakers on some of the key issues related to increased demand for collateral assets.

William C Dudley

Chairman, Committee on the Global Financial System
President, Federal Reserve Bank of New York

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Executive summary

The use of collateral in financial transactions has risen in many jurisdictions in the aftermath of the financial crisis, and is likely to increase further. This is driven by both market forces and regulatory changes, and has triggered concerns about real or perceived collateral scarcity and excessive asset encumbrance. Taking a system-wide perspective, this report examines how greater collateral use and asset encumbrance may impact the functioning of the financial system and draws lessons for policymakers. The key findings are summarised below.

Increasing collateralised funding and asset encumbrance

- There is evidence of increasing bank reliance on collateralised market funding, particularly in Europe. A key driver of this development is perceptions of higher counterparty credit risk amongst investors, who demand more collateral or charge higher risk premia on unsecured debt.
- However, the share of collateralised funding differs significantly among banks and between jurisdictions. Indeed, different business models, market structures and regulatory frameworks will tend to generate – and support – structurally different levels of collateralised funding in bank balance sheets.
- Greater reliance on collateralised funding raises the share of bank assets that are encumbered. Asset encumbrance is also rising on account of initial margin requirements of central and bilateral counterparties to cover derivatives exposures and other aspects of regulatory reform.

No aggregate collateral shortages, but differences amongst jurisdictions

- The demand for high-quality assets (HQA) that can be used as collateral will increase due to a number of key regulatory reforms. Examples are stricter standards for initial margin requirements on over-the-counter (OTC) derivatives transactions, both for central and for bilateral clearing arrangements, and the introduction of the liquidity coverage ratio under Basel III. This comes on top of greater demand for collateral assets in secured bank funding.
- Current estimates suggest that the combined impact of liquidity regulation and OTC derivatives reforms could generate additional collateral demand to the tune of \$4 trillion. At the same time, the supply of collateral assets is known to have risen significantly since end-2007. Outstanding amounts of AAA- and AA-rated government securities alone – based on the market capitalisation of widely used benchmark indices – increased by \$10.8 trillion between 2007 and 2012. Other measures suggest even greater increases in supply.
- Hence, concerns about an absolute shortage of HQA appear unjustified. Yet as the situation varies markedly across jurisdictions, temporary HQA shortages may arise in some countries, for example when the level of government bonds outstanding is low or when government bonds are perceived risky by market participants.

Implications for markets and financial stability

- *Private sector adjustments* can mitigate shortages of HQA. Such adjustments include broader eligibility criteria for collateral assets in private transactions, more efficient entity-level collateral management and increased collateral reuse and collateral transformation.
- Yet while lessening any collateral shortage, such endogenous responses will come at the cost of greater *interconnectedness* in the financial system, for example in the form of more securities lending or collateral transformation services. They may also increase *concentration*, if these responses rely on the services of only a small number of intermediaries, and will add to financial system *opacity*, including via shadow banking activities, and increase *operational, funding and rollover risks*.
- Increased collateralisation of bank balance sheets mitigates counterparty credit risk, but adds to the *procyclicality* of the financial system. The channels through which this occurs, in times of financial stress, are the exclusion of certain assets from the pool of eligible collateral, higher haircuts on collateral assets, increased margin requirements on centrally cleared and non-centrally cleared derivatives trades and marking-to-market of bank assets in collateral pools.
- Greater encumbrance of bank balance sheets can adversely affect the residual claims of unsecured creditors during bank resolution, increase risks to deposit insurance schemes and reduce the effectiveness of *policies aimed at bail-in*. Given limited disclosures on encumbered assets, the ability of markets to accurately price unsecured debt can also be impaired.

Implications for policy

- Market discipline can be enhanced by requiring banks to provide regular, standardised public disclosures on asset encumbrance. Transparency about the extent to which bank assets are encumbered or are available for encumbrance will allow unsecured creditors to better assess the risks they face. Such disclosures would include information on unencumbered assets relative to unsecured liabilities, on overcollateralisation levels, and on received collateral that can be rehypothecated. Development of such standards would benefit from outreach to market participants and could involve the reporting of lagged, average values to limit adverse dynamics in crisis periods. Supervisors, in turn, should receive more detailed and granular data, as required, including the amounts and types of unencumbered assets.
- Including asset encumbrance in the pricing of deposit guarantee schemes deserves consideration in jurisdictions where encumbrance is of concern. Since depositors will not themselves factor in the risks posed by increased asset encumbrance – as their deposits are guaranteed – risk-sensitive deposit guarantee premia could serve to discipline banks. This would internalise the effect of asset encumbrance on residual risks for such schemes, as well as for the government as the ultimate safety net. Further analysis is needed to make this operational, taking into account differences in business models.
- To internalise the risks of rising asset encumbrance, prudential limits can serve as a backstop to other policy measures, as practised in some jurisdictions. In cases where encumbrance could become a material concern, banks should be

asked to perform regular stress tests that evaluate encumbrance levels under adverse market conditions.

- Central banks and prudential authorities need to closely monitor and oversee market responses to increased collateral demand and their effects on interconnectedness. This provides support for work on best practice standards in securities financing markets and for shadow banking activities more generally, as well as for supervisory reviews of financial institutions' risk and collateral management arrangements.
- Concerns over procyclical demand for collateral assets lend support to efforts targeting strict standards for collateral valuation practices and through-the-cycle haircuts.

1. Introduction

The use of collateral in financial transactions has risen in many jurisdictions in the aftermath of the financial crisis, driven by both market forces and regulatory changes. Market participants have shown increased appetite for secured long-term bank bonds, such as covered bonds. Likewise, reliance on repo markets, as opposed to short-term unsecured lending, has risen for some regions such as the euro area or the United States. Many banks, especially in Europe, have become increasingly dependent on collateralised borrowing, leading to rising bank asset encumbrance levels. Adding to the demand for collateral assets will be more stringent collateralisation requirements, a key element of over-the-counter (OTC) derivatives markets reform, and the new Principles for Financial Market Infrastructures (PFMIs) issued jointly by the Committee on Payment and Settlement Systems (CPSS) and the International Organization of Securities Commissions (IOSCO). New liquidity regulation under Basel III will require banks to maintain larger buffers of high-quality liquid assets (HQLA).¹ Finally, European insurance firms are likely to add to the demand for high-quality assets (HQA), driven by the new capital requirements under Solvency II.

These developments have raised concerns about the implications of increased collateralisation of financial transactions and bank asset encumbrance for the functioning and stability of the financial system. Against this backdrop, in May 2012, the Committee on the Global Financial System (CGFS) set up a working group, under the Chairmanship of Aerd Houben of the Netherlands Bank, with the mandate to: (i) engage in a stocktaking exercise, including consultations with market participants, to understand the factors contributing to the increased reliance on collateralised funding markets, and how this may affect asset encumbrance on banks' balance sheets; (ii) to assess the effects of ongoing regulatory reform initiatives on collateral demand, and how these influence the supply of collateral assets; and (iii) to assess the system-wide implications of these developments for markets and policy.²

The report, which documents the findings of the Working Group, is organised as follows. Section 2 discusses the factors that influence the share of collateralised bank funding and then documents bank funding patterns in different jurisdictions. Challenges that arise when measuring bank asset encumbrance levels are also highlighted. Section 3 provides an assessment of the structural demand for HQA from various regulatory reforms. Estimates of HQA supply and ways in which real or perceived shortages of HQA could be met through behavioural responses are presented in Section 4. Section 5 examines the implications for market functioning and financial stability, and those for policy are discussed in Section 6.

¹ For the purposes of this report, collateral assets are discussed in the context of three overlapping definitions of increasing generality (see Box 1 in Section 3): high-quality liquid assets (HQLA); high-quality assets (HQA); and collateral assets (CA).

² See Annex 1 for the Working Group mandate; a list of Working Group members is attached at the end of the report.

2. Bank funding and asset encumbrance

The arrangements through which banks fund their business activities have important effects on the demand for collateral assets (see Box 1 in Section 3 for a categorisation of collateral assets). For example, a shift from unsecured to secured funding sources creates additional demand for collateral assets to back the claims of secured creditors. Pledging collateral to secured creditors, however, leads to encumbrance of banks' assets. That is, assets pledged as collateral in secured transactions become unavailable for other uses, such as for meeting the claims of unsecured creditors in case of bankruptcy. This implies that secured funding contributes to lower recovery values for unsecured creditors (see Annex 2 and Section 2.3).

The degree of reliance on secured funding varies substantially across different banking systems, jurisdictions and bank business models. Funding costs also influence the decision on whether to issue secured or unsecured debt. Greater reliance on secured funding instruments, therefore, does not necessarily reflect the (in)ability of banks to access unsecured funding markets, but depends on a mixture of structural and cyclical factors as well as the desire to reduce funding costs. As a result, a bank's business model, the quality of its assets, the level of bank capital, legal frameworks, existing funding patterns, and sovereign risk in the bank's home jurisdiction are all factors that influence its funding mix. This, in turn, leads to different levels of asset encumbrance, suggesting that changes, not levels, are likely to be more relevant for assessing the implications of funding patterns and asset encumbrance for the functioning of financial markets.

To further explore these issues, this section first discusses the factors that influence the share of collateralised bank funding, and then documents how the share of bank funding, categorised by instrument types, varies across jurisdictions and banks. The section concludes with a discussion of the mechanics of how different secured funding instruments contribute to asset encumbrance, and what challenges arise when measuring bank asset encumbrance levels.

2.1 Factors influencing the share of collateralised funding

Financial institutions fund themselves using a variety of instruments that differ in terms of attributes such as maturity, priority in case of bankruptcy, and ease of substitutability across sources of funding. Market liquidity, relative costs of funding instruments, asset composition of balance sheets, and regulatory rules are key factors influencing the composition of bank funding patterns. In addition, the funding mix is managed on a dynamic basis in response to changes in market conditions and competitive pressures. A sudden retrenchment in market liquidity, for example, could expose banks to rollover risk on their short-term liabilities. In such periods, there is usually a shift towards greater reliance on secured funding instruments, as they tend to be less prone to rollover risk.³ This section highlights a number of factors that influence a bank's decision to raise collateralised funding.

³ An important prerequisite for the stability of repo funding is the ease of valuation of the collateral assets. During the financial crisis, for example, repo funding based on structured products as collateral could not be rolled over, as market participants had lost their trust in the valuation of

Bank business models

Banks that specialise in mortgage lending activity typically have a higher share of secured funding, and their liabilities generally have a longer maturity profile. This is partly driven by regulatory criteria favouring mortgage assets for use as collateral in long-term funding transactions compared with other types of bank assets (such as bank loans). In addition, the levels of overcollateralisation required by rating agencies and investors to issue collateralised debt backed by mortgage assets are generally lower than for other securitised assets, enabling banks to raise more funds for a given amount of assets.

Two forms of collateralised mortgage debt are common: covered bonds, which remain on the issuing bank's balance sheet; and residential mortgage-backed securities (RMBS), which are off-balance sheet instruments. The reliance on covered bonds or RMBS to fund mortgage lending tends to be influenced by local market practices and legislation. For example, Denmark, Germany and Spain have a long history of covered bond legislation that has supported funding of mortgage lending through these instruments (Table 1). In the United States, by contrast, mortgage lending is primarily based on the issuance of RMBS, which relies on the originate-to-distribute business model.

Outstanding amounts of covered bonds backed by mortgage assets

In millions of euros						Table 1
Country	2003	2005	2007	2009	2010	2011
Canada	–	–	2,000	7,525	18,003	38,610
Denmark	204,695	246,411	244,696	319,434	332,505	345,529
France	21,079	32,133	63,555	134,757	156,239	198,395
Germany	256,027	237,547	206,489	225,100	219,947	223,676
Italy	–	–	–	14,000	26,925	50,768
Netherlands	–	2,000	15,727	28,367	40,764	54,243
Spain	57,111	150,213	266,959	336,750	343,401	369,208
Sweden	–	–	92,254	133,903	188,750	208,894
United Kingdom	5,000	26,778	81,964	201,096	205,370	194,783

Source: European Covered Bond Council.

Different business models and corresponding bank funding patterns generate different encumbrance levels (see Section 2.3). In general terms, only those liabilities that are retained on bank balance sheets add to asset encumbrance (eg in the case of covered bonds), whereas off-balance sheet liabilities (eg RMBS and other securitisations) affect encumbrance only to the extent that issuing banks provide implicit or explicit guarantees to securitisation structures.

Investment banks typically fund their trading activities through short-term repo markets and thus rely heavily on secured funding as well. These repo positions are often offset through reverse repos, limiting their impact on asset encumbrance levels. At the same time, both positions will tend to be different in terms of maturity

these products. But rollover risk can also be high when a large share of the repo funding is based on one-week or shorter maturities.

and quality of collateral assets, so that the offset provided by reserve repos is imperfect in risk terms.

Cyclical factors

The share of secured funding on bank balance sheets can also change as risk appetite, investor preferences and the net supply of HQA change (see Annex 2 for details). The capacity to pool eligible collateral assets to raise secured funding can be viewed as a liquidity buffer to be used in times of financial market stress. This provides an incentive for banks to issue unsecured debt in normal times. In periods of financial stress, when risk appetite falls sharply due to increased counterparty risk, adjustments in the relative pricing of secured and unsecured debt will influence how banks use their balance sheets to obtain funding. This can lead to a rise in the share of collateralised funding on bank balance sheets, as unsecured funding becomes more costly or even unavailable owing to investor uncertainty about the true level of risk. Similarly, access to secured funding markets can be adversely affected if collateralised instruments have complex structures that call standard valuation methodologies into question. These dynamics were observed during the subprime mortgage crisis in the United States, resulting in the collapse of large parts of the securitisation market (see Annex 3 for details).

Sovereign risk is another important channel affecting banks' reliance on secured funding. As highlighted by the recent euro area crisis, concerns over sovereign risk in conjunction with declines in the quality of bank assets can adversely affect access to unsecured funding markets for banks exposed to sovereign risk.⁴ For some banks, unsecured markets may be closed entirely, forcing recourse to secured markets or the central bank, as seen, for example, in the context of the recent increase in central bank credit in the euro area. In the recent crisis, some central banks decided to broaden the eligible pool of collateral assets to ease funding stress and to ensure that the banking sector holds sufficient amounts of unencumbered assets – as implied by the difference between outstanding credit and usable collateral (Graph 1) – that can be used to raise additional collateralised funding if needed.

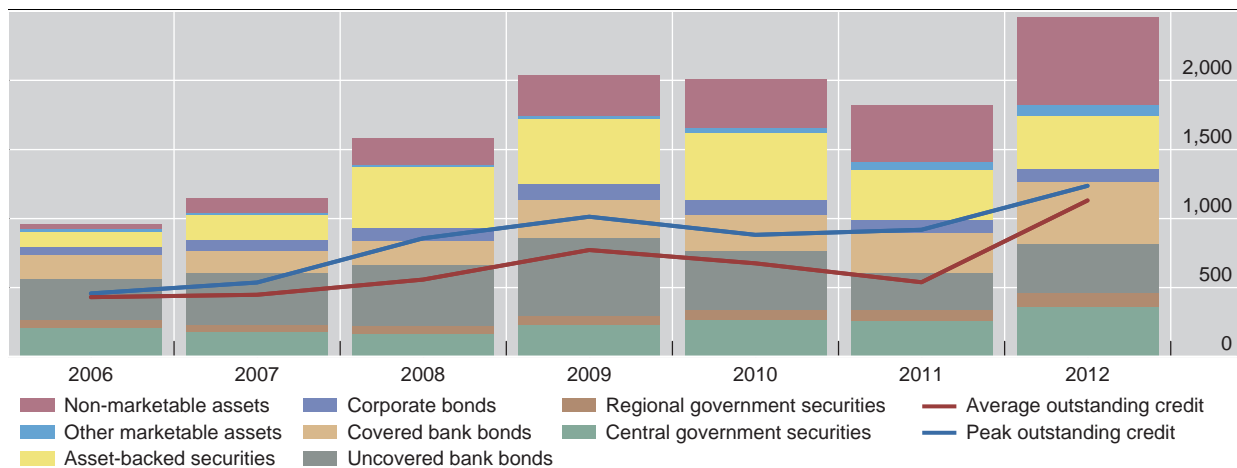
A third cyclical factor that can influence the share of secured funding is changes in liquidity risk, which affect the demand for and supply of HQA. During the recent financial crisis, liquidity preference contributed to an increased demand for instruments such as covered bonds, which could be used as collateral for central bank funding in the euro area. In part, increased bank issuance of covered bonds in the current environment may thus simply represent a supply response to strong demand for HQA, with secured funding becoming cheaper relative to unsecured funding even for those issuers that retain access to both markets.

⁴ See Committee on the Global Financial System, "The impact of sovereign risk on bank funding conditions", *CGFS Papers*, no 43, July 2011.

Collateral and outstanding credit in the Eurosystem¹

In billions of euros

Graph 1



¹ Assets that banks have pledged to their collateral pool at Eurosystem national central banks, after haircuts and valuation. Eurosystem's average and peak outstanding credit to banks.

Source: ECB.

Regulatory frameworks

Some shifts in bank funding patterns towards collateralised debt are regulation-driven. Specifically, the introduction of Basel III, Solvency II and possible new resolution frameworks is likely to increase the demand for bank debt that is backed by collateral. The liquidity coverage ratio under Basel III also favours secured funding to unsecured short-term interbank funding.

Covered bonds, which are popular as a funding instrument in Europe, are one of the secured funding instruments that have benefited from the regulatory reform agenda mentioned above. For example, regulatory reforms under Solvency II will require insurance companies to hold less capital for exposure to covered bonds as compared with unsecured or securitised debt.⁵ This will most likely create greater demand for covered bonds among insurance companies. Moreover, covered bonds are excluded from writedowns in many resolution frameworks, while unsecured debt is not.⁶ These factors are likely to contribute to increased issuance of covered bonds in jurisdictions where they are already a popular funding instrument, and can be a hurdle for efforts to restart the markets for other types of securitisations.

⁵ For more detail on the impact of Solvency II on the demand for bank-issued instruments, see Committee on the Global Financial System, "Fixed income strategies of insurance companies and pension funds", *CGFS Papers*, no 44, July 2011.

⁶ See European Commission, *Proposal for a Directive of the European Parliament and of the Council establishing framework for the recovery and resolution of credit institutions and investment firms*, June 2012.

2.2 Bank funding patterns in different banking systems

Comprehensive data on banks' recourse to secured and unsecured funding instruments are not consistently available across jurisdictions. To compare funding patterns for different banking systems, members of the Working Group used the following broad categorisation of bank funding for which comparable data were known to exist:⁷

- *retail deposits*: deposits from non-banks (non-monetary financial institutions for euro area countries) irrespective of maturity;
- *short-term funding*: short-term borrowings (excluding repos) with maturities of less than one year and all interbank deposits;
- *long-term funding*: long-term debt instruments (with maturities exceeding one year), excluding deposits; and
- *net repos*: the banking system's net repo balance.

While the above categorisation does not provide a breakdown of funding sources into secured and unsecured, some broad patterns can be discerned from the data (Graph 2). In addition, some indication of the trends in bank funding patterns can be observed by examining the changes in funding shares over the period 2006–11.

The first observation, corroborated by the Group's interviews with market practitioners, is that funding patterns vary widely across and also within jurisdictions.⁸ Even when comparing funding patterns within groups of emerging or developed economies, there are significant differences. The second observation is that funding shares changed considerably in almost all banking sectors, with some indication of greater reliance on secured funding observable, in particular, for Europe. Third, there is a shift towards greater retail deposits in the majority of countries in the sample between 2006 and 2011.

Banks in China and India are primarily funded by retail deposits with a share of more than 70% of bank liabilities, implying limited recourse to secured funding instruments. By contrast, the share of retail funding is only about 40% in Korea and Mexico. The Mexican banking system's reliance on repo funding, in turn, is substantial, with net repos accounting for about 18% of liabilities in 2011, reflecting regulatory incentives but, perhaps, also differences in how funding data are categorised in individual banking systems.⁹ For both Korea and Mexico, aggregate data point to a replacement over time of repo funding with retail funding, implying less reliance on secured funding overall.

⁷ These four components do not represent all liabilities of a banking system. For example, derivatives and insurance-related liabilities are included in the total liabilities, but are not captured in the data. Therefore, the four liability components do not add to 100%, and the shortfall is generally larger in banking systems with bigger trading books.

⁸ Data from other sources, such as Dealogic, confirm these broad patterns (see Annex 3).

⁹ The depositor insurance scheme requires Mexican banks to pay a fee in relation to their deposit base. With repos being exempt from this rule, repo funding compares relatively favourably with deposit funding. The large net repo share in Graph 2 may, however, also reflect the inclusion of central bank liquidity provision to the banking system via repos. For other jurisdictions, such as those of the euro area, these transactions will be represented in short- or long-term funding, thus leading to different funding shares across the funding instruments reported in Graph 2.

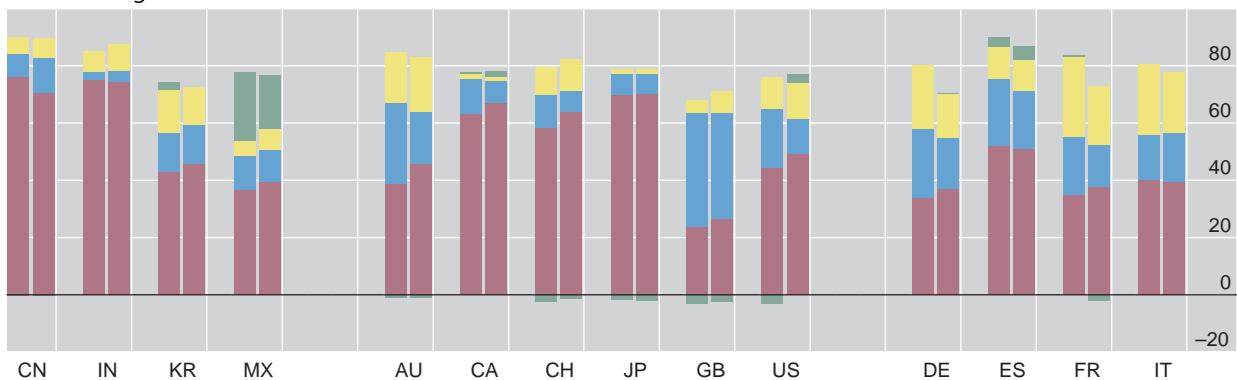
Differences in bank funding patterns are equally pronounced across advanced economies. Countries such as Canada, Japan and Switzerland show strong reliance on retail deposit funding similar to that in China and India, with a share of about two thirds of total liabilities. Reliance on longer-term funding is less than 2% for Canada and Japan, but amounts to about 10% for Switzerland. Whereas funding shares remained basically unchanged in Japan between 2006 and 2011, the observed reduction in short-term borrowing in Canada and Switzerland was offset by an increasing share of retail funding. While the observed substitution of funding sources generally leaves the overall share of unsecured funding unchanged, covered bond issuance data suggest that a small but increasing share of long-term funding has been collateralised. Similar developments are observed for the Australian banking sector.

Deposits and borrowings¹

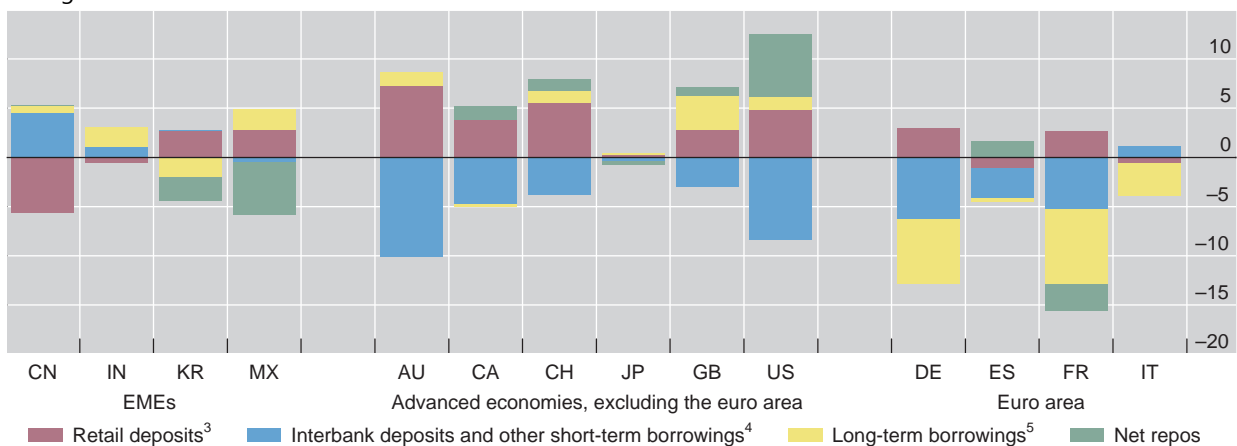
As a percentage of total liabilities (excluding equity)

Graph 2

Bank funding sources in 2006 and 2011²



Changes between 2006 and 2011



AU = Australia; CA = Canada; CH = Switzerland; CN = China; DE = Germany; ES = Spain; FR = France; GB = United Kingdom; IN = India; IT = Italy; JP = Japan; KR = Korea; MX = Mexico; US = United States.

¹ For Mexico, 2006 data are approximated by January 2007 observations. For France and Canada, data represent aggregates for the four and six largest banks, respectively. ² The first and second set of stacked bars for each country show data for 2006 and 2011, respectively. ³ For Canada, retail deposits are estimated by combining reported total deposits and bank-level data on retail deposits from Bankscope. ⁴ For the United Kingdom, interbank deposits are estimated by combining reported data on domestic deposits and estimates of non-resident interbank deposits from BIS statistics. For Spain, short-term borrowing with maturities of less than two years (other breakdown not available). ⁵ For Spain, includes borrowings with maturities of at least two years (other breakdown not available).

Sources: Bankscope; Working Group member submissions; BIS calculations.

The United Kingdom has the lowest share of retail funding in the available sample, accounting for about 25% of the banking sector's liabilities in 2011. Deleveraging at some UK banks in 2012, in combination with increased retail funding and lower reliance on short-term debt, means that the sector's structural funding position has improved noticeably.

In the United States, banks reduced their reliance on unsecured short-term borrowings, offset by retail funding and higher repos. US banks raised their long-term unsecured funding shares, aided by government-guaranteed debt that has since matured, after the collapse of major securitisation markets.

Banking sectors in the euro area are characterised by intermediate levels of retail funding, ranging from as much as 50% in Spain to around 37% in France and Germany. While the reliance on short-term funding is broadly similar across the euro area (15–20%), national banking sectors differ more strongly regarding the share of long-term funding, ranging from about 10% in Spain¹⁰ to around 22% in Italy. Overall changes in funding shares in the euro area suggest greater reliance on collateralised funding, including both short- and long-term funding markets. For short-term borrowings, interviews with market participants highlighted a pronounced shift from unsecured borrowings in short-term money markets to repo funding. For longer-term funding, bank bond issuance data suggest greater recourse to covered bond funding with the exception of Germany (see Graph A3.1 in Annex 3) and, as discussed in Section 2.1, significant retention of secured bonds to generate collateral for central bank funding.

2.3 Asset encumbrance patterns

Pledging bank assets as collateral to back covered bonds or other types of secured funding instruments results in those assets becoming encumbered. That is, they become unavailable to repay unsecured creditors in the event of the bank's default. Encumbrance of bank assets can also arise from posting of initial margins with central counterparties (CCPs) or bilateral counterparties to cover OTC derivatives exposures (for more detail, see Section 3).

Why asset encumbrance levels can matter

Higher levels of bank asset encumbrance can create challenges for banks' ability to fund in unsecured markets. This stems from four possible issues. First, eligibility requirements may result in better-quality assets being pooled to back covered bonds and other collateralised funding instruments, thus eroding the average quality of the assets backing claims on unsecured credit ("cherry-picking"). Second, overcollateralisation requirements (ie the amount of assets pledged in excess of the nominal value of the bonds) increase asset encumbrance, further lowering the recovery values on unsecured debt. Third, as overcollateralisation requirements have to be met dynamically, the residual assets available to meet claims of unsecured creditors can decline quickly, particularly under stressed market conditions. Fourth, limited transparency of actual asset encumbrance levels can impede the ability of

¹⁰ Long-term borrowings for Spain include maturities of at least two years due to data limitations. Long-term funding shares for the Spanish banking sector are thus likely to be biased downwards, whereas short-term funding shares may be biased upwards.

market participants to appropriately price unsecured debt, challenging the viability of the unsecured debt market.

Rising levels of asset encumbrance will tend to be viewed negatively by unsecured creditors, particularly when they coincide with an increase in the probability of bank default, given the potentially lower recovery values for unsecured debt. Yet secured funding arrangements are generally more resilient during periods of market stress, so that increased reliance on secured funding (and, hence, higher asset encumbrance) tends to reduce funding liquidity risk. In contrast, when markets consider banks' asset quality to be strong and banks are seen as adequately capitalised, access to and cost of funding in unsecured markets may not be adversely affected even if a significant share of bank assets is encumbered. Indeed, this is at present the case for many Nordic banks.

Assessing asset encumbrance levels

To assess whether asset encumbrance levels have the potential to affect the viability of, or borrowers' access to, unsecured funding markets, an appropriate measure of asset encumbrance has to be computed. One measure that would capture this is the ratio of unencumbered assets to unsecured liabilities. This measure provides an indication of the amount of assets on the bank's balance sheet that would be available to cover unsecured creditors' claims in the event of default. The major challenges that may arise in computing such a measure are limited disclosure by banks of encumbered assets and secured liabilities and a lack of harmonised definitions that makes comparability of data across banks difficult.

Reflecting these limitations, two different measures of asset encumbrance tend to be cited by market practitioners on the basis of available data: one that is based on the proportion of secured borrowing in bank liabilities (liabilities-side approach); and one based on the proportion of balance sheet assets pledged (assets-side approach). Neither of these measures is entirely adequate. On the liabilities side, issuance volumes do not reveal the amount of overcollateralisation that underpins the secured funding liabilities, and will miss out also on any derivatives-related liabilities. This will lead to a downward bias in estimated asset encumbrance ratios under this approach. On the other hand, if repo-based funding in wholesale markets is a significant part of the bank balance sheet, liability-based measures can overestimate actual encumbrance levels if offsetting reverse repo transactions are not properly taken into account.

On the assets side, a key challenge is the lack of comparable and publicly available data on pledged assets, including those posted as initial margins for derivatives transactions. The lack of information on contingent encumbrance, eg additional encumbrance of assets resulting from potential margin calls, adds a further challenge. In addition, the ratio of encumbered assets to total assets may be high as a result of a bank business model that involves a structurally high proportion of secured funding. Hence, this ratio does not allow assessment of the amount of unencumbered assets relative to the amount of unsecured claims.

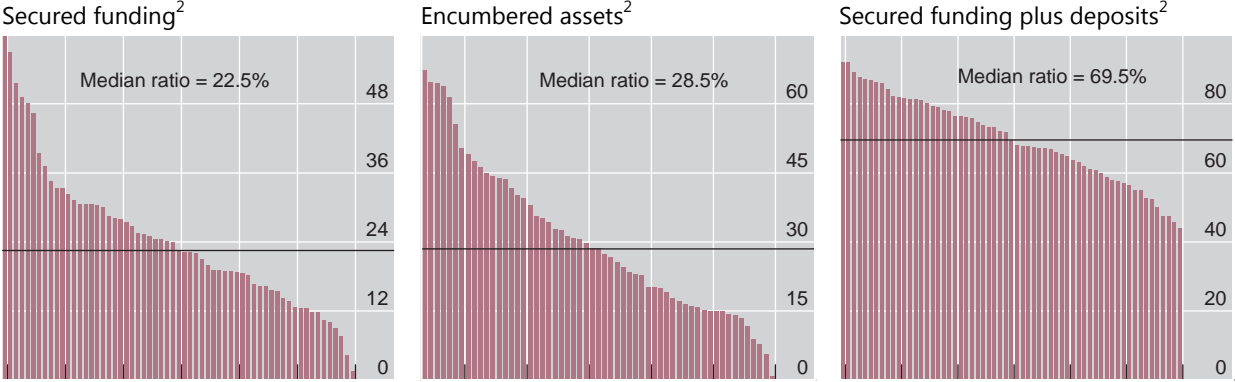
Keeping these caveats in mind, Graph 3 reports different asset encumbrance ratios for a sample of 60 large European banks. Liabilities-side ratios, as measured by the share of secured funding in banks' funded assets, are shown in the left-hand panel. Although the median encumbrance ratio is 22.5% and some banks have ratios of less than 10%, encumbrance ratios greater than 50% are reported in individual cases. While such high encumbrance levels are explained in part by different

business models,¹¹ they are in line with information obtained through interviews with market participants which suggests that, for some institutions, sovereign risk concerns have resulted in levels of encumbrance that could affect their ability to respond to future funding shocks.

Dispersion of asset encumbrance ratios across large European banks¹

As a percentage of funded assets

Graph 3



¹ Comprises a sample of 60 large European banks. ² The vertical axis represents encumbrance ratios and the bars represent individual banks.

Source: FitchRatings; BIS calculations.

As noted earlier, a second approach to measuring asset encumbrance is to compute the proportion of balance sheet assets pledged. Broad patterns under this alternative measure are similar to those observed for liabilities-side data, although the median ratio is somewhat higher at 28.5% (Graph 3, centre panel). Banks with higher encumbrance ratios using the assets-side approach are typically specialist mortgage banks, such as those in the Nordic countries.

Another issue in the computation of asset encumbrance levels is the treatment of deposits. Strictly, deposits do not encumber a bank’s assets, as they are not secured by any specific collateral. But depositor preference rules can change the priority of claims related to deposits and can thus subordinate unsecured creditors in case of bankruptcy. A rough estimate of the influence of depositor preference on asset encumbrance levels can be obtained by adding retail deposits to the liabilities-side measure. Assuming all retail deposits were to receive depositor preference, this would raise the median asset encumbrance ratio for European banks to about 69.5% (Graph 3, right-hand panel). Overcollateralisation requirements would tend to further increase encumbrance for some countries. For example, the Swiss deposit insurance scheme requires banks to hold assets in Switzerland equivalent to 125% of their insured deposits. On the other hand, not all jurisdictions assign preferred creditor status to claims related to the deposit guarantee scheme.

¹¹ For example, banks with large investment banking operations tend to have higher asset encumbrance ratios using this measure, as they fund their trading assets in short-term repo markets.

3. Demand for high-quality assets

The evolving trends in bank funding examined in Section 2 suggest that, due to a combination of cyclical and structural factors, the reliance on both short- and long-term collateralised funding has increased in recent years – even though there are large differences across jurisdictions. Owing to concerns over sovereign and bank credit risk as well as their combined impact on bank funding, the shift towards collateralised funding is particularly evident in those euro area countries that are most affected by the recent financial and economic crisis. One consequence of this development is increasing collateralisation of bank balance sheets and rising demand for collateral to back secured funding, at least in Europe.

At the same time, a number of key regulatory reforms will contribute to a structural increase in the demand for assets used as collateral going forward. They include: the introduction of the liquidity coverage ratio (LCR) as part of the Basel III package of liquidity reforms; reform of the OTC derivatives market through the introduction of margining requirements, for both centrally (standardised) and bilaterally cleared (non-standardised) derivatives; and the introduction of the new Principles for Financial Market Infrastructures,¹² which will set higher international standards for the resources that CCPs must hold.

Before assessing the demand for collateral assets, a key first step is to develop a consistent asset definition. This is complicated by the fact that there is no clear standard, and different definitions of collateral assets exist among regulators, central banks and market participants. Moreover, the definition of a collateral asset differs depending on the purpose and the risk profile of the institution accepting the underlying asset, either as collateral or for investment purposes (see Box 1).

3.1 Liquidity coverage ratio

During the global financial crisis, many financial institutions saw a rapid depletion of liquidity that severely restricted their ability to perform credit intermediation activities. Strengthening banks' liquidity risk management standards has therefore been one of the key objectives of global financial regulatory reforms under Basel III. In this context, the Basel Committee on Banking Supervision (BCBS) has introduced two new global standards for liquidity regulation: the LCR and the net stable funding ratio (NSFR).¹³ The LCR is aimed at ensuring that banks hold sufficient amounts of HQLA that can be used without any restraints (unencumbered) so that banks can survive a significant stress scenario lasting for one month, promoting their short-term resilience to liquidity shocks. In this regime, banks will be required to hold an amount of HQLA equal to or greater than their net cash outflow in a stress scenario over a 30-day period.

¹² Issued jointly by the CPSS and IOSCO in April 2012 as *Principles for Financial Market Infrastructures*.

¹³ See Basel Committee on Banking Supervision, *Basel III: International framework for liquidity risk measurement, standards and monitoring*, January 2013.

Categorisation of collateral assets

A prerequisite for assessing the demand for collateral is to agree on a definition of the assets that are eligible as collateral. While, in principle, any asset can be used to collateralise a given claim, the approach taken for this report seeks to define collateral assets according to two dimensions. One is regulatory, and gives rise to narrow definitions of collateral assets that are unlikely to change much over time. The other dimension is market practice. Here, the definition of collateral assets will depend on the requirements and preferences of market participants.

On this basis, three overlapping definitions are being considered. The narrowest one is based on regulatory considerations and follows the Basel Committee on Banking Supervision in including only high-quality liquid assets (HQLA) under the Level 1 and Level 2 definitions of the liquidity coverage ratio (LCR). Assets that qualify for the LCR are expected to have low credit and market risk and be easy to value, exchange-listed, traded in active markets, unencumbered, liquid during times of stress and ideally central bank-eligible.

A broader definition, termed high-quality assets (HQA), takes a more market-based stance, including all assets that market participants can use to meet collateral demand from derivatives transactions. This definition will be the relevant one for assessing the impact of over-the-counter derivatives reforms.

The broadest definition, termed collateral assets (CA), targets the pool of assets that qualifies for use in collateralised funding transactions (such as in covered bonds, agency and private-label mortgage-backed and asset-backed securities). Notably, the categorisation of any particular asset under these last two definitions may vary with time and across different markets and counterparties.

Central banks tend to publish their own list of assets with applicable haircuts that are eligible as collateral for their monetary policy operations and to provide intraday credit to qualifying financial institutions. The definition of HQA used by central banks and banking supervisors can also influence the type of collateral accepted by banks in repo transactions, as they can subsequently be used to obtain central bank liquidity or to comply with Basel III liquidity regulation.

The BCBS conducted a global quantitative impact study (QIS) to analyse the impact the LCR regulation will have on structural demand for collateral.¹⁴ According to the QIS results based on 2011 data, the 209 banks studied would have had an HQLA shortfall of €1.8 trillion (\$2.3 trillion) under the LCR minimum requirement (100%), which is approximately 3% of their total assets (€61.4 trillion).¹⁵

Although the QIS fails to cover all banks affected by the LCR and banks are likely to hold a certain level of buffer in addition to the minimum requirement, actual HQLA shortfalls are nevertheless likely to be significantly lower than the 2011 estimate. This is for a variety of reasons. First, the QIS did not account for any redistribution of liquid assets across banks, which would result from the banking system's adjustment to the new regulations. As part of this adjustment, at least some HQLA will be bid away from surplus banks by deficit banks, eliminating parts of the estimated aggregate shortfall. Second, banks will take further mitigating actions to address the remaining shortfall, including lending more short-term to increase net cash inflows in the LCR calculation and engaging in collateral upgrade

¹⁴ The public reports of the QIS have been published based on end-2009, June 2011 and end-2011 data as of October 2012. They are available at www.bis.org/publ/bcbs186.htm, www.bis.org/publ/bcbs217.htm and <http://www.bis.org/publ/bcbs231.htm>.

¹⁵ The aggregation reflects only shortfall of banks below the 100% requirement, and does not include surplus HQLA at banks above the 100% requirement. In addition, it assumes that banks make no changes to their liquidity risk profile.

transactions. But banks may also start borrowing more long-term to reduce their cash outflows in a stressed scenario. Third, current estimates are based on the 2010 formulation of the LCR. Revisions to the LCR determination rule, as announced in January 2013, are likely to substantially reduce the aggregate shortfall.

3.2 OTC derivatives reforms

Recent regulatory changes

In 2009, the G20 initiated a series of reforms aimed at reducing the systemic risk associated with OTC derivatives and improving transparency in the market. Regulators have mandated central clearing of standardised derivatives, and non-centrally cleared derivatives will be subject to higher capital requirements. Work is ongoing to introduce initial margin requirements for transactions that are not centrally cleared. Both CCPs and counterparties to non-centrally cleared derivatives transactions will also face restrictions on the rehypothecation of collateral posted, and will impose stricter standards on eligible collateral assets and applicable haircuts (see Box 2).

Box 2

Rehypothecation and reuse of collateral assets

Rehypothecation refers to the right of financial intermediaries to sell, pledge, invest or perform transactions with client assets they hold; and it allows prime brokers and other financial intermediaries to obtain funding using their client collateral. Collateral reuse, in turn, usually covers a broader context where securities delivered in one transaction are used to collateralise another transaction, including the ability to reuse collateral through change in (temporary) ownership. Yet the terms rehypothecation and reuse of securities are often used interchangeably; they do not have distinct legal interpretations.

Certain types of collateral rehypothecation (and reuse) can play an important role in financial market functioning, increasing collateral velocity and potentially reducing transaction and liquidity costs. Rehypothecation decreases the (net) demand for collateral and the funding liquidity requirements of traders, since a given pool of collateral assets can be reused to support more than one transaction. This lowers the cost of trading, which is beneficial for market liquidity.

Securities lending-type transactions (including collateral swaps), which have been structured as collateralised loans, would not exist without rehypothecation. In the repo market, participants would not be able to cover short positions without the ability to reuse collateral. However, repos do not directly rehypothecate collateral because they are structured as a sale and repurchase transaction.

While certain types of rehypothecation can be beneficial to market functioning, if collateral collected to protect against the risk of counterparty default has been rehypothecated, then it may not be readily available in the event of a default. This, in turn, may increase system interconnectedness and procyclicality, and could amplify market stresses. Therefore, when collateral is rehypothecated, it is important to understand under what circumstances and the extent to which the rehypothecation has occurred; or in other words, how long the collateral chain is.

In 2012, around 40% of interest rate contracts and about 10% of credit default swaps were estimated to be centrally cleared.¹⁶ Because market participants may change their behaviour in response to the regulatory changes, it is difficult to

¹⁶ See Financial Stability Board, *OTC derivatives market reforms: fourth progress report on implementation*, October 2012.

estimate the proportion of OTC derivatives trades that will be centrally cleared over the medium term. Some industry estimates indicate that 20–30% of the OTC derivatives market will not be centrally cleared, although this may vary across asset classes.

In April 2012, CPSS-IOSCO issued the *Principles for Financial Market Infrastructures* (PFMIs). The PFMIs include minimum standards for the mitigation of credit risk exposures, in the form of both margin requirements and default fund contributions. They further specify minimum standards for the collateral a CCP can accept – this is limited to assets with low credit, liquidity and market risk. The PFMIs also require CCPs to offer segregation of member and client collateral. To the extent that segregation will be taken up by market participants, this will result in reduced netting and, in turn, higher collateral demand. But it is very difficult to quantify the precise impact of the PFMIs on collateral demand.

Impact on demand for high-quality collateral

The regulatory reforms described above are widely expected to significantly increase demand for HQA, primarily through initial margin requirements. Both parties to a centrally cleared derivatives transaction are subject to these requirements, and a two-way margining regime, with the use of an initial margin threshold, is proposed in the standards for uncleared transactions by the BCBS and IOSCO.¹⁷ The initial margin will have to be in the form of cash or HQA and may be held in segregated accounts, which will facilitate monitoring and reduce incentives for rehypothecation. The variation margin payments, on the contrary, should not have a first-order effect on the demand for collateral, as variation margin is a one-way payment and hence does not affect the *net* demand for collateral assets. Some second-order effects may nonetheless materialise, eg if market participants increase their precautionary holdings of liquid, high-quality collateral in order to be able to sustain variation margin calls through periods of high financial market volatility.

Several studies have assessed the impact of derivatives reforms on HQA demand. A QIS study conducted by the BCBS and IOSCO, for example, estimates the total initial margin required to collateralise exposures from non-centrally cleared trades to be around €0.7 trillion (\$0.9 trillion).¹⁸ While this is significant, the results are based on responses to a survey from dealers and are sensitive to assumptions about clearing and netting, and the way initial margins are computed (internal models or standardised method). Moreover, the additional collateral demand would be gradually phased in over a four-year period starting in 2015, with the margin requirements being applicable only to new trades from that date.

Other studies (eg the Bank of England, BIS, IMF and Netherlands Bank) suggest that initial margin requirements for centrally cleared derivatives could add another €0.1–0.6 trillion (\$0.1–0.7 trillion) under normal market conditions. Yet overall amounts remain uncertain and could be higher in some scenarios, due to different

¹⁷ See BCBS-IOSCO, *Margin requirements for non-centrally cleared derivatives – Second consultative document*, February 2013.

¹⁸ The QIS study reports a range of €0.7–1.7 trillion for an initial margin exemption threshold between €50 million and zero, assuming that netting, hedging and diversification benefits across asset classes are not recognised. The second BCBS-IOSCO consultative document (see footnote 17) recommended the exemption threshold to be €50 million, so that the lower end of the QIS range would be the relevant estimate of the initial margin requirements for non-centrally cleared trades.

methodologies, instrument coverage and netting assumptions. The BIS and Bank of England, for example, estimate total initial margins, whereas the IMF and Netherlands Bank focus on the incremental impact of central clearing on collateral demand.¹⁹

Partly in response to these regulatory changes, the market structure of central clearing is also adjusting, with new CCPs entering the market and competing with incumbent CCPs. One consequence is that any resulting fragmentation of central clearing and reduction in multilateral netting would contribute to increased collateral demand.²⁰ Moreover, as central clearing requirements for end users are phased in, the demand for collateral for their trade exposures will also be higher, as these participants are likely to have one-directional derivatives exposures limiting benefits from multilateral netting.

3.3 Demand from the official sector

Another source of additional demand for HQA has been the official sector, through both its foreign exchange reserve management and monetary policy operations. Investment of foreign exchange reserve holdings, which rose from \$6.7 trillion at end-2007 to \$10.5 trillion in the second quarter of 2012, is concentrated primarily in HQA denominated in the major reserve currencies. Changes to portfolio allocation, in turn, would tend to shift demand across different HQA types, while participation in securities lending markets would reduce the net demand impact of additional reserve accumulation (see Section 4.2).

The other key source of official sector demand for HQA has been the conduct of unconventional monetary policies, which has led to large balance sheet expansions for some central banks.²¹ Yet while central banks' purchases of HQA have taken significant quantities of collateral assets out of the market, the corresponding creation of central bank liabilities has replaced these assets with high-quality claims on the central bank. As a result, combined with adjustments to collateral eligibility, net HQA supply is likely to have increased (see Section 4).

4. Supply of high-quality assets

The discussion so far suggests that, even though the available estimates are subject to considerable uncertainty, various reform initiatives – including liquidity regulation and derivatives reforms – can be expected to potentially increase the structural

¹⁹ According to the 2012 International Swaps and Derivatives Association Margin Survey, only about \$25 billion is currently posted with CCPs in the form of initial margins for OTC derivatives transactions. Hence, the additional collateral demand can be taken to lie in the range \$100–800 billion to meet initial margin requirements under the derivatives reforms.

²⁰ See Committee on the Global Financial System, "The macrofinancial implications of alternative configurations for access to central counterparties in OTC derivatives markets", *CGFS Papers*, no 46, November 2011.

²¹ See Markets Committee, *Central bank collateral frameworks and practices*, March 2013.

demand for HQA and other collateral assets by about \$4 trillion (€3.1 trillion),²² spread out over the next several years. This increased demand comes at a time of continued attention to counterparty risks and concerns over sovereign risk exposures – especially in Europe. While this has, in turn, raised concerns over possible collateral shortages, real or perceived supply-demand imbalances in the markets for collateral assets are likely to be met by supply changes, due to both exogenous and endogenous factors. The next section examines these supply factors in more detail.

4.1 Exogenous supply factors

In most jurisdictions, sovereign issuers are the dominant suppliers of HQA. Unsecured debt issued by highly rated corporates – including both financial and non-financial firms – broadens this pool of HQA. The supply of HQA to the financial system is to some extent exogenous, as it depends on the financing needs of governments or non-financial corporates. Yet during periods of weak economic activity, when the supply of private sector debt declines, fiscal policies tend to expand and thus increase the supply of HQA as long as market participants consider sovereign issues to be of sufficient quality.

The supply of HQA, as proxied by the market capitalisation of benchmark indices, has risen significantly since end-2007 (Graph 4, left-hand panel). For example, between 2007 and 2012, outstanding amounts of AAA- and AA-rated government bonds increased by \$7.7 trillion. When short-term debt outstanding is included (with maturities less than one year), the supply of AAA- and AA-rated government securities increased by \$10.8 trillion. Outstanding amounts of global corporate bonds rated single-A or higher and US securitised bonds rose by about \$0.5 trillion over the same period.

Benchmark indices, however, cover only part of the relevant HQA universe, as only the more liquid and actively traded securities are included. Debt securities data gathered by the Working Group and aggregated across major currencies indicate that the supply of high-quality assets in 2012 was \$48 trillion under the narrow (HQLA) definition, and \$53 trillion under the broad (HQA) definition (Graph 4, right-hand panel). The former is based on the Basel III framework for liquidity regulation, while the latter is consistent with the BCBS-IOSCO proposal for non-centrally cleared derivatives (see also Box 1 in Section 3).

The extent to which the outstanding amounts of HQA can be summed across currencies will depend on the purpose for which a measure of HQA is sought. For example, by size, sovereign debt is the most significant of these assets, with supply having expanded considerably in recent years. HQA eligibility of these securities is unlikely to change for domestic uses, even if the credit quality of the sovereign issuer deteriorates. However, where a sovereign issuer is not highly rated, the likelihood of foreign investors recognising these issues as HQA would diminish. For example, eligible collateral assets that a CCP accepts, particularly those denominated in foreign currencies (cross-border assets), will also be those that have high credit quality.

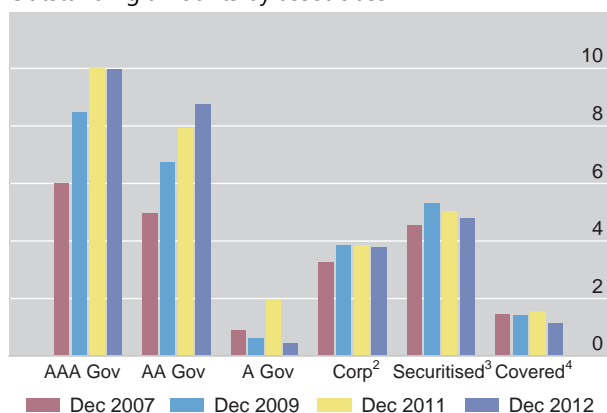
²² This is based on the sum of the following estimates: €1.8 trillion for liquidity regulations; €0.7 trillion for initial margin requirements for non-centrally cleared derivatives; and €0.6 trillion for centrally cleared derivatives.

High-quality debt securities

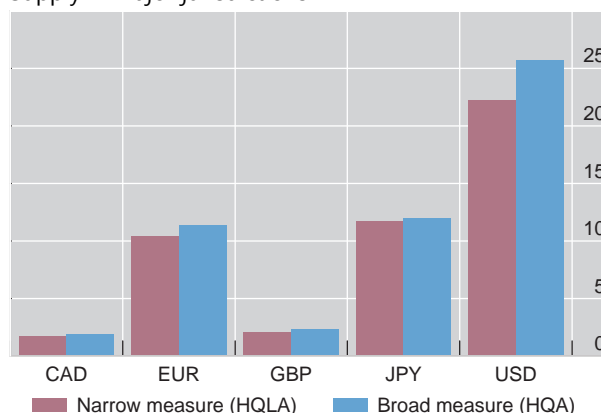
In trillions of US dollars

Graph 4

Outstanding amounts by asset class¹



Supply in major jurisdictions



¹ Outstanding amounts with maturity greater than one year. ² Global corporate bonds rated single-A or higher. ³ US securitised bonds. ⁴ Global covered bonds.

Sources: Barclays; national data.

It is important to note that the estimate of HQA in Graph 4 (right-hand panel) includes neither commercial bank nor central bank balances. For many entities, cash balances will represent their principal store of liquidity and may be the most likely asset to be exchanged or received as margin against derivatives positions. Central banks, in turn, can play a significant role in determining the overall supply of HQA available to the private sector. As noted in Section 3.3, the expansion of central banks' balance sheets over the past four or five years has taken significant quantities of collateral assets out of the market. At the same time, however, the additional central bank liabilities created would generally be recognised as being of equal or higher quality. Indeed, where the eligibility criteria for central bank purchases are broader than the relevant regulatory standard, the overall impact of central bank policies would have been to expand the supply of HQA.

4.2 Endogenous market responses

The measures of HQA supply presented in Graph 4 suggest that outstanding amounts and changes observed since 2007 are significant. This applies both in absolute terms and in relation to the additional demand for these assets stemming from regulatory reforms and greater reliance on collateralised funding in some jurisdictions, as presented in Section 3. Such aggregate information is, however, inadequate for assessing the likelihood of collateral shortage in individual jurisdictions or markets, given uneven distributions of collateral asset holdings. Official sector responses (eg via committed liquidity facilities or changes to central bank repo eligibility) are one way to address this distributional problem, as discussed in Section 6. The other is endogenous market responses, which would

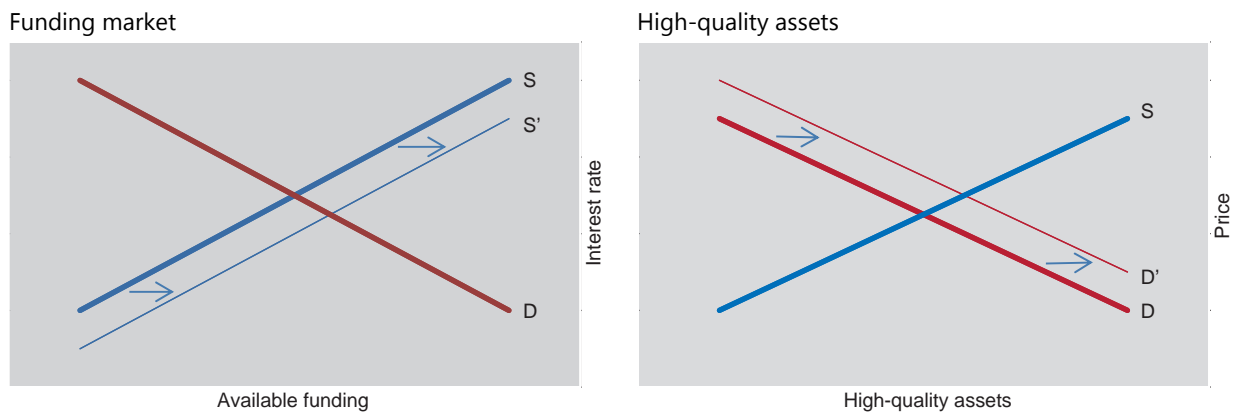
address any perceived shortage of HQA in two ways: price changes and behavioural changes.²³ These endogenous mechanisms are discussed below.

Price changes

Any shift in net HQA demand is likely to result in changes to prices (eg yields) in the market for HQA. This adjustment mechanism can be illustrated with a collateralised transaction backed by HQA. In such a transaction, there are two parties to the trade: one participant makes the funds available and accepts collateral in return; and the other participant borrows the funds and can use them to finance the securities provided as collateral. In this setup, the demand for HQA is equivalent to the supply of funds, and the supply of HQA (or the level of HQA in need of financing) is equivalent to the demand for funds. Graph 5 illustrates the supply of and demand for funds and collateral relative to interest rates (left-hand panel) and prices (right-hand panel), respectively.

Supply of and demand for funds and high-quality assets

Graph 5



Source: Working Group.

In this simple framework, a net increase in the demand for HQA – that is, an increase in demand that outstrips the increase in supply – results in the collateral asset becoming more valuable and there is a corresponding fall in the interest rate on the secured transaction.

Consistent with these mechanics, situations involving declining or negative interest rate spreads between the general collateral (GC) repo rate and overnight index swap (OIS) rate usually indicate that cash investors have a preference for obtaining high-quality collateral (high demand for HQA) to secure their loans even if this translates to lower returns. GC-OIS spreads have been relatively tight (not lower than –10 basis points) in the past few years for major economies outside the euro area (Graph 6, left-hand panel). In terms of the supply-demand framework discussed above, this is consistent with no net increase in the demand for HQA in

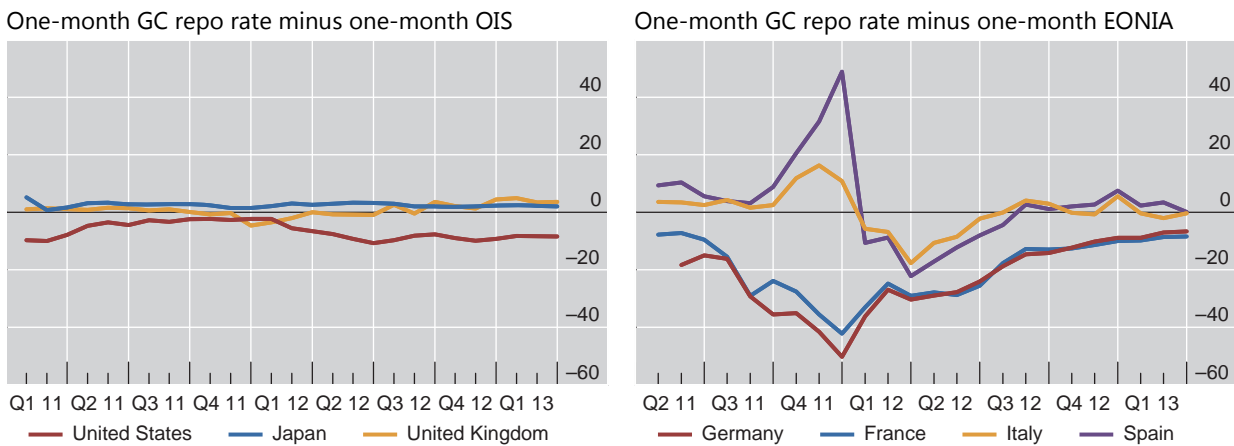
²³ It is the emphasis on endogenous adjustments, and the incentives provided by changes in HQA pricing, that distinguish the analysis here from earlier assessments of HQA supply and demand that have focused primarily on actual and prospective changes in volumes. See eg International Monetary Fund, “Safe assets: financial system cornerstone?”, *Global Financial Stability Report*, Chapter 3, April 2012, which also does not yet contain some of the more recent QIS estimates quoted above.

these jurisdictions. In contrast, spreads for GC repos backed by German and French government bonds became significantly more negative from the second half of 2011, consistent with views of relative shortage of securities issued by highly rated sovereigns in the euro area (Graph 6, right-hand panel).

General collateral repo spreads

Monthly averages, in basis points

Graph 6



Source: Bloomberg.

Behavioural changes

The above discussion highlights that collateral shortages, if they occur, will be reflected in price and interest rate adjustments for any given level of HQA supply. These price adjustments, in turn, induce market participants to endogenously raise HQA supply. A number of potential channels through which such changes can occur were mentioned by market participants in interviews. Drawing on this information, this section discusses how such behavioural changes alter the supply of HQA used as collateral in financial transactions.²⁴

Pooling and securitisation of assets. Responding to shifts in investor demand and risk preferences, banks, in particular, are able to create HQA through the pooling of balance sheet assets. Covered bonds, which are more common in Europe, are an example of this. Banks may also use securitisation to create HQA that are then shifted off-balance sheet, a practice that remains more common in the United States. Here, the pooled assets are usually tranching into high- and low-quality assets and, in addition, may benefit from credit enhancement through other highly rated financial institutions. In recent years, global investor demand for covered bonds has been greater than for securitised assets. On the one hand, this development reflects the lack of confidence in the value of the assets underpinning securitised deals around the time of the financial crisis. On the other hand, this may also be influenced by the more favourable treatment covered bonds receive in regulatory capital rules and the lower haircuts that may apply when the bonds are used as collateral to access central bank credit or back derivatives trades. Thus, both

²⁴ These changes can be interpreted equivalently as an increase in the supply of HQA or a decrease in the demand for HQA.

market developments and regulatory rules are likely to influence banks' ability to increase the supply of HQA.

Broader collateral eligibility. The supply of HQA will depend on the criteria used to determine eligible assets that serve as collateral in financial transactions. Broadening the pool of assets that meet such eligibility criteria will lead to an increase in the effective supply of HQA. This could happen, for example, if competition among CCPs to attract participants leads to pressures to broaden their pool of eligible collateral assets within the constraints imposed by the new CPSS-IOSCO principles. Similarly, market participants may decide to broaden the eligibility criteria for collateral assets in bilateral transactions.

As a specific example, in response to the increasing demand for collateral associated with the new regulation of derivatives markets, the Chicago Mercantile Exchange has started accepting corporate bonds rated at least single-A as collateral for initial margins, applying a haircut of 20%. If this practice were adopted by all major CCPs, it would increase the total supply of HQA by around \$4 trillion based on outstanding amounts of corporate bonds in Graph 4, left-hand panel. Although this may seem to be a relatively small increase in the total supply, it is about twice the upper-range estimate given in Section 3.2 of the increased demand for collateral from initial margin requirements for bilaterally cleared OTC derivatives transactions.

Collateral optimisation. Some market participants have pointed to industry efforts to improve the efficiency with which they manage their collateral. Such efforts include: moving the collateral management function from a back office to a front office function; more strategic use of their collateral; and the role of third-party vendors who can help optimise a firm's collateral pool. Financial institutions are also developing more efficient collateral inventory management systems that look across the entire firm. This type of "enterprise-wide collateral management" effectively reduces the demand for HQA, as they are replaced with other forms of collateral whenever possible.

Collateral reuse and transformation. An alternative mechanism to increase effective HQA supply is to make greater use of the available stock of HQA. As collateral is reused, it flows around the financial system in a similar way to cash. Therefore, collateral can be considered to have a *velocity* – a scalar which indicates the level of reuse or a *multiplier* effect on collateral.²⁵

Securities lending activities and repos are prime examples of collateral reuse. Institutional investors, such as pension funds, insurance companies and investment funds lend out securities in order to offset custodians' fees and generate additional income on their portfolio holdings. In the same way, securities lending may also be employed by institutional investors to raise cash for meeting variation margin payments for derivatives trades requiring central clearing. As of April 2012, the total securities on loan globally, which include a significant share of equities, are estimated to have been about \$1.8 trillion.²⁶ Volumes could rise significantly if holders of large stocks of HQA, such as sovereign wealth funds and managers of

²⁵ See International Monetary Fund, "Shadow banking: economics and policy", *IMF Staff Discussion Note*, December 2012, which estimates collateral velocity to have declined from a factor of 3.0 in 2007 to about 2.5 in 2011.

²⁶ Estimates are based on securities lending data in Data Explorers.

foreign exchange reserves, were to lend out more assets than they have done in the past.

Collateral transformation services and other forms of collateralised financing, including collateral swaps, can be also used to increase effective supply of HQA. In this arrangement, custodians or institutional investors provide HQA from their balance sheets through securities lending-type transactions to clients in exchange for lower-quality collateral (plus a fee). A general implication of these endogenous responses is that they could increase the size of the shadow banking sector, raising the risk of negative externalities (see Sections 5 and 6).

5. Implications for the financial system

The evidence gathered by Working Group members suggests that endogenous market responses – triggered by price changes – are expected to minimise, at a macroeconomic level, the likelihood of any lasting, structural shortages of collateral assets. Nevertheless, members identified a number of possible implications for market functioning and financial stability from two related developments: (i) the observed increase in asset encumbrance levels for banks in some jurisdictions; and (ii) the trend towards increased collateralisation of financial transactions more generally. This section discusses these implications.

5.1 Risks from rising levels of asset encumbrance

Pricing of unsecured bank debt

Higher levels of asset encumbrance mean that it is even more important that bank liabilities, particularly those that are unsecured, are priced appropriately. Bank balance sheets are complex and pose significant challenges to investors in analysing the underlying risks. Opaque balance sheets will generally result in higher risk premia being charged for a firm's unsecured debt. But, in the past, implicit government guarantees ensured that bank debt did not attract this risk premium, and this was particularly true in normal times. While the withdrawal of these guarantees may help improve the pricing of underlying risks in unsecured bank debt going forward, increased asset encumbrance, inadequate information about encumbrance levels, and the lack of historical data to assess how resolution regimes will affect recovery values can complicate risk assessment and, therefore, pricing. As a result, liquidity in unsecured markets can deteriorate, possibly creating a self-reinforcing process (see the discussion below).

For the above reasons, unsecured creditors may not be able to play an effective role as facilitators of price discovery for bank debt, which in turn could lead to increased bank risk-taking. On the other hand, monitoring incentives of unsecured creditors, including shareholders, will tend to increase as a result of the removal of implicit government support for banks. These incentives are particularly strong in downturns as probabilities of default rise, suggesting that the net impact of both effects may vary over the cycle.

Adverse feedback effects

The risk premium for holding unsecured bank debt is likely to rise in periods of weaker economic activity as there is a general decline in the quality of bank balance

sheet assets. Risk premia can also rise when there are concerns about the creditworthiness of the sovereign where the bank is domiciled. Incentives to raise secured funding in such market conditions will be high for banks. However, such shifts in funding practices will lead to an increase in the level of asset encumbrance. Rising asset encumbrance levels, in turn, tend to amplify banks' reliance on secured funding markets, due to limited levels of disclosure on asset encumbrance and overcollateralisation. As this complicates the assessment of potential recovery rates, access to short-term unsecured funding markets, including interbank markets, can become difficult or impossible. In stressed times, there is thus a risk of an adverse feedback process setting in, where the cost of unsecured funding increases as the willingness of unsecured creditors to provide this type of funding decreases.

Risks associated with deposit guarantee schemes

Deposit guarantee schemes, in particular those with depositor preference rules which change the seniority of claims, can tilt investor preferences away from unsecured debt, and are another factor which may contribute to higher asset encumbrance levels. Interviews with market participants indicated that this generally poses a greater concern for unsecured investors than cyclically higher levels of asset encumbrance. Cyclical factors, combined with depositor preference rules, could thus pose the risk of structural increases in asset encumbrance levels. To the extent that this limits the amount of unsecured debt that can be issued, such a development risks undermining policies aimed at bail-in.

Even in jurisdictions where deposits and senior unsecured debt have the same priority (rank *pari passu*), the holders of senior debt and retail deposits face risks from increased asset encumbrance (via rising losses-given-default (LGDs)). But while the holders of senior unsecured debt will, in principle, demand compensation for any extra risk in the form of a higher return, the pricing of deposit insurance schemes is usually insensitive to the effects of changing LGDs and balance sheet opacity. Thus banks with a large deposit base may find it optimal, from a cost perspective, to issue secured funding instead of unsecured debt, thus tilting risks to their depositors and the deposit guarantee scheme.

In summary, differences in the seniority and risk sensitivity of deposit guarantee schemes across jurisdictions can potentially help explain differences in banks' preferences for secured funding and in the funding patterns observed across countries. Raising the seniority of deposit guarantee schemes vis-à-vis unsecured creditors may either tilt investor preferences further away from unsecured debt or raise the risk premium required to hold such debt.

5.2 Risks from increased collateralisation

Implications for liquidity and interconnectedness in markets

The current regulatory reform agenda is designed to improve the resilience of bank funding through new rules for liquidity regulation, and to mitigate risks from counterparty credit exposures in OTC derivatives markets through central clearing and initial margin requirements. A key implication of these reforms, as highlighted above, is a structurally increased demand for HQA. This, in combination with bank capital requirements that promote segregation of margin accounts at CCPs and restrict rehypothecation of collateral posted, could reduce the market liquidity of these assets. At the same time, higher demand will also tend to make HQA more expensive, triggering market responses via increased incentives for repos and

securities lending and for collateral transformation services. While these activities will endogenously increase the effective HQA supply through market transactions, they increase the interconnectedness in the financial system, generating infrastructure interdependencies and interconnections between institutional investors and banks that did not previously exist or that were smaller in magnitude. They may also increase concentration (eg as a result of increased reliance on a small number of service providers).

Procyclicality and cliff effects

During economic downturns, the effects of the economic cycle on bank leverage and credit supply can be amplified when the share of collateralised financial transactions is higher. For example, falling collateral asset values in the covered bond pool mean that the pool has to be replenished or that assets need to be replaced to maintain the desired credit ratings of the secured debt outstanding. Similarly, higher haircuts and falling asset values require more assets to be pledged to raise a given level of repo funding or to meet initial margin requirements on derivatives exposures.²⁷ Such increased demand for collateral assets can then lead to a reduction in balance sheet leverage (eg via asset sales). Institutional investors may add to these pressures by pulling back from securities lending and similar activities in times of financial stress.

Other potentially destabilising dynamics can arise from cliff effects. For example, a particular asset class may become ineligible for margin posting due to a rating downgrade or a tightening of credit standards. This could be the result of close links between bank risk and sovereign risk, or when maturities are concentrated around important regulatory intervals (such as one month for the LCR).

Procyclical liquidity management practices

A fall in market prices and/or a rise in haircuts on collateral assets posted as initial margin for OTC derivatives trades generally triggers calls for additional collateral assets. Similarly, overcollateralisation levels on secured debt may have to be maintained to retain original credit ratings even in adverse market conditions. These dependencies create a positive correlation between the level of collateralisation in financial transactions and the share of bank balance sheet assets that are subject to pressures associated with mark-to-market accounting practices.

The extensive use of fair value accounting (due to increased shares of trading book assets from investment banking activities) contributed to adverse market dynamics during the recent financial crisis as liquidity in financial markets evaporated. As bank liabilities and potential future exposures on OTC derivatives transactions are increasingly collateralised, banks may face greater liquidity pressures. This would force them to maintain sufficient liquidity buffers to meet collateral calls when there is a broad decline in asset prices – for example, due to declining economic activity. This, in turn, could contribute to a decline in interbank lending as banks strengthen their degree of protection against liquidity shocks. Increased collateralisation in the financial system can therefore lead to liquidity

²⁷ For more detail on these effects, see Committee on the Global Financial System, “The role of margin requirements and haircuts in procyclicality”, *CGFS Papers*, no 36, March 2010.

management practices becoming procyclical, especially in periods of economic downturn.

6. Implications for policy

Current changes to the regulatory environment, such as increased liquidity buffers and strengthened margining requirements in OTC derivatives markets, are designed to make the financial system safer. Attaining the full benefits of these policy initiatives, however, will require monitoring their cumulative effects on banks' balance sheet asset encumbrance, supply-demand imbalances for collateral assets as well as market responses to these imbalances, and any other imperfections that these policies may create.

Against this background, the findings presented in the earlier sections suggest that policy implications are likely to arise in at least two broad areas: (i) transparency and disclosure requirements for encumbrance of bank assets; and (ii) monitoring endogenous market responses to asset encumbrance and collateral scarcity, if it arises, and addressing any adverse impact of these responses on the stability of the financial system. These, and potential implications for central banks, are examined in more detail below.

6.1 Transparency and disclosure requirements

Improved disclosure. Periods of low risk appetite tend to be associated with situations of restricted access to unsecured bank funding markets. As banks come to rely on secured funding markets in such periods, the incentives for investors to monitor bank asset encumbrance levels rise. Well capitalised banks may thus have incentives to disclose information on asset encumbrance levels to retain market access in such conditions and to gain competitive advantages vis-à-vis banks with weaker balance sheets. But experience so far suggests that such voluntary disclosures may be hampered by difficulties in agreeing on what the appropriate measures of asset encumbrance should be, as market participants may lack a consistent interpretation of published figures. This can give rise to first mover disadvantages.

To help overcome these hurdles and support the ability of markets to appropriately price unsecured debt, central banks and other policymakers could work with market participants to agree on the type of disclosures on encumbered assets to be made at regular intervals (see Box 3).

Three critical issues relating to disclosure are the choice of encumbrance ratio, the standardisation of definitions, and the timing and scope of disclosure. With respect to the encumbrance ratio, the discussion in Section 2.3 suggests that the ratio of unencumbered assets to unsecured liabilities is the most appropriate measure of asset encumbrance. Other ratios, such as encumbered assets to total assets, may vary as a function of banks' business models and are less likely to allow unsecured creditors to accurately price unsecured credit, as they provide no information on the structural subordination of unsecured creditors that result from overcollateralisation.

An example: Swedish banks' disclosure of asset encumbrance

The four largest Swedish banks are mainly retail banks with big mortgage lending operations that are funded by issuance of covered bonds. This contributes to a structurally high level of asset encumbrance. In 2010, the encumbrance level varied between 30 and 50% of total assets for the four main banks. As a consequence, asset encumbrance is an important factor for investors' risk assessment of Swedish banks, complementing the information on banks' capital and liquidity positions. Moreover, not only the level of encumbrance, but also its rate of change as well as the source and quality of assets pledged matter.

Despite the importance of asset encumbrance information for investors, international accounting standards only require minimal disclosures on asset encumbrance. To improve investors' ability to price unsecured debt correctly and to incentivise banks to maintain a balance between secured and unsecured debt, Sveriges Riksbank has recommended improved disclosures on asset encumbrance. Specifically, in its 2012 Financial Stability Report, the Riksbank recommended that the main banks complement their public reporting of balance sheet data with the following information:

- assets that are encumbered, specified by asset and liability type;
- assets that are available for encumbrance, specified by asset and liability type;
- outstanding secured funding, specified by liability type; and
- a quantitative assessment of how the asset encumbrance rate may increase if the bank's derivatives positions should develop negatively.

Following these recommendations, one Swedish bank has recently made disclosures in line with the proposed reporting detail and other banks have started disclosing enhanced information on asset encumbrance.

If banks were to disclose the values of their encumbered and unencumbered assets as well as the amount of unsecured funding and overcollateralisation levels, market participants could calculate their own measures of encumbrance.²⁸ At the same time, a necessary condition for disclosure to achieve the desired benefits is that the information being disclosed is comparable across jurisdictions. This requires that definitions for different asset categories be made as precise as possible and be internationally agreed. The greater the discretion that can be exercised in the interpretation of a particular category, the lesser the degree of comparability across banks or jurisdictions.

A third issue is the timing of disclosure. A trade-off exists between the market discipline-enhancing impact of disclosure in normal times and potentially self-fulfilling negative expectations that can be generated by disclosure of asset encumbrance in stress periods. Namely, unsecured creditors may react to the disclosure of a bank's increasing asset encumbrance at the start of a stress period by becoming unwilling to supply credit, in the expectation that the bank's asset encumbrance will continue to increase. The refusal to supply unsecured credit will then force the bank to rely increasingly on secured credit, thereby increasing asset encumbrance and potentially creating liquidity problems that require a drawdown of the bank's liquidity buffer.

²⁸ The recommendations of the Enhanced Disclosure Task Force set up by the Financial Stability Board include the reporting of encumbered and unencumbered assets, and of secured and unsecured funding. See Enhanced Disclosure Task Force, *Enhancing the risk disclosures of banks*, October 2012.

Policy implications. Policymakers need to balance this trade-off, which also arises in relation to disclosure of a bank's LCR, when determining disclosure requirements. The reporting of lagged, average values of encumbered assets or encumbrance ratios is one potential means of achieving such a balance to address concerns about adverse effects. Similarly, care may also need to be taken to avoid disclosure of banks' participation in central bank operations and to assure consistency across different disclosure initiatives currently under discussion.²⁹

At the same time, a distinction must be made between the information that banks are required to report to supervisors and information that must be publicly disclosed. Currently, many supervisory reporting schemes do not contain sufficient detail regarding banks' asset encumbrance. Supervisors thus need to require the regular reporting of detailed data relating to the amounts and types of assets that are encumbered, including the amounts and types of assets in the unencumbered pool that are easily "encumberable"; that is, readily available to secure funding.³⁰

Given the potential importance of conditional, future asset encumbrance from derivatives-related positions (eg in the context of initial margin requirements), the information reported to supervisors should include regular stress tests designed to estimate the potential size of such additional encumbrance. Similarly, bank funding scenarios and collateral frameworks should be stressed. The extent and nature of any public disclosure of information relating to stress testing would need to be determined in light of the trade-off discussed above.

6.2 Building prudential safeguards

Risk-sensitive deposit insurance. The pricing of deposit insurance schemes does not typically incorporate the effects of structural subordination of claims when a larger share of bank assets is encumbered. These effects can be material, particularly when deposits and senior unsecured debt have the same priority of claims. Banks with a large deposit base may find it optimal, from a cost perspective, to issue secured funding instead of unsecured debt and shift risks to their depositors. Since depositors will not themselves factor in the risks posed by increased asset encumbrance – as their deposits are guaranteed – the benefits of public guarantee schemes would be externalised.

Policy implications. To mitigate this risk, premia associated with deposit insurance schemes could be made risk-based (eg through the inclusion of a dedicated risk premium in deposit guarantee pricing), taking into account the funding structure of insured institutions in normal times. The pricing could differ depending on whether, during resolution, deposits rank *pari passu* with unsecured debt or are considered senior through depositor preference rules. But more work by central banks and others is needed to assess the trade-offs and details of such a policy. For global banks that are systemically important, the design of deposit

²⁹ Given the large number of disclosure initiatives currently being discussed at the international as well as at the individual jurisdiction level, different choices in terms of disclosure granularity and timing raise questions about consistency. There is thus a need for closer cooperation among standard setters in setting best practices for disclosures on encumbered assets.

³⁰ See European Systemic Risk Board, *Recommendation of the European Systemic Risk Board of 20 December 2012 on funding of credit institutions*, ESRB/2012/2.

insurance schemes should take appropriate account of how bail-in and resolution regimes will be implemented.

Caps on asset encumbrance. Caps on covered bond issuance and similar activities, such as those existing in some jurisdictions (eg Australia, Canada and Switzerland), can restrict the share of bank assets that are encumbered, either through limits on assets that can be pledged when a covered bond is issued, or through limits on covered bond issuance or asset encumbrance itself. But there are a number of challenges as regards how such caps should be designed and how to apply them uniformly across banks with very different business models. They also do not prevent institutions from having to pledge further assets to maintain the covered bond pool if required. Moreover, Basel III liquidity regulation, via the LCR, and other statutory liquidity ratios (as used, for example, in India) already establish a buffer of unencumbered assets to be held as insurance against liquidity shocks.

Policy implications. Overall, any additional limits are thus best considered in the context of Pillar II measures, possibly linking capital requirements to the level of asset encumbrance to ensure that the risk-sharing burden is not unduly tilted towards unsecured creditors. Authorities may want to consider further work in this area.

Standardisation of collateral in market transactions. Standardisation or harmonisation of collateral used in secured funding transactions can promote liquidity within the relevant asset markets. For example, there are strict standards relating to loan-to-value ratios of mortgage assets for inclusion in Danish mortgage bonds, which differ according to the nature of mortgaged property. Moreover, each new mortgage loan is funded by the issuance of new mortgage bonds of equal size and identical cash flow and maturity characteristics, dubbed the balance principle. These features are usually credited with having supported the development of liquid and transparent markets for such bonds. In turn, this has aided the reliability of secured mortgages as a funding source for banks in times of stress.

Policy implications. As standardisation requirements along these lines might be helpful in promoting other asset-backed securities (ABS), authorities may want to explore working with market participants to harmonise collateral standards in market transactions. This would help stabilise bank funding as well as alleviate possible future shortages of collateral assets.³¹

Strengthening standards in securities financing markets. In a world where there is increased demand for collateral, the distribution of collateral assets matters. While pricing is likely to promote the redistribution of these assets in times of real or perceived shortages, it can also lead to efforts to circumvent regulation (eg by expanding activities taking place in the shadow banking sector) or increase exposures to operational and liquidity risks. Thus, there is a dual role for the official sector to remove impediments to the movement of collateral, while ensuring that any adjustment can play out in a safe and transparent manner.

Policy implications. One way to pursue both goals is the promotion of best practice standards in securities financing markets and for shadow banking activities more generally, underscoring the importance of current efforts by the Financial

³¹ Some initiatives are already under way. In Europe, for example, these include the covered bond label initiative of the European Covered Bond Council and the prime collateralised securities (PCS) initiative.

Stability Board in this area (see Box 4). This includes current work on strengthening collateral valuation practices and implementing through-the-cycle or minimum haircuts to reduce system procyclicality, as recommended in an earlier CGFS report.³² However, the expected expansion of collateral transformation services requires active monitoring and further work by the official sector on the financial stability risks posed by these activities and their interactions with monetary policy frameworks – an area of analysis to which the CGFS intends to contribute.

A particular aspect that has received considerable scrutiny in the policy debate on securities financing markets is the extent to which rehypothecation activities should be permitted. The recent crisis experience suggests that greater reliance on rehypothecation in financial intermediaries' balance sheets will increase interconnectedness and make them more vulnerable to financial shocks. Rehypothecation of client assets can also delay the recovery of assets or even impose losses on beneficial owners. In addition, it can prompt intermediaries to build up leverage in good times, contributing to increased procyclicality of the financial system (see also Box 2).

Yet rehypothecation of collateral can also be beneficial to market functioning by enhancing market liquidity and price discovery, and mitigating temporary shortages of collateral assets. In sum, any restrictions imposed on the rehypothecation of collateral assets need to carefully balance financial benefits and risks, which argue against proposals for an outright ban on the rehypothecation and reuse of collateral assets.

Box 4

Strengthening standards in securities financing markets

Securities lending and repo markets are essential to financial intermediaries' ability to provide market-making services and manage risks. By increasing collateral in circulation, markets for securities financing can help reduce the risk of persistent shortages in collateral supply. Yet such activities add to the risk of interconnectedness in the financial system and also introduce liquidity risks in times of stress when collateral valuation practices come into question. Recognising the importance of these markets for the financial system, including for price discovery and market liquidity, a recent Financial Stability Board consultative document has made recommendations in the following areas:^①

- *Introducing minimum standards for setting haircuts.* This standard is intended to limit the extent to which haircuts on collateral assets are reduced in benign market conditions and to mitigate the procyclical effects on the build-up of financial leverage.
- *Strengthening collateral valuation and management practices.* Weaknesses in collateral valuation practices adversely affect the collateral status of an asset in securities lending and repo markets. Strengthening minimum regulatory standards for collateral valuation practices reduces this risk.
- *Addressing risks associated with rehypothecation.* Financial intermediaries should provide sufficient disclosure to clients when collateral assets posted by them are rehypothecated; rehypothecation should be allowed only for the purpose of financing the long position of clients and not for financing the own-account activities of the intermediary; and only entities subject to adequate regulation of liquidity risk should be allowed to engage in the rehypothecation of client assets.

^① See Financial Stability Board, *Strengthening oversight and regulation of shadow banking*, consultative document, November 2012.

³² See Committee on the Global Financial System, "The role of margin requirements and haircuts in procyclicality", *CGFS Papers*, no 36, March 2010.

6.3 Implications for central banks

Questions about the implications for and role of central banks in addressing supply-demand imbalances in the market for collateral assets revolve around their possible role as (i) facilitators or sponsors of market initiatives (eg transparency standards) or – more controversially – as (ii) providers of liquidity transformation services in situations of collateral shortage (ie HQA-HQLA transformation).

Central banks as facilitators or sponsors of market initiatives. Central banks can facilitate more efficient use of collateral in various ways. Working with other standard setters as well as the private sector, central banks can be instrumental in developing best practice standards for collateralised funding, including disclosure requirements for asset encumbrance levels or other transparency efforts. One example is the European ABS loan-level initiative,³³ which has the two aims of improving transparency in ABS markets by requiring loan-by-loan information to be made available and accessible to market participants on an ongoing basis, and of facilitating the risk assessment of these securities when used as collateral by Eurosystem counterparties in monetary policy operations.

Another way in which central banks can facilitate a more efficient use of collateral is through triparty collateral management services. Some central banks already support the use of these services in their monetary policy collateral frameworks, and there are initiatives under way to extend the support of such services at the central bank level in the future. Similarly, central banks may consider supporting specific market initiatives which are aimed at improving the mobilisation of collateral assets.

Central banks as providers of liquidity backstops. Only central banks can provide liquidity in their own currency when markets are unable to do this. This makes them uniquely placed to absorb liquidity shocks in the banking system, including those caused by a shortage of HQLA. Furthermore, in those cases where collateralised lending plays a central role among the central bank's tools for monetary policy implementation, a shortage of collateral may disrupt the transmission mechanism of monetary policy, which will hinder the core responsibilities of the central bank.

Throughout the financial crisis, central banks have reacted to signs of collateral shortages in different ways. Some adjusted the eligibility criteria used by them when providing collateralised lending in order to allow counterparties to have the increased access to central bank liquidity that they would temporarily need to address funding difficulties in the market. Others broadened the set of collateral assets to include foreign currency-denominated (cross-border) assets as central bank-eligible collateral.³⁴ While helping to ease any localised collateral shortages, particularly in times of stress, such measures can also facilitate broader eligibility of cross-border collateral in private markets (see "Central banks as facilitators or sponsors of market initiatives" above). But these changes will require adjustments to technical infrastructures and risk management frameworks before they can take place.

At the same time, considering a more active and permanent role for central banks to address HQLA shortages raises a number of issues. First, it can be argued

³³ See European Central Bank, *ABS loan-level initiative*, December 2010.

³⁴ See Markets Committee, *Central bank collateral frameworks and practices*, March 2013.

that such a role would not be part of a central bank's mandate. The acceptance of less liquid assets by the central bank could also expose it to increased credit risk. This would require central banks to strengthen their internal credit assessment capabilities. But in stressed market conditions – periods when central banks are called upon to address liquidity shortages – credit and liquidity risks are highly correlated and difficult to distinguish. Often there are also legal constraints on the type of assets that the central bank can assume. But constraints may also result from the need for the central bank to remain adequately capitalised in view of increased balance sheet risks,³⁵ as well as to remain institutionally and financially independent.

Adverse selection and moral hazard issues could also emerge if central banks adopt a more active role in providing liquidity transformations. By offering such services, the central bank may be forced to hold less liquid and difficult-to-value assets that are likely to be of lower credit quality. The central bank role may even impede the development of market-based solutions to the problem of collateral shortage, such as a more active securities lending market. And, while broadening collateral eligibility may encourage the use of such collateral in private markets, it could also lead to negative incentive effects and market distortions (as noted above). Finally, it may encourage complacency in the management of banks' liquidity needs and even be considered countervailing liquidity regulation.

As a result, there are several reasons why central banks may not wish to consider structural adjustments to their operations in the context of possible collateral shortages. An exception is the actions taken, by some jurisdictions, in the context of Basel III liquidity regulation. This involves new committed liquidity facilities which are designed, against an upfront fee, to ensure that participating deposit-taking institutions have enough access to liquidity to respond to acute stress scenarios in an environment where the outstanding amount of government bonds is not sufficient to fulfil the LCR requirement.

³⁵ One response of central banks to improve the degree of their financial protection has been the implementation of appropriate risk management measures, such as haircuts.

Annex 1

Working Group mandate

Motivation. Demand for collateral assets has been on the rise for many years and across jurisdictions – a trend that has been amplified by the financial crisis. Banks, particularly in Europe, have become increasingly reliant on collateralised borrowing. Central bank funding, which is generally collateralised, has increased substantially, and various central banks have broadened the range of eligible collateral assets.

Further impetus for increased collateral demand is going to come from the current financial reform agenda. Bank liquidity regulation and Solvency II, for example, will contribute to greater demand for high-quality assets, including secured debt instruments from banks. Stricter standards for margin requirements and the central clearing of standardised OTC derivatives contracts are likely to work in the same direction.

Increasing demand for collateralisation coincides with a shrinking pool of high-quality assets. Many structured products lost their AAA status in the early stages of the financial crisis, and securitisation markets have yet to recover. And deteriorating fiscal positions of key sovereign issuers have reduced the supply of highly rated government bonds.

Rising asset encumbrance has raised concerns among supervisors as well as market participants about adverse consequences for bank funding. More generally, structural changes in the balance between collateral demand and supply may affect market functioning and financial stability.

Scope of work. To develop a central bank perspective on the system-wide implications of these developments and draw broad conclusions for policymakers, the CGFS is establishing a Working Group on “*increased demand for collateral assets: implications for markets and policy*”. The Group will examine current developments in collateralised funding markets and regulatory reform initiatives with a view to understanding how increased collateralisation and asset encumbrance may affect the cost of bank funding, and how the potential scarcity of collateral supply may impact market functioning and central bank operations.

Key questions to be addressed would include:

Greater reliance on secured funding markets

- Are there significant differences in banks’ reliance on secured versus unsecured funding markets across jurisdictions? How has reliance on these markets evolved over time? What are the consequences of these trends for collateral demand across jurisdictions, asset encumbrance levels and the quality of pledged and unpledged collateral?
- What are the driving forces behind banks’ greater reliance on secured funding markets? What factors explain any observed differences across jurisdictions (eg deposit insurance, monetary policy operation regimes)?
- How is this current configuration of collateral supply and demand affecting the pricing of collateral and bank funding costs? Are there signs of collateral scarcity across types of institutions and markets?

Impact of regulatory reform initiatives

- How, and through which channels, will ongoing regulatory reform initiatives (eg resolution regimes, bail-in legislation, OTC derivatives reform or prudential regulation) affect the structure of bank funding markets and the demand for high-quality collateral assets? What other factors (eg changes to central bank operations) may contribute to structural change in collateral demand going forward?
- How do longer-term structural changes in the demand for high-quality collateral assets compare with any prospective changes in the effective supply of these assets?
- To what extent will price effects or other factors help to alleviate any mismatches between the supply of and demand for collateral assets?

Implications for the functioning and stability of the financial system

- What are the challenges posed by increased collateralisation in financial transactions for market functioning?
- What are the likely effects of a structural shift towards increased asset encumbrance levels for funding profiles and bank business models? What are the implications for market discipline and the demand for unsecured instruments?
- What are the implications of changing collateral usage for the stability and cyclical behaviour of the financial system?

Implications for policy

- How can central banks and other authorities address any market functioning or financial stability issues arising from increased reliance on collateralised funding? How can any imbalances in collateral supply and demand be countered (eg by incentivising more effective use of collateral or strengthening deposit insurance)?
- Are there any implications for central bank operations under normal conditions (eg importance of considerations regarding collateral needs in the design of operational frameworks, breadth of the pool of eligible collateral, use of cross-border collateral), or for lender of last resort policies?

Process. The Working Group will be chaired by Aerd Houben (Netherlands Bank) and will work through teleconferences and face-to-face meetings. It is expected to establish at least two parallel workstreams. The first workstream will engage in a stocktaking exercise to understand the factors contributing to the increased reliance on collateralised funding markets, and how this may affect asset encumbrance on financial institutions' balance sheets. The second workstream will assess the effects of ongoing regulatory reform initiatives on collateral demand, and how these influence the supply of collateral assets. Drawing on the contributions from both workstreams, the system-wide implications of these developments for markets, as well as for policy, will be discussed.

Given the cross-sectional nature of the issues involved, the Group will take stock of, and will take into account, any related work going on elsewhere, and will liaise with other Groups and involve them in the Group's meetings, as appropriate.

Annex 2

Analytical framework: secured funding and asset encumbrance

Concepts

Traditional characteristics of secured borrowing. Collateralisation involves the legal pledging or granting of a security interest in a specific asset to the creditor. In the event of default, the creditor may take action to convert its contingent claim on the designated assets into outright ownership to settle its claim.

In conceptual terms, even unsecured debt is backed by the underlying assets of a firm. The main differences in this respect between secured and unsecured debt are related to (i) the reference to specific assets in the case of secured debt, and (ii) the procedure for enforcing claims, which tends to be easier for secured creditors than for unsecured ones, since in the event of default secured creditors are able to more rapidly seize the collateral backing their claims. Typically, at least in the case of issuance of a secured bond, if in the event of default the value of the collateral is lower than the face value of the secured investor's claim, then the secured investor has an unsecured claim on the firm equal to the difference between these two values.

Differences between "traditional" secured borrowing, securitisation and covered bonds. Traditional secured debt is a general obligation of the issuer and its repayment comes from the general cash flow of the issuer, similarly to unsecured debt. This implies that, in principle, the probability of default (PD) of secured debt should be similar to that of unsecured debt. However, secured borrowings may have a different loss-given-default (LGD), which will depend on the value of the pledged assets. Securitisation involves the repayment of the creditor directly from the cash flows of the pledged assets. Moreover, if the cash flows from the securitised assets are less than the face value of the creditor's claim, the creditor has no recourse to any of the borrower's other assets or cash flows. Hence, in securitisations, both the PD and the LGD are directly tied to the cash flows from the pledged assets. In return for limited recourse, overcollateralisation or other structural features may be used to compensate investors.

Covered bonds resemble traditional secured credit in that the creditors have recourse to the bank's unsecured assets if in the event of default the value of the covered bond pool (ie the pledged assets) is less than the face value of the credit. Covered bonds nevertheless differ from traditional secured borrowing in that, typically, the borrower is required to replace weak assets in the cover pool with higher-quality ones, thus maintaining the quality of the pledged assets over time. This adds an element of time variation to the collateral and may limit the amount of overcollateralisation needed relative to other forms of secured funding.

Definition of encumbered assets. Encumbered assets are on-balance sheet assets that have been pledged as collateral in secured transactions and are therefore not available to unsecured creditors in the event of a default. More reliance on secured sources of funding, therefore, generally implies higher levels of asset encumbrance. Specifically, encumbrance levels will be driven by two factors. One is whether or not secured funding is obtained against assets that remain on-balance sheet. The other is the level of overcollateralisation (or haircuts) associated with a particular form of secured funding.

Rationale for secured funding

Modigliani-Miller. In a Modigliani-Miller world, the use of secured funding would be irrelevant. Given the assumption of frictionless and complete markets, the structure of a firm's liabilities does not affect firm value. In such a world, firms would not be able to modify their cost of capital by switching between secured and unsecured debt (just like they would not be able to affect their cost of capital by switching between debt and equity). For unsecured funding to have a value-enhancing role, therefore, it must address some underlying market imperfection.³⁶

How can secured funding add value? The extent to which secured borrowing adds value is a question that has been discussed rather extensively in the academic literature. Most of the attention, however, has been devoted to the case of a borrower who supplies "outside" collateral (ie assets that are not part of the borrower's business, such as the pledge of a house by an entrepreneur as collateral for a business loan). The question of the value added from secured borrowing with "inside" collateral (ie the firm's business assets), in contrast, has been addressed much less in the literature.

The following market imperfections may give rise to demand from creditors for secured bank funding:

Adverse selection. In a situation where potential borrowers differ in terms of their credit quality and borrowers have better information regarding their credit quality than creditors do, creditors may demand a pledge of collateral which is on the borrower's balance sheet, but for which fewer information asymmetries exist, or for which the value is more stable or better understood by the creditors. This has been one of the rationales for securitisation markets.³⁷

Moral hazard. Collateral can help overcome moral hazard problems.³⁸ Pledging assets as collateral may limit the ability of borrowers to take actions that decrease the probability of repayment, such as undertaking riskier projects or selling the pledged assets.

Protecting creditors against future claims or claims by other stakeholders. Secured debt can protect creditors against unforeseen future claims on the firm. In the case of a bank, this could protect current creditors against demands on collateral or asset encumbrance in the future. Secured debt can limit the ability of the bank to dilute the claims of existing creditors, as secured creditors have the higher priority (at least up to the value of the collateral assets). Along these lines,

³⁶ One such friction is the fact that, due to deposit insurance, the price of deposits (which represent one form of unsecured credit) typically does not fully react to changes in the level of secured funding.

³⁷ See Committee on the Global Financial System, "Credit risk transfer", *CGFS Papers*, no 20, January 2003.

³⁸ The (ex ante) moral hazard problem arises in a situation where non-contractible actions, taken by borrowers after funds are disbursed but prior to the realisation of project returns, may affect the expected return to lenders. Even if the creditors are able to perfectly observe the credit quality of the borrower before granting the credit, once the funds are disbursed, the borrower may take actions that reduce the probability of repayment, such as investing the funds in risky activities, exerting low effort or diverting funds to private uses.

Stulz and Johnson³⁹ argue that secured debt can help to overcome debt overhang problems, as secured lenders may be willing to finance a project with a lower expected return than would be attractive to equity holders, because the secured creditors do not have to share the returns with the existing creditors in the case of insolvency.

Implications

General implications. The factors reviewed above have a number of general implications. Namely, reliance on secured funding would be expected to increase during periods when informational asymmetries become greater, when moral hazard problems are expected to worsen and when risk aversion is higher. This suggests that the proportion of secured bank funding should have a pronounced cyclical pattern, moving with changes in investor risk appetite. In addition, such reliance should increase in regions affected by banking crises and for individual banks perceived to be encountering difficulty in funding markets.

Instrument-level differences. While these general observations appear valid, it is also interesting to understand what conditions influence the form that secured bank funding will take, especially since differing forms of secured funding can lead to differing degrees of asset encumbrance. Secured bank funding instruments differ not only in the nature and value of the underlying collateral, but also in their relative impacts on various bank stakeholders. Examining differences in the characteristics of secured funding instruments (and in the structure of different financial systems with regard to the availability of these instruments) can thus help to explain shifts across types of secured funding in various circumstances.

Two examples serve to illustrate the importance of these effects. First, periods of generalised risk aversion in financial markets tend to coincide with a flight to safety by investors, which often implies a transfer of assets from financial markets to bank deposits (given existing guarantees). This increase in bank deposits, which represent a form of unsecured funding, may actually result in a lower proportion of secured funding by banks in periods of low risk appetite than in periods with high risk appetite.

A second example derives from a characteristic of securitisation, namely that the value of the collateral determines both the PD and the LGD of the credit. As a result, securitisation might be expected to be applied primarily to assets whose value is judged to be more stable or higher than the average value of the bank's total assets. This also suggests that securitisation is likely to be more sensitive to the value of the underlying assets than traditional secured borrowing. As a result, a boom in the market for a particular type of asset may coincide with increased securitisation of that type of asset, with a corresponding increase in the proportion of secured funding for banks (the reverse is true for periods of deflating asset values). Hence, depending on the business model, it is possible that the proportion of secured bank funding is actually higher in the boom than in the bust period.

The above examples illustrate that consideration of the specificities of financial institutions, combined with differing characteristics of secured funding instruments,

³⁹ R Stulz and H Johnson, "An analysis of secured debt", *Journal of Financial Economics*, 14, 1985, pp 501–21.

can help to identify situations in which “generic” predictions relating to secured funding may not hold. Understanding the differences in characteristics of secured funding instruments can also help to explain observed variations in secured bank funding across countries and time periods, as the characteristics of an instrument determine the private benefits and costs created for various stakeholders and, therefore, the nature of the demand from creditors for particular forms of secured funding.

Annex 3

Summary of the Working Group's analysis of bank funding data

Bank funding data availability

The Working Group mandate calls on members to assess the differences in banks' reliance on secured versus unsecured funding markets across jurisdictions and to study how reliance has evolved over time. Comprehensive data on banks' recourse to secured and unsecured funding instruments, however, are seldom available. Even in cases where they are available, the lack of standardised reporting requirements makes them difficult to compare among banks and across jurisdictions.

The Group's analysis of bank funding data, as outlined in Section 2.2 of the report, is thus based on members' own gathering of country-level bank funding data on (i) retail deposits, (ii) short-term borrowings, (iii) long-term borrowings and (iv) net repos. These four broad categories typically account for the bulk of bank funding in the banking sectors studied and were available in most Working Group member jurisdictions, notwithstanding differences across jurisdictions and over time.

The following classification was applied for the analysis: both retail deposits and short-term funding (excluding repos) are considered to represent mostly unsecured funding; net repos are categorised as secured funding instruments; long-term funding typically includes both secured (eg covered bonds) and unsecured (eg senior unsecured debt) funding instruments.

Qualitative information from interviews with market participants and complementary data gathered from Bankscope, Dealogic and FitchRatings were used to support the Working Group's assessment.

Developments in banks' reliance on secured versus unsecured funding

Bank funding patterns differ greatly across jurisdictions and also within groups of emerging or developed economies (see Graph 2 in Section 2 of the report).

Funding patterns, with the exception of Japan, have changed markedly in most jurisdictions, including banking sectors with limited exposure to recent financial crises. In most advanced economies, banks have reduced their reliance on interbank deposits and other short-term borrowings, while typically raising retail funding shares. This substitution, if matched, would leave the share of unsecured short-term funding unaltered from the bank's perspective. That said, it does imply a partial shift from unsecured creditors to (at least partially) insured depositors. While in emerging market economies, such as Korea and Mexico, a similar rise in retail funding is observed as well, the banking sectors of China and India are found to have raised the share of short-term borrowing.

Banking sectors in **emerging market economies** can be categorised into two groups. The first comprises those of China and India, where banks remain predominantly funded by retail deposits. The deposit base accounts for about three quarters of the banking systems' total liabilities, with other funding sources of minor importance to date. Banks' reliance on secured funding thus remains limited. The second group consists of Korea and Mexico, where aggregate data point at a

replacement of repo funding by retail funding, implying less reliance on short-term secured funding overall.

In countries such as **Australia, Canada and Switzerland**, the observed reduction in short-term borrowing was largely offset by an increasing share of retail funding, leaving the overall share of unsecured short-term funding broadly unchanged. There is some indication from covered bond issuance data that secured funding shares in these countries rose due to a small but increasing share of secured long-term funding. Interviews with market participants suggest that bank asset encumbrance levels in Australia have remained largely unaffected by this development, however, as encumbrance from covered bond issuance was offset by declining margin requirements from derivatives transactions. In Canada, covered bond issuance reflects a desire to broaden their existing investor base for bank debt. Market participants in Switzerland mentioned that banks' greater reliance on secured funding is likely to be structural, reflecting the rapid development of covered bond markets, which has been supported by regulatory initiatives. In all three countries, limits to covered bond issuance apply, limiting the amount of asset encumbrance from this funding source.

In **Sweden and the United Kingdom**, the banking sectors are found to have substituted long-term for short-term borrowings in addition to rising shares of retail deposit funding. That said, these developments may mask changes in intragroup funding arrangements, such as greater reliance on short-term funding through foreign subsidiaries. To assess the impact on long-term secured funding in more detail, Graph A3.1 depicts the share of long-term funding that can be attributed to covered bond issuance in these countries. The data suggest that, for Swedish banks, stronger reliance on long-term funding has led to significantly higher long-term secured funding shares as well as asset encumbrance levels, with overcollateralisation averaging 30% for covered bonds. According to interviews with market participants, the recent rise in covered bond issuance reflects both changes in covered bond legislation and regulatory incentives, a development seen in a number of other European jurisdictions as well. In addition, Swedish banks' asset composition has shifted in favour of mortgage financing, which, in turn, supported the availability of collateral assets to back covered bonds.

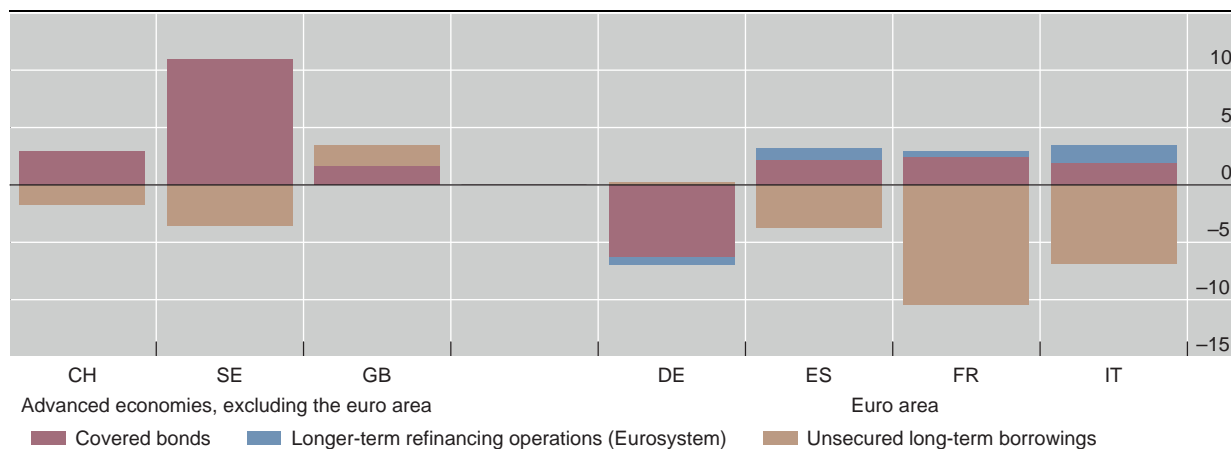
By comparison, the rise in long-term funding for UK banks represents an increase in secured as well as senior unsecured debt of roughly similar magnitude. Taking changes in funding shares together (see Graph 2 in Section 2 of the report), reliance on secured funding may, on aggregate, have slightly increased for UK banks. This finding is corroborated by feedback from market participants, alluding to the favourable regulatory treatment of covered bonds and increasing concerns among unsecured investors about subordination (via depositor preference and encumbrance) as potential drivers towards more reliance on long-term secured funding. That said, bank asset encumbrance at the larger UK banks is considered to have declined, as increased covered bond issuance, while robust in 2011 and early 2012, only offset some of the banks' exiting the Bank of England's Special Liquidity Scheme (SLS) introduced in 2008.⁴⁰

⁴⁰ A sizeable share of UK bank funding before the crisis relied on securitisation markets (residential mortgage-backed securities, in particular), with the underlying collateral assets being removed from the banks' balance sheets. This form of secured funding cannot be directly tracked by the balance sheet data gathered from the Working Group and will thus be discussed in more detail below.

Changes in European banks' long-term funding sources, 2006–11

As a percentage of total liabilities

Graph A3.1



CH = Switzerland; DE = Germany; ES = Spain; FR = France; GB = United Kingdom; IT = Italy; SE = Sweden.

Sources: ECB; European Covered Bond Council; Working Group member contributions; BIS calculations.

Balance sheet data for the **US banking system** imply a shift, at the aggregate level, from short-term borrowing to repo funding and stronger reliance on retail funding. At the same time, US banks have slightly raised their long-term funding share, which, given the absence of an active covered bond market in the United States, corresponds to greater recourse to unsecured debt instruments. In many of the countries covered, changes in funding shares do not net out because not all of banks' liabilities are accounted for. It is therefore difficult to assess whether reliance on secured funding has increased overall. Interviews conducted with market contacts do not indicate reduced demand for unsecured bank debt in the United States, suggesting that US banks (as opposed to the more vulnerable institutions in the euro area) may face no pressure to issue secured debt. However, the demise of private-label US securitisation markets discussed below implies that off-balance sheet secured funding capacity has yet to recover.

National banking sectors in the **euro area** are the only ones in the sample to report sizeable declines in banks' long-term funding shares.⁴¹ The decomposition of long-term funding in Graph A3.1 unveils that the overall decline in long-term funding shares masks an increase in collateralised long-term funding based on covered bond issuance and central bank funding except for Germany. The funding share of senior unsecured debt thus typically contracted by more than what the overall decline in long-term funding suggests.⁴²

Developments in the German banking sector stand out in the euro area, given that covered bond issuance declined during the period under consideration. While the decline has been relatively contained for mortgage-backed issues (see Table 1 in

⁴¹ Short-term borrowings for Spain include maturities of up to two years because comprehensive data for shorter maturities were not available. A fraction of the observed decline in short-term borrowing will thus be attributable to longer-term borrowings.

⁴² A caveat applies to the magnitude of developments in France, given that funding data for France comprise only the four largest banks, representing some 80% of total banking sector assets, whereas covered bond and central bank funding data include all banks resident in France.

Section 2 of the report), the issuance of public Pfandbriefe contracted markedly in response to changes in legislation that strongly reduced the supply of eligible collateral for these securities.

Turning to short-term funding in the euro area, a number of market participants stressed that there has been a sizeable shift from unsecured money markets towards secured funding, such as repos.⁴³ While the data suggest that German and French banks raised their retail funding shares to at least partly offset the decline in unsecured short-term borrowing,⁴⁴ retail deposits in Italy and Spain remained broadly unchanged at the aggregate level. For Italy, interview responses point to increased issuance of (unsecured) short-term paper (eg certificates of deposit and commercial paper) to substitute for interbank lending, although issuance seems to have receded markedly as of mid-2011.

Data for euro area banking sectors as well as market participants' assessments indicate a shift towards more collateralised funding, including both short- and long-term funding markets. The effects of the financial crisis can be considered to have a cyclical impact on banks' recourse to secured central bank funding. Yet, against the backdrop of new bank resolution regimes and depositor preference rules, market participants view the shift in investor demand for secured bank debt as structural, and also expect the move from interbank to repo funding not to reverse over the medium term.

Increased reliance on secured funding has generally raised banks' asset encumbrance in the euro area, although encumbrance levels differ greatly across banks (see Graph 5 in Section 2 of the report). A number of market participants allude to the rise in covered bond issuance and retained issues of secured bonds (eg asset-backed securities (ABS) and mortgage-backed securities (MBS)) backing central bank funding as the main drivers of asset encumbrance in the euro area. The following section therefore studies banks' bond issuance in more detail.

Developments in banks' bond issuance across markets

In jurisdictions where banks raise considerable funds by issuing securitisation instruments backed by off-balance collateral assets, banks' balance sheet data examined above may at best provide only a partial picture of overall funding developments. To complement the analysis of trends in secured and unsecured funding, this section reviews the recent evolution of banks' bond issuance, including both balance sheet and off-balance sheet instruments.

In the run-up to the subprime mortgage crisis in the United States, securitisation markets expanded significantly. This allowed banks to raise sizeable funds by issuing ABS and MBS (Graph A3.2), thus adding to the supply of assets considered at that time as high-quality assets. Although securitisations have no direct impact on banks' asset encumbrance levels, the provision of implicit or explicit guarantees to support securitisation structures adds to the issuing banks'

⁴³ Net repo data for Italy were not available at the consolidated banking sector level. Data for Germany are available only as of 2010.

⁴⁴ While changes in funding shares do not net out in most jurisdictions covered by the sample, the effect is most pronounced for Germany and France. Inspection of a sample (Bankscope) of large banks from these jurisdictions suggests that a strong increase in derivatives liabilities from 2006 to 2011 is likely to explain the gap in net funding changes from the Working Group's data gathering.

contingent asset encumbrance. Indeed, during the financial crisis, banks had to provide additional collateral for the securitised debt they had issued. Since then, banks' access to secured funding via off-balance sheet instruments has remained subdued.

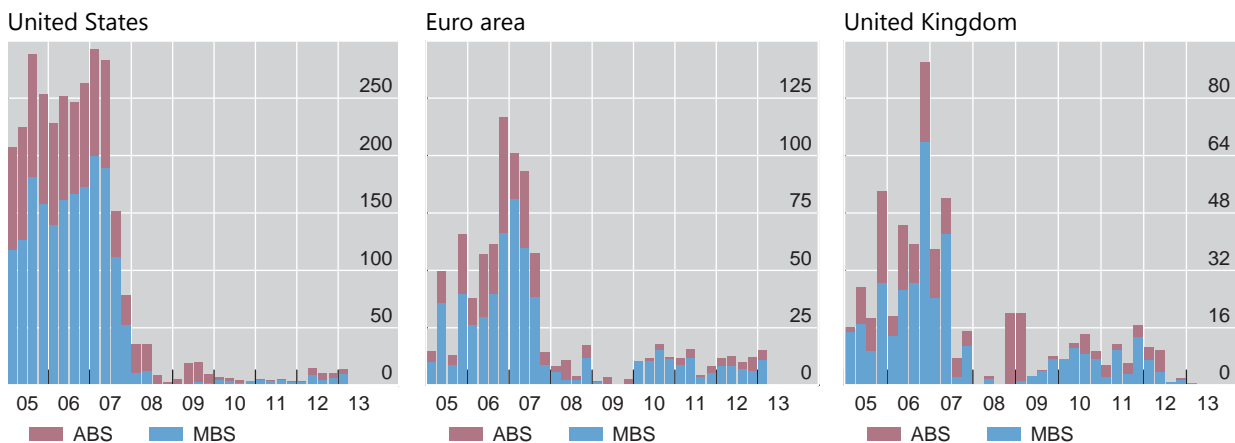
The demise of securitisation markets also marks a break in developments in secured and unsecured bank bond issuance. Banks in the United States have returned to issuing predominantly unsecured debt, which in the immediate aftermath of the Lehman Brothers bankruptcy was backed by government guarantees (Graph A3.3, left-hand panel).

Banks' issuing patterns in the euro area have differed from those in the United States due to several factors (Graph A3.3, centre panel). First, in contrast to the United States, many euro area jurisdictions have active covered bond markets that have been providing a stable funding source for banks. Second, monetary policy operations in the euro area have created an increasing demand for collateral (see also Graph 1 in Section 2 of the report). As funding conditions deteriorated in 2007, banks in the euro area started to increasingly originate and retain securitisation instruments to use them as collateral for central bank funding. With the expansion of Eurosystem operations in response to the aggravation of the sovereign crisis and related funding strains for banks in crisis-hit countries, retained secured bonds have become an important source of eligible collateral for central bank funding. This development, while ensuring banks' access to funding, is likely to have considerably added to banks' asset encumbrance in at least parts of the euro area, given the conservative haircuts and valuations applied by central bank collateral frameworks.

Banks' gross issuance of ABS and MBS¹

In billions of US dollars

Graph A3.2



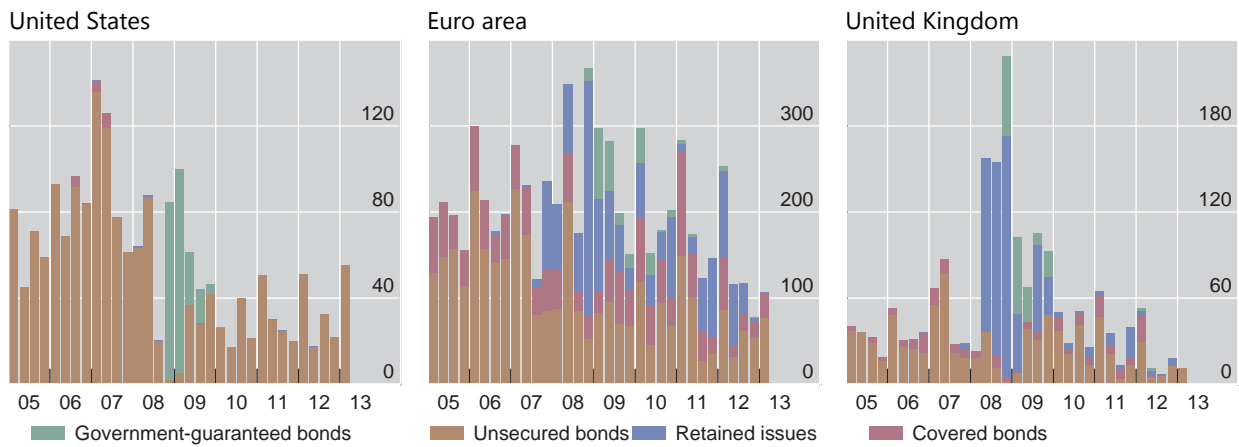
¹ Based on the nationality of the issuer's parent company. Only private-label MBS are included. Retained issues are excluded.

Sources: Dealogic; BIS calculations.

Banks' gross bond issuance¹

In billions of US dollars

Graph A3.3



¹ Based on the nationality of the issuer's parent company. Retained issues include retained covered bonds, ABS, private-label MBS and government-guaranteed bonds

Sources: Dealogic; BIS calculations.

Developments in the United Kingdom provide an example of how the banking sector transitioned steadily away from official liquidity support. As highlighted in Graph A3.3 (right-hand panel), the introduction of the Bank of England's SLS in April 2008 led to a strong increase in retained issues, as banks were given the opportunity to swap these bonds for UK Treasury bills to improve their liquidity positions. With the SLS being phased out over time, the amount of retained issues receded and banks reverted to covered bonds as a means of secured funding.

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