

Mind the gap? Sources and implications of supply-demand imbalances in collateral asset markets¹

Increasing demand for collateral assets in the aftermath of the financial crisis has raised concerns about a shortage of high-quality assets (HQA). Drawing on a recent report by the Committee on the Global Financial System, we argue that such concerns seem unjustified. In aggregate, the increase in the supply of HQA appears sufficient to meet the additional demand arising from both market forces and regulatory changes. But given the uneven distribution of HQA among market participants, higher demand is likely to trigger market responses that could themselves generate risks for the financial system and thus warrant further monitoring.

JEL classification: G21, G28.

The use of collateral in financial transactions is on the rise, driven by both market forces and regulatory changes. This has triggered concerns about possible shortages of collateral assets and the associated implications for financial markets.²

A variety of factors has lifted demand for collateral. In response to counterparty risk concerns triggered by the financial crisis, issuers and investors have shown increased appetite for secured long-term bank debt, such as covered bonds. Likewise, funding activity has shifted from short-term unsecured lending to repo markets. Many banks, especially in Europe, have become increasingly dependent on collateralised borrowing, leading to rising bank asset encumbrance levels – a sign of rising demand for certain types of collateral for funding purposes.

Regulatory changes add to this increased demand. One factor is derivatives regulation, as more stringent collateralisation requirements in over-the-counter (OTC) derivatives markets (BCBS and IOSCO (2013)) or the requirement for central clearing of all standardised OTC derivatives come into force. Another factor is capital and liquidity regulation. New rules under Basel III will require banks to maintain larger buffers of high-quality liquid assets (HQLA; see Box). European insurance firms, in turn, are likely to add to the demand for high-quality assets (HQA), given new requirements under Solvency II (CGFS (2011a)).

¹ The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS or the CGFS. We are grateful to Srichander Ramaswamy for his collaboration and insights and to Claudio Borio, Dietrich Domanski, Aerdt Houben, Bob McCauley and Christian Upper for useful comments on earlier drafts of this article, as well as to Jhuvesh Sobrun for able research assistance.

² This is not a new phenomenon; see CGFS (2001) for earlier coverage of related concerns.

A key question is how the supply of collateral assets will react to this additional demand and whether any supply-demand imbalances are likely to have adverse effects that may warrant a response from policymakers. Drawing on recent work by the Committee on the Global Financial System (CGFS),³ this article investigates these issues from a financial system perspective.⁴ Using a simple supply-demand framework, it contrasts shifts in the demand for collateral assets with actual and expected supply side changes that affect both the outstanding stock of eligible assets as well as how these assets are utilised, a concept sometimes described as collateral velocity. We argue that a lasting, widespread scarcity of collateral assets in global financial markets is unlikely, but that possible endogenous adjustments in market practices might warrant the attention of policymakers.

The first section looks at the key drivers of collateral demand to provide an overview of the size and direction of any shift in aggregate demand for collateral assets. The second section turns to the supply side, investigating how quantities, prices and market practices are likely to respond to any structural increase in collateral demand. The third section discusses implications for markets and policy, followed by a short conclusion.

Changes in the demand for high-quality assets

Structural versus cyclical factors

Demand for collateral assets is changing, owing to both structural and cyclical factors. A key factor on the structural side is regulatory reform, which will be covered in more detail below. Cyclical factors are more difficult to assess, in part because empirical analyses are lacking that would help quantify their impact on overall collateral demand. Moreover, even cyclical developments can have a structural component (or turn structural over time), implying that additional assumptions would have to be made in order to arrive at a fuller assessment.

Shifts in bank funding patterns, for example, respond to changes in the risk preferences of investors in bank debt and can significantly influence the demand for collateral assets. In periods of heightened counterparty credit risk, banks' reliance on repo market funding will thus tend to increase, replacing unsecured funding. The recent experience in some euro area economies is one obvious example. However, whether and to what degree such developments are lasting, rather than purely cyclical, depends on a variety of factors, including the success of sovereigns and banks in improving their creditworthiness.

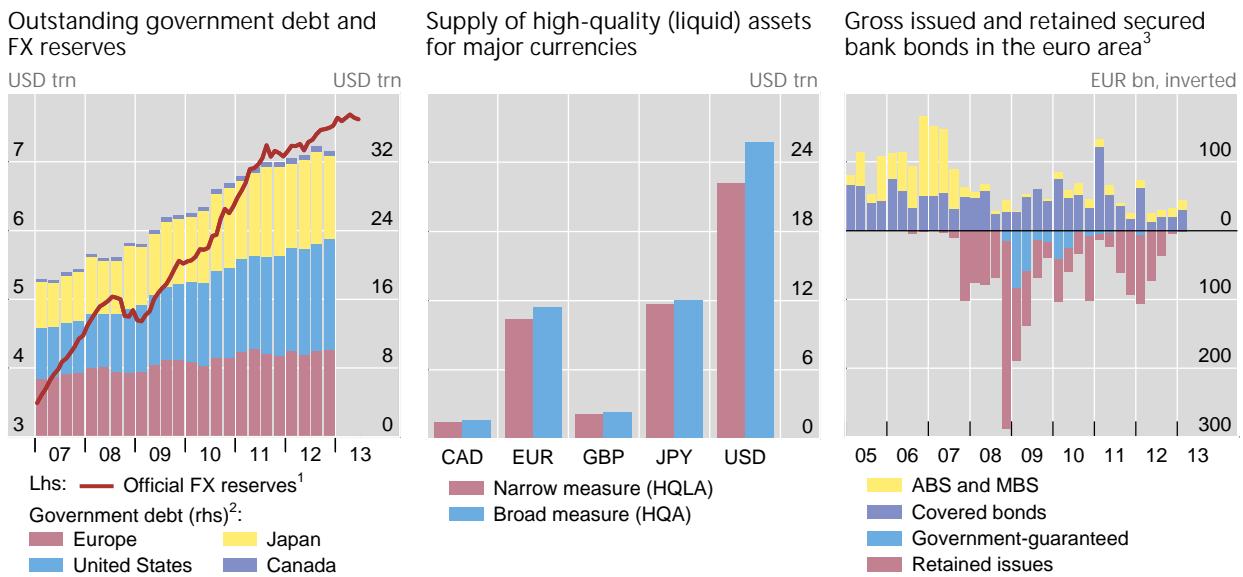
Another example is demand from the official sector stemming from both its foreign exchange (FX) reserve management and monetary policy operations. Investment of FX reserve holdings, predominantly in assets denominated in the major reserve currencies, rose by about \$4 trillion between 2007 and 2012 (Graph 1).

³ The CGFS is a BIS-based committee of senior central bank officials that monitors developments in global financial markets for central bank Governors (see www.bis.org/about/factcgfs.htm).

⁴ Specifically, this article draws heavily on the recent CGFS (2013) report entitled *Asset encumbrance, financial reform and the demand for collateral assets* (www.bis.org/publ/cgfs49.htm), which was prepared by a Working Group chaired by Aerdt Houben (Netherlands Bank).

High-quality assets: demand and supply factors

Graph 1



¹ Sum of the official FX reserves for the following countries: Australia, Brazil, Canada, Chile, China, Czech Republic, Denmark, the euro area, Hungary, India, Indonesia, Japan, Korea, Mexico, Poland, Russia, South Africa, Sweden, Switzerland, Turkey, the United Kingdom and the United States. ² Outstanding amount of central government debt securities for major advanced economies. ³ To highlight how public sector support has eased bank funding strains during different phases of the financial crisis, the amount of government-guaranteed bonds and retained issues that may serve as collateral in central bank funding operations are presented on an inverted axis of ordinates.

Sources: World Bank; Dealogic; national data; CGFS report no 49; authors' calculations.

left-hand panel). If not utilised via activities such as securities lending, these assets will not be available to the private sector, changing the overall distribution of collateral assets across the economy. Detailed information on such practices, however, is scarce.

Central bank operations have also affected collateral demand in ways that make it difficult to assess the net impact. On the one hand, large-scale purchases of domestic HQA (see box), such as those conducted by major central banks over recent years, have absorbed significant quantities of collateral assets. On the other hand, these purchases have resulted in the creation of high-quality liquid claims on these same central banks, mitigating the impact of their asset purchases on net HQA demand. At the same time, central bank funding based on a broader set of eligible assets has allowed banks to transform non-HQA into claims on the central bank, raising net HQA supply. This was a significant factor in a number of euro area jurisdictions as the sovereign debt crisis deepened.

Structural factors: regulatory reform

Key regulatory initiatives that increase the demand for collateral assets include reforms in derivatives markets, the new liquidity coverage ratio (LCR) and changes to capital requirements under Basel III and Solvency II.

Collateral asset terms

What determines whether an asset is considered to be a collateral asset and how is its quality established? Although, in principle, any asset can be employed to collateralise a claim, market participants, regulators and academics typically take different views of collateral assets.^① This article considers three – clearly overlapping – definitions:

High-quality liquid assets (HQLA): This relatively narrow definition is based on regulatory considerations. HQLA include only those assets that qualify in meeting the LCR requirement. Key characteristics of these assets are their low credit and market risk. They are also expected to be easy to value, exchange-listed, traded in active markets, unencumbered, liquid during times of stress and, ideally, central bank-eligible.

High-quality assets (HQA): This term includes all assets that market participants can use to meet collateral requirements in derivative transactions. Notwithstanding regulatory guidance on eligibility criteria (eg BCBS-IOSCO (2013) for non-centrally cleared derivatives), the boundaries of the HQA set are largely determined by market practice and may, for example, be subject to cyclical developments or competitive pressures to broaden eligibility criteria among CCPs. This is the relevant definition for assessing the impact of OTC derivatives reforms.

Collateral assets: The broadest definition refers to all assets on which market participants rely in collateralised funding transactions. This definition extends well beyond HQLA and HQA, including assets such as mortgages or other credit claims that are pooled to collateralise covered bonds, agency and private-label mortgage-backed and asset-backed securities.

^① See CGFS (2013).

Derivatives reforms

Reforms in OTC derivatives markets are increasing demand for HQA. This occurs primarily through new requirements for initial margin on both centrally and non-centrally cleared OTC derivatives trades.⁵

Several studies have estimated the impact of derivatives reforms on HQA demand. The BCBS and IOSCO, for example, put the total initial margin required to collateralise exposures from non-centrally cleared trades at around €0.7 trillion (\$0.9 trillion), given existing transaction volumes.⁶ Initial margin requirements for centrally cleared derivatives could add another €0.1–0.6 trillion (\$0.1–0.7 trillion) under normal market conditions (eg Heller and Vause (2012) and Sidanius and Zikes (2012)).

Yet the range of existing estimates is significant. This reflects differing methodologies as well as varying assumptions about future market developments. Rising fragmentation of central clearing and an associated reduction in multilateral netting, for example, would tend to increase collateral demand (CGFS (2011b)), even though the scale of this effect is not yet clear. This has to be set against the phasing-in of the new requirements over several years, which will give market

⁵ Both parties to a centrally cleared derivatives transaction are subject to the requirement. For uncleared transactions, a full two-way margin is proposed as well. Variation margin, on the contrary, should not have a first-order effect on the aggregate demand for collateral, even though precautionary holdings of HQA may increase to meet future margin calls.

⁶ The 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 consultative document BCBS-IOSCO (2013) recommends the exemption threshold to be €50 million, so that the lower end of the range would be the relevant estimate of the initial margin requirements for non-centrally cleared trades.

participants time to adjust their business models so as to reduce their collateral needs.

Liquidity regulation

The LCR seeks to strengthen banks' resilience to severe liquidity shocks. Specifically, it will require banks to hold an amount of HQLA equal to or greater than their net cash outflow over a 30-day period (BCBS (2013)). Assessing the impact of the LCR based on end-2011 data (BCBS (2012)), the BCBS estimates that banks would face an aggregate shortfall of €1.8 trillion (about 3% of the banks' total assets). Notably, the study neither includes all banks affected by the LCR nor does it account for banks holding excess HQLA as an additional liquidity buffer.

Nevertheless, actual HQLA shortfalls are likely to be significantly lower than the 2011 estimate for a variety of reasons. Most importantly, the study provides a static assessment of banks' HQLA demand and cannot account for the likely adjustment in banks' balance sheets, funding patterns and lending behaviour to mitigate any shortfalls. In addition, current estimates are based on the 2010 formulation of the LCR and do not reflect the revisions to the LCR definition, as announced in January 2013, that will further reduce additional HQLA demand.

Capital requirements

Changes to capital requirements to be introduced under Basel III and Solvency II will raise demand for both HQA and some debt instruments that are secured by collateral assets (such as covered bonds). Yet, as issuer incentives will also change, only qualitative observations on the overall impact on net HQA demand are possible at this stage (see separate section on HQA supply below).

One example is the lower capital requirement that will apply to exposures from repo transactions under Basel III – especially those secured by HQA – as compared to those from unsecured money market transactions. While this is likely to raise demand for repo funding and, hence, for HQA as collateral, this increase may be counterbalanced by incentives to raise the supply of specific types of secured debt. Specifically, both Basel III and Solvency II apply lower capital charges for covered bonds than for other bank debt. This could induce insurance companies, typically large investors in such instruments, to shift demand from unsecured bank debt to covered bonds, leading banks to adjust their issuance patterns accordingly.

Changes in the supply of high-quality assets

The discussion so far suggests that, even though estimates are subject to considerable uncertainty, various reform initiatives – including liquidity regulation and derivatives reforms – may increase the structural demand for HQA and other collateral assets by about €3.1 trillion (\$4 trillion), spread out over the next several years.⁷ Other, more cyclical factors are also important.

⁷ Of these, as detailed above, some €1.8 trillion are due to the implementation of the LCR, while reforms in derivatives markets that seek to raise the amount of centrally cleared transactions and broaden margining practices for bilaterally cleared ones are expected to add another €0.6 trillion and €0.7 trillion, respectively, to the demand for HQA

Will these changes be met by increasing supply? The supply of HQA to the financial system is to some extent exogenous, ie largely independent of any developments on the demand side. For example, when driven by the financing needs of governments or non-financial corporates and changes in their creditworthiness. But, as mentioned above, it is important to recognise the ability of the financial sector to adjust to signs of collateral scarcity: by increasing either the stock of eligible (or potentially eligible) collateral assets, or by raising what is sometimes termed the velocity of collateral (IMF (2012)), ie intensifying the utilisation of the existing stock of collateral assets via collateral reuse and securities lending. Both sets of factors will be assessed in more detail below.

Independent supply factors

Sovereign issuers, including central banks and entities issuing instruments supported by government guarantees, are the dominant suppliers of HQA in most jurisdictions. Private debt issued by highly rated non-financial corporates can add to the supply of HQA in the financial system. The contribution to HQA supply from each of these sources has a strong cyclical component, with the usual expansion of public debt issuance countervailing the typical decline in private – and sometimes also public – sector creditworthiness during economic downturns.

Accordingly, several measures suggest that, despite the observed slippage in issuer quality, the supply of publicly issued HQA has risen significantly in recent years. The market capitalisation of benchmark indices, for example, implies an increase in the outstanding amounts of AAA- and AA-rated government bonds by \$10.8 trillion between 2007 and 2012 (CGFS (2013)). Yet benchmark indices only include the more liquid and actively traded securities and are thus a better approximation of changes in HQA than of the overall HQA volume outstanding.

For comparison, central government debt securities data for major advanced economies suggest an increase of \$15 trillion (Graph 1, left-hand panel). Data gathered in CGFS (2013) for the major currencies, including high-quality private debt, indicate an aggregate supply of HQA of \$48 trillion, and \$53 trillion under the broader HQA definition (Graph 1, centre panel). These estimates come on top of aggregate cash balances and any liquid claims on central banks.

Whether or not an asset qualifies as HQA depends on the use market participants can make of it (see Box). Domestic public debt, for example, is likely to be considered as HQA for domestic regulatory uses, even if the credit quality of the sovereign issuer deteriorates. Foreign investors, however, would likely consider these issues as HQA only up to a certain issuer credit risk level and to the extent that they can be used to collateralise financial transactions (eg are eligible collateral with CCPs or accepted by counterparties in non-centrally cleared derivative transactions). These considerations constrain the ability of the public sector to provide HQA from an international perspective.

Market-driven supply factors

Adjustment mechanisms

Imbalances in supply and demand for collateral assets, at both the aggregate and market levels, will trigger adjustments in the effective supply of these assets that will tend to alleviate potential shortages. One such mechanism is adjustments to

eligibility requirements in private transactions, which broaden effective collateral supply for a given volume of transactions. In addition, banks and other financial institutions are able to create HQA through the pooling of balance sheet assets and overcollateralising them. The issuance of covered bonds, as mentioned above, uses this mechanism. Banks may also securitise assets to create HQA that are then shifted off the balance sheet. Here, the pooled assets are usually trashed into high- and low-quality assets and may benefit from external credit enhancement.

Changes in investor risk perceptions can, however, hamper the efforts of financial market participants to increase the effective HQA supply in these ways. One example is the collapse of global securitisation markets from 2007, when the valuation of complex collateral pools was increasingly called into question. This continues to hinder banks from creating HQA by issuing asset- and mortgage-backed securities (excluding those with public sector support). Covered bond issuance, by contrast, has remained an important funding source for European banks, adding to the supply of HQA at the system level. Public sector enhancement of bank bonds via government guarantees, in turn, has been a complementary source of HQA in times of stressed financial conditions (Graph 1, right-hand panel).

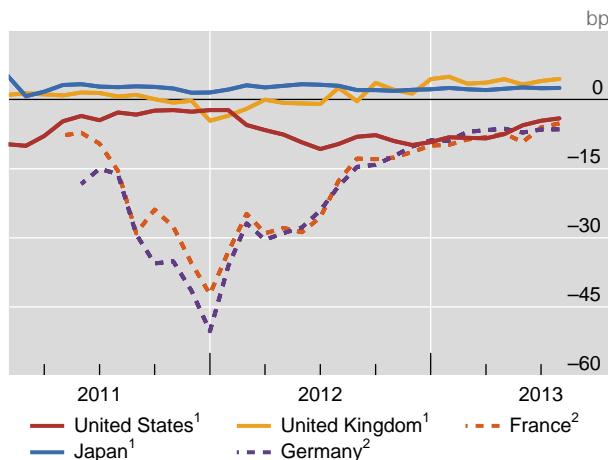
Another mechanism that enhances supply is the more effective utilisation of available HQA by raising collateral velocity. For example, effective collateral supply can be increased by rehypothecation of collateral assets posted, or of assets held in the custody accounts of prime brokers. Securities lending and similar transactions can be used in a similar fashion. Even a modest increase in securities lending by holders of large investment portfolios – FX reserve managers and institutional investors – would contribute to a significant increase in HQA availability for market transactions. This, however, would require these investors to overcome any existing operational constraints on such activities.

Assessing the scarcity of collateral assets

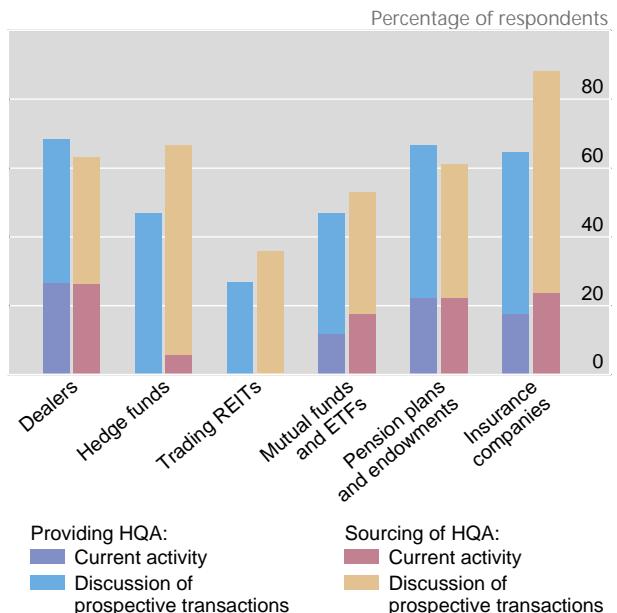
The above discussion highlights the mechanisms through which shortages of collateral assets can be addressed: increasing the stock of eligible assets (eg broadening the pool and issuance of eligible collateral) and raising collateral velocity (eg more efficient collateral management; creating incentives for securities lending and similar activities). As these mechanisms allow an effective increase in the net supply of collateral assets, a generalised and persistent scarcity of these assets is unlikely to occur. Given the uneven distribution of collateral assets, however, localised and temporary supply-demand imbalances are possible.

One way to assess the strength of these imbalances (and of related incentives for market-based responses) is to move beyond volume considerations and look for price indicators of collateral scarcity. A key such indicator is the spread between the sovereign general collateral (GC) term repo rate and the corresponding overnight index swap (OIS) rate, a close proxy for the risk-free rate. It reflects market conditions in collateralised funding markets, where one participant makes funds available and accepts collateral in return. The other participant borrows the funds and can use them to finance the securities provided as collateral. A net increase in the demand for HQA then results in the collateral asset becoming more valuable, with a corresponding fall in the interest rate on the secured transaction. As a result, declining or negative GC-OIS spreads usually indicate that cash investors prefer to obtain high-quality collateral (high demand for HQA) to secure their loans even if this translates into lower returns.

One-month general collateral repo spreads



Collateral transformation transactions



¹ One-month GC repo rate minus one-month OIS rate. ² One-month GC repo rate minus one-month EONIA rate.

Sources: Bloomberg; Federal Reserve; authors' calculations.

Recent data illustrate this point. GC-OIS spreads have been relatively tight in the past few years for major economies outside the euro area (Graph 2, left-hand panel). This is consistent with the absence of an increase in the net aggregate demand for HQA in 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 a relative shortage of securities issued by highly rated sovereigns in the euro area during the acute periods of the European sovereign debt crisis.

Qualitative indicators, based on a survey of US senior credit officers (Board of Governors of the Federal Reserve System (2012)), tell a similar story. According to dealers surveyed in late 2012, the volume of collateral transformation transactions, which are used by certain market participants to obtain higher-quality collateral in exchange for assets of lesser quality or liquidity (see Graph 3 for an illustration), had remained broadly unchanged in net terms from the beginning of 2012 – both for transactions that source and provide HQA. At the same time, despite the relative lack of current activity, up to two thirds of respondents reported frequent or at least some discussions with clients about prospective transactions (Graph 2, right-hand panel). Of the different client types, hedge funds and insurance companies were seen as more likely to be engaged in discussions about sourcing collateral, whereas interest across other client types was more balanced.

Overall, neither price nor quantity indicators currently indicate any signs of a broad-based collateral shortage at the aggregate level. Moreover, known supply-demand dynamics in collateral asset markets argue against expectations of any future lasting, aggregate shortages of collateral assets to meet increased demand from regulatory initiatives or other factors. Nevertheless, there are good reasons to believe that the increased collateralisation of financial transactions and endogenous

responses to temporary supply-demand imbalances in collateral asset markets will have effects that can be quite transformational for financial markets. These issues will be examined in the next section.

Implications for markets and policy

Market perspective

Regulatory reforms address a number of important financial stability concerns. Reforms in OTC derivatives markets, for example, are designed to mitigate risks from counterparty credit exposures, while liquidity regulation and capital requirements aim to improve the resilience of banks and bank funding. These measures, as suggested above, will structurally increase the demand for HQA. Yet higher demand will, in turn, provide for market responses that could increase financial system interconnectedness, opacity and procyclicality.

Interconnectedness and opacity in markets

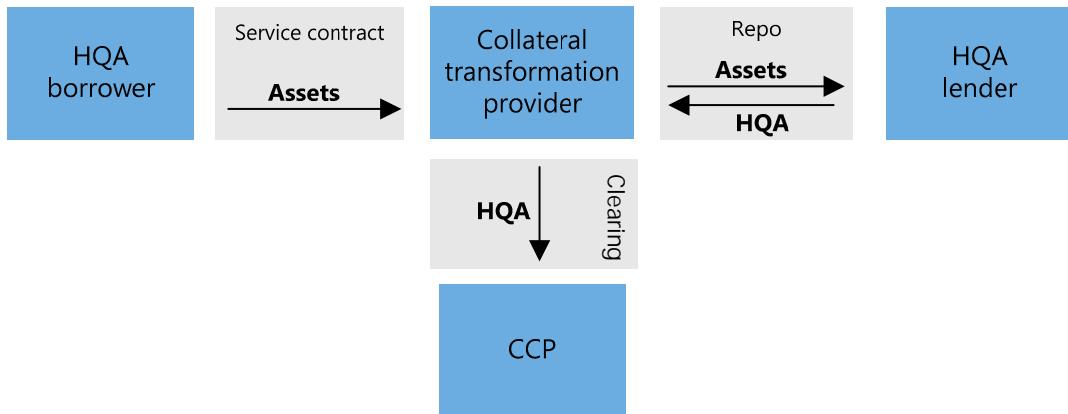
Higher HQA demand will tend to make these assets more expensive, incentivising market participants to increase their supply via repo transactions, securities lending and collateral transformation services. While these activities will ease any supply-demand imbalances and support market liquidity, they will also make the financial system more interconnected, establishing or reinforcing interdependencies between financial infrastructures, institutional investors and banks.

For example, subject to operational and regulatory constraints, pension funds and insurers may lend out their HQA holdings to financial institutions that need to post collateral at a CCP. Custodians, in turn, have incentives to lift their revenues by helping insurance companies and other financial institutions to more actively manage those parts of their HQA holdings that are currently idle.⁸ This would add new links and counterparty exposures across different parts of the financial system and may raise concentration levels (eg as a result of increased reliance on a small number of service providers). Without appropriate disclosure, it would also increase financial system opacity, particularly if collateral were increasingly sourced from or moved to entities outside the regulated financial sector (eg shadow banks; see IMF (2012)).

Procyclicality and “fair weather” effects

Another implication is increased procyclicality, combined with higher funding and rollover risks. During economic downturns, the effects of the economic cycle on bank leverage and credit supply can be amplified when the market value of collateral assets in financial transactions moves procyclically. This is because falling asset values, combined with higher haircuts, require more assets to be pledged to raise, say, a given level of repo funding or to meet initial margin requirements on derivatives exposures (CGFS (2010)). Once started, such a process can feed on itself, with falls in market prices and/or rising haircuts triggering calls for additional

⁸ A recent study (Accenture-Clearstream (2011)) estimates that idle collateral assets on financial institutions’ balance sheets generate carrying costs and inefficiencies worth €4 billion annually.



collateral assets that may then turn into asset liquidations to obtain the necessary collateral.⁹

Current developments would add to these effects primarily through broader eligibility requirements as well as through collateral transformation and similar activities. Even though the margin requirements introduced by OTC derivatives reforms will need to be met by HQA for which market valuations should, in principle, prove relatively resilient, broader eligibility for other uses and rising reliance on collateral transformation transactions would contribute to greater financial system procyclicality by adding poorer quality assets to the collateral chain. An illustrative example is shown in Graph 3, in which the borrower exchanges poorer quality assets for HQA to meet the margin requirements of a centrally cleared derivatives transaction. The collateral transformation provider, in turn, sources the HQA (eg cash) from the repo market, lending out the borrower's assets. To simplify the example, the provider also acts as the borrower's clearing member, posting the HQA as margin with the CCP.

This setup brings about a number of potential stability implications. For one, HQA lending institutions could find their claims collateralised by assets that may prove to be illiquid, and more difficult to value during stressed market conditions than implied by lenders' risk management frameworks. Repo fails could then prompt fire sales of these assets, adding to the pressure on asset valuations and prompting HQA lenders to exit such activities. The result could be pronounced "fair weather" effects in collateral markets, with sudden withdrawals of HQA supply during times of stress that would prevent borrowers from meeting their CCP margin requirements. In this case, risks would quickly propagate through the financial system.

⁹ Studies of developments in US repo markets during the financial crisis provide some detail on the mechanisms at play. Haircuts were little changed for public and public-guaranteed securities – perceived as safe assets in times of crisis – containing the contraction of those parts of the repo market for which these securities represented the majority of collateral assets (Krishnamurthy et al (2012)). Haircuts, by contrast, rose significantly for collateral assets that had suffered sizeable valuation losses (eg private-label securitisations) adding to funding pressures for banks reliant on the US interdealer repo market (see, for example, Gorton and Metrick (2010)).

Increased maturity transformation represents another source of risk that will tend to become particularly acute in stressed environments. Borrowers seeking HQA to collateralise derivative transactions with long-term maturities will be exposed to rollover risk, given that collateral transformation transactions will tend to be short-term, reflecting limited liquidity (higher costs) at longer maturities in the underlying repo market.¹⁰ Collateral transformation providers acting as clearing members, in turn, may need to advance HQA on CCP margin calls, leaving them exposed to the HQA borrowers' counterparty risks.

Policy perspective

The above discussion suggests that policy responses to current developments in collateral asset markets should focus primarily on measures that can help address system interconnectedness, opacity and procyclicality. In addition to broader efforts supporting the creditworthiness of both the public and private sectors to increase the supply (eg through a broader and more stable issuer universe) and reduce the demand for collateral assets (eg through reduced reliance on collateralised funding), three policy areas will be particularly important: transparency and system monitoring, prudential safeguards, and liquidity backstops.

Enhancing transparency and system monitoring

Market discipline is the first priority. Changing regulatory environments and business practices always invite financial innovation, and market responses to signs of supply-demand imbalances in HQA markets will be no different. Many of the markets that will be key to such responses remain in their infancy, but their growth potential is large (Graph 2, right-hand panel). This suggests a need for policy to ensure that developments and risk management practices in these markets are closely monitored and that market discipline is enhanced as much as possible.

A key requirement for effective market discipline is appropriate disclosure. One basic issue in this context is the benchmarking of how markets are evolving to give market participants a sense of the scale of the associated risks. For example, while broad information on the wider repo and securities lending markets is available from industry surveys and existing statistical data sets, these are often not detailed enough to capture different market segments. This lends support for more granular and flexible data collections aimed at gauging market developments over time. More detailed disclosures at the individual institution level, as currently being promoted by the Financial Stability Board (FSB) in other areas, could also be helpful (see, for example, Enhanced Disclosure Task Force (2012)).

At the same time, a distinction must be made between the information that financial institutions have to report to their supervisors and information that they disclose to the public. Currently, supervisory reporting schemes do not necessarily contain sufficient detail regarding financial institutions' collateral management and collateral transformation activities. Existing risk management frameworks may struggle to cope adequately with these new activities. Supervisors may thus need to require the regular reporting of detailed information on the nature and scope of any collateral transformation activities and how these affect the risk profile of

¹⁰ While broadening the collateral eligibility criteria at CCPs to accept poorer-quality assets could reduce the risks associated with collateral transformation, this would shift credit and liquidity risks directly to the CCP and not address procyclicality effects.

supervised entities (eg via any effects on asset encumbrance levels).¹¹ In addition, given concerns over additional funding and operational risks and their amplification in times of stress, supervisors need to ensure that risk management and operational procedures are designed to withstand periods of stress without negative knock-on effects. This is best done through stress tests aimed at overcollateralisation levels, haircuts and other parameter settings which lessen the risk that additional assets will be liquidated in times of stress.

Building prudential safeguards

Key to any policy response to developments in collateral asset markets is that market responses to supply-demand imbalances can play out safely and efficiently. One such response is enhanced disclosure and stress testing, as discussed above. Another response is a more direct effort to create robust market practices, such as harmonisation measures and the establishment of market standards.

Standardisation or harmonisation of the collateral used in secured funding transactions can promote liquidity within the relevant asset markets. One example is the standardisation of Danish mortgage bonds, which is often credited with having supported the development of liquid and transparent markets for such bonds, aiding market functioning and the reliability of secured mortgages as a funding tool in times of stress (Dick-Nielsen et al (2012)). With this in mind, authorities may wish to consider 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.¹²

A related approach is the promotion of best practice in securities financing markets and for shadow banking activities more generally (FSB (2013)). This includes ongoing work to strengthen collateral valuation practices and implement through-the-cycle or minimum haircuts to reduce system procyclicality (CGFS (2010) and BCBS-IOSCO (2013)).¹³

Provision of liquidity backstops

Liquidity backstops are a means of providing liquidity transformation in situations of severe collateral shortage. In contrast to other market participants, the central bank can provide liquidity in its own currency at all times. It is thus uniquely positioned to absorb liquidity shocks, such as those caused by a severe shortage of HQLA, but is also ultimately reliant on other central banks if the shortage concerns foreign currency collateral.

Central banks have provided liquidity backstops throughout the financial crisis. In some cases, this has been within their regular operational frameworks, as banks have tapped central bank funding using assets they could no longer place in stressed markets, as witnessed by the increase in so-called retained issues in the euro area during the financial crisis (Graph 1, right-hand panel). In other cases,

¹¹ For more detail on policy issues raised by rising asset encumbrance levels, see CGFS (2013).

¹² Some harmonisation efforts are already under way. In Europe, for example, these include the covered bond label initiative and the prime collateralised securities initiative.

¹³ Central banks, working with other standard setters as well as the private sector, have a particular role to play in this context. Given their own involvement in collateral asset markets, they can be instrumental in developing best practice standards for collateralised funding, including disclosure requirements, and helping to implement them through their operational procedures.

central banks responded to signs of collateral shortage by broadening the eligibility criteria of their lending facilities to ease banks' access to central bank liquidity. Among these measures, expanding the range of eligible foreign currency-denominated (cross-border) assets, as some central banks have done, could be particularly helpful in facilitating the flow of collateral in private markets.

One question is whether the crisis experience suggests a more active and permanent role for central banks in addressing real or perceived HQLA shortages. Yet, the balance of the associated costs and benefits is less than clear. One issue is that the acceptance of less liquid assets may expose the central bank to increased credit risk. Another issue is adverse selection and moral hazard. Despite the conservative rates that tend to apply to their operations, central banks adopting a more active role in providing liquidity transformation could be left with less liquid and harder-to-value assets that banks would avoid pledging in private markets. Thus, banks might be encouraged to become complacent in managing their liquidity needs.

These issues imply that structural adjustments to central banks' operations will not be the first choice when addressing the risks associated with any collateral shortages, underscoring the importance of transparency and prudential safeguards as the main lines of defence. An exception may be the approach based on committed liquidity facilities (CLFs) taken by Australia in the context of Basel III liquidity requirements. Given its reliance on up-front fees, it is consistent with the goals of liquidity regulation, while having the potential to serve as a safety valve for situations in which scarcity of HQLA turns out to be more of a problem than currently expected (Stein (2013)).

Conclusion

Ongoing regulatory reforms, such as increased liquidity buffers and strengthened margining requirements in OTC derivatives markets, are designed to enhance the safety and robustness of the financial system. Attaining the full benefits of these policy initiatives, however, will require their cumulative effects on the financial system to be monitored, including the impact on the markets for collateral assets, where current reforms will contribute to a structural shift in demand.

While this additional structural demand will be sizeable, as argued above, there is no evidence of any lasting current or prospective scarcity of collateral assets at the financial system level. Both price and volume indicators suggest that, over time, supplies will adjust to meet expected increases in collateral asset demand. The distribution of collateral assets, however, matters in that supply-demand imbalances and associated price changes will generate powerful incentives for endogenous private sector responses. While these will help mitigate any shortage of collateral assets, they could also turn out to be quite transformational from a financial system perspective.

Private sector responses to rising collateral demand will occur through a variety of channels. These include the pooling and securitisation of assets, changes to collateral eligibility in private transactions, collateral optimisation, and collateral re-use and transformation. While the mechanics of these responses differ considerably, they are all likely to come at the cost of increased interconnectedness, procyclicality and financial system opacity as well as higher operational, funding and rollover

risks. In addition to efforts supporting the creditworthiness of both the public and private sectors (which would increase the supply of collateral assets and reduce demand for them), policy responses should focus primarily on monitoring and stress testing these endogenous market adjustments and on designing measures that lessen any adverse implications for market functioning and financial stability.

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