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Containing System-Wide Liquidity Risks: Some Issues and Challenges*

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Abstract
The financial crisis has demonstrated the importance of strengthening liquidity risk management and supervision. Such strengthening must take account of the system-wide dimension of risks: the likelihood that a number of firms will face a common stress at the same time, and the impact of their response to that stress on other firms and the wider system. Five high-level objectives are presented to guide the future development and design of a framework to contain system-wide liquidity risks.

Keywords: liquidity, regulation, systemic risk.

1. INTRODUCTION

1 Commercial banks' ability to transform short-term deposits into long-term loans provides clear benefits to individual agents and to the economy more broadly. Savers can place funds with banks that are available contractually on

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demand or with a short delay. Depositors can thus draw down their funds quickly in the event of an adverse shock, such as a temporary spell of unemployment, or to finance transactions that may sometimes be 'lumpy' at the level of an individual household, such as a deposit on a house. And borrowers can obtain funding to support the purchase of assets providing economic services over the long term, such as plant and machinery and commercial and residential property.

2 Banks provide such maturity transformation by pooling across agents and taking account of aggregate behaviour. In any one period, only a small proportion of savers will experience an adverse shock or make a major lumpy payment that requires a large withdrawal. Moreover, recipients of such payments are likely to place the proceeds back into the banking system. A bank that has just financed a large payment can bid for the surplus deposits on the interbank market. So, providing savers retain confidence in the bank, deposits with an immediate or short-term contractual maturity are transformed through this pooling process into deposits with a much longer term 'effective' maturity. That enables the bank to offer long-term loans.

3 'Providing savers retain confidence in the bank' is of course the key phrase here. By undertaking maturity transformation, banks are exposed to funding liquidity risk – the risk that a bank cannot generate sufficient cash to meet the obligations placed upon it in any time period. Perceptions that a bank is facing liquidity pressures will lead to a withdrawal of funding and ultimately to a 'run', as time deposits are not rolled over and as customers withdraw demand deposits (particularly if deposit insurance arrangements are weak). An inability to withstand such pressure and restore market confidence will quickly lead to failure of the bank, unless additional support can be obtained either from the private sector (for example, through an injection of funding or a takeover by a stronger bank) or from the central bank (in cases where the problem is demonstrably one of liquidity rather than solvency, and the authorities are concerned that failure of the bank would threaten stability of the system more broadly).

4 The managers and shareholders of a bank will face losses if funding liquidity risk crystallises. That provides an incentive to manage and control liquidity risk. The losses are capped, however, for example for equity holders to the value of their equity in the bank. Such losses thus do not capture the broader impact of severe liquidity distress on the wider financial system. A bank facing acute liquidity pressures may attempt to sell assets at 'fire sale' prices, lowering market liquidity and adding to balance sheet and liquidity pressures on other banks.[1] It is also likely to hoard liquidity, withdrawing funding from the interbank market and

[1] Cifuentes, et al. (2005), Brunnermeier and Pederson (2007).

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shortening the terms of remaining lending. And other banks and financial intermediaries may also hoard liquidity as a defensive response, exacerbating the stress on the system. In addition, a bank that fails is likely to generate counterparty losses for other banks and increase funding pressures on banks operating perceived similar funding models. There is no incentive for the managers and shareholders of a bank to take account of the 'externalities' of their own liquidity distress on other banks and the financial system more broadly. That provides a clear justification for regulation and supervision of liquidity risk, to hold banks to higher standards than they would naturally adopt given their own individual incentives, in support of the public policy goal of protecting financial stability.[2]

5 The current financial crisis has exposed severe failings in risk management by financial firms and flaws in regulatory design. One clear lesson is that insufficient attention was given to the system-wide dimension of risks. In designing prudential regulation to support the resilience and robustness of the financial system as a whole, it is essential to consider both the likelihood that a number of firms will face a common stress at the same time, and the impact of their response to that stress on other firms and the wider system. Such responses may substantially amplify the impact of the individual shock. Moreover, they may negate the value of some defences that would work effectively if a bank were the only one to face a particular adverse shock. It is clearly important that regulatory design delivers resilience to a system-wide shock as well as to a firm-specific one. Indeed, the very marked rise in international financial market integration in recent years,[3] as well as the growing convergence in business models across the global financial system, has increased the relative chances that adverse shocks will have system-wide ramifications.[4]

6 There are many examples of the importance of system-wide interactions and feedback effects for the design of financial market regulation and of market infrastructure.[5] The current crisis has demonstrated vividly the importance of feedbacks within the financial system, and between the financial system and the macroeconomy.[6] For example, attempts by banks individually to rein back lending to limit prospective credit losses may in practice lead collectively to a rise in such losses, as a widespread shortage of credit would deepen the recession.

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[2] Basel Committee on Banking Supervision (2008b), Brunnermeier, et al. (2009).

[3] Hamilton, et al. (2007), Haldane (2009a and b).

[4] Gai, et al. (2007), Haldane (2009b), Gai and Kapadia (2009).

[5] See Renault, et al. (2008) for a payment systems example.

[6] It is vital to take such feedbacks into account in judging risks to the financial system as a whole (Jenkinson (2007), Haldane (2009a and b)). The Bank of England is developing a model to support the assessment and modelling of systemic risk (Aikman, et al. (2009), Alessandri, et al. (2009), Haldane (2009a)).

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Another example is that the design of payment and settlement systems should ensure that system problems in one institution do not spill over to the whole network, and that the systems are as robust as possible to potential single points of failure.[7] I plan, however, in my remarks today to focus especially on the issue of liquidity risk. That is an area where system-wide interactions are particularly important.

7 The next section describes briefly how system-wide liquidity risks rose in advance of the crisis and why some defences to the crystallisation of liquidity risk in individual banks were ineffective in cases of system-wide stress. Section 3 sets out some high-level objectives to bear in mind in considering ways to reduce both the likelihood and impact of events of severe liquidity stress. Section 4 discusses some of the practical challenges and outstanding issues in carrying these ideas forward.

2. LIQUIDITY RISK AND THE CURRENT CRISIS

8 The origins of the crisis have been described well in a number of reports and speeches.[8] I shall keep my summary brief and focus particularly on the liquidity risk dimension.

9 Fuelled by low global real interest rates (associated with high Asian saving rates), a perceived decline in macroeconomic volatility, and rapid advances in information and communication technology that spurred innovation, capital market activity and financial system leverage rose sharply and persistently in the years ahead of the crisis. Market participants sought higher yields by increasing leverage both on and off balance sheet and by investing in higher risk, innovative and complex structured products. Many banks saw opportunities to exploit new wholesale market funding sources to expand activity, in some cases to finance loan origination for eventual sale, in others to fund holdings of highly rated structured assets both on and off balance sheet. Banks' funding liquidity became increasingly dependent on sustained market liquidity.[9] In advance of the crisis, high market confidence supported high market liquidity (see Chart 1).[10] Indeed, Federal Reserve Governor Kevin Warsh argued that in terms of its most fundamental feature: 'Market liquidity is confidence'.[11] But as leverage rose, credit

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[7] Bedford, et al. (2004).

[8] For example, see Bank of England *Financial Stability Reports* 22 (2007), 23 (2008) and 24 (2008), Turner (2009).

[9] Basel Committee on Banking Supervision (2008a).

[10] Kerry (2008).

[11] Warsh (2007a).

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spreads tightened and liquidity risk premia narrowed, the likelihood of a sharp and pronounced correction continued to increase.[12] Indeed, as Claudio Borio has noted, the vulnerability to a change in market liquidity is highest when liquidity itself appears at its most plentiful: 'The illusion of permanent market liquidity, in the strong sense of feeling always able to transact at the prevailing price, is the most insidious threat to liquidity itself.'[13]

10 Once sentiment changes it may change very quickly. To take a sporting analogy: 'Confidence is contagious. So is lack of confidence' (Vince Lombardi).[14] And financial markets are particularly vulnerable to contagious swings in confidence given the importance of the interactions between participants and the influence of others' behaviour.[15] My incentive to sell a financial asset or withdraw funds from a bank increases if I expect that others are about to sell or run from the bank.

11 By the first half of 2007, many financial market participants were expressing concerns that compensation for taking both credit and liquidity risks had been bid down to unsustainably low levels. Equally, while many recognised that financial risks were rising, few were prepared to pull out of the most over-heated markets or take the contrary position. Pressures to match short-term performance led to a reluctance to restrict risk-taking before competitors. Running profits had been a successful strategy over a number of years, notwithstanding warnings of heightened risks in speeches and numerous Financial Stability Reports across the globe. And many market participants thought the business risks of withdrawing actively from certain markets were higher than the increased financial risks they were running.[16]

12 A major mistake made by many was failing to recognise the similarity of their risk position to that of many others, and the vulnerabilities that posed. As concerns about the credit quality of US subprime assets rose, market liquidity evaporated as many participants simultaneously attempted to sell or hedge positions, with few if any investors willing or able to fund a major contrarian position on the other side of the trade given the weight of selling pressure and the marked rise in uncertainty. It very quickly became a similar story in other asset-backed securities markets, as investors attempted to lower risk positions, given increased concerns about the opacity and underlying credit quality of structured products in particular, and as market participants hoarded liquidity to protect

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[12] Bank of England *Financial Stability Report*, April 2007, and King (2007).
[13] Borio (2004).
[14] Legendary coach of the Green Bay Packers.
[15] Bernardo and Welch (2004), Morris and Shin (2004).
[16] Bank of England *Financial Stability Report* (July 2006 and April 2007).

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themselves against a perceived rise in redemption risk. The hoarding of liquidity by stronger market participants compounded pressures on institutions with structurally weak funding positions, such as Northern Rock. Financial market liquidity fell dramatically as confidence was lost (see Chart 2).

13 Defences against a rise in system-wide liquidity pressure were clearly inadequate. Indeed, attempts by banks to use defences designed to address idiosyncratic liquidity problems affecting the bank in isolation severely compounded system-wide stress.[17]

14 Consider the options available to a bank suddenly faced by a liquidity problem – perhaps, for example, because of the revelation of unexpected losses due to a fraud that raises market uncertainty but does not jeopardise solvency. Assume the bank is the only one affected and that other banks have strong funding positions and that financial market liquidity is high. A number of options are open. Examine the following three. First, the bank could sell (or repo) less liquid assets, accepting a loss in income to obtain additional liquidity. Alternatively, the bank could 'pay up' for additional funding, offering higher returns to attract deposits. Third, the bank could scale back lending plans by raising borrowing rates and introducing more stringent lending conditions. Each of the defences would work. The bank would have to pay more and accept a loss in profitability to restore confidence in its liquidity position. And there would be a small adverse effect on other banks and the financial system more broadly. But under the conditions outlined, these would be easily absorbed.

15 A bank focusing on its own liquidity risk in isolation might consequently draw comfort from such defences. But consider now the merits of such defences when other banks are facing similar pressures and attempting to use the same tools. The first option will no longer work, as a sudden, sharp increase in selling pressure is likely to lead to a complete evaporation of market liquidity for less liquid assets. Paying up for additional funding is also likely to be relatively ineffective as many other banks pursue the same strategy and compete actively to retain and indeed increase deposits – any impact from higher aggregate savings is likely to be small and sluggish at the level of the individual bank. And the third option of restricting lending growth may appear attractive to an individual bank, but again will precipitate a defensive response from other banks attempting to strengthen their own liquidity and credit position, and, as noted above, could severely amplify the adverse impact of the initial shock. So, not only is the comfort drawn from such defences false in this case, but an attempt to use them is

[17] Jenkinson (2008).

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likely to have an adverse impact on other banks and the financial system more broadly given the externalities and spillovers they entail.

16 Problems of poor liquidity risk management have been exacerbated by the under-capitalisation of the banking system in advance of the crisis. A fear that counterparties may have insufficient capital and reserves to meet obligations clearly has a major and immediate impact on the availability of funding to such firms. Moreover, lenders in a relatively strong funding position are likely to hoard their own liquidity in conditions of heightened uncertainty, both to contain counterparty risks and to guard against a rise in their own perceived redemption risk. Such behaviour has been very clearly apparent during the current crisis, and was particularly acute following the collapse of Lehman Brothers in September 2008.[18] Provision of additional capital is essential to bolster confidence and maintain financial stability in such circumstances. And there are clear lessons from the crisis that the quantity and quality of capital must be raised in the future to strengthen the resilience of the banking system.[19] A stronger capital position will have some benefits on liquidity risk given the clear inter-relationships between the two.[20] As Charles Goodhart has remarked: 'An illiquid bank (system) would not remain solvent for long, nor an insolvent bank (system) remain liquid.'[21] But equally, measures to strengthen the capital position alone are unlikely to correct for market failures leading to excess system-wide liquidity risk. The recent crisis has clearly highlighted the need to strengthen defences against liquidity risk as well as to bolster future capital levels.

3. REDUCING THE LIKELIHOOD AND IMPACT OF SEVERE LIQUIDITY STRESS – SOME GUIDING OBJECTIVES.

17 Reducing the likelihood and impact of future episodes of system-wide liquidity risk is high on the policy agenda.[22] Given the numerous shortcomings revealed by the recent crisis, the Basel Committee has revised and strengthened its high-level 'Sound Principles' that provide guidance on the management and supervision of liquidity risk,[23] and is taking further action to improve the consistency and robustness of liquidity risk standards for international banks. CEBS is undertaking parallel work within Europe. Domestically, the FSA is consulting on

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18 Bank of England *Financial Stability Report* (October 2008), Heider, et al. (2009).
19 G20 (2009).
20 Basel Committee on Banking Supervision (2008b).
21 Cited with permission of Professor Goodhart.
22 G20 (2009).
23 Basel Committee on Banking Supervision (2008b).

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improvements to the UK regime for the management and supervision of liquidity risk in line with the Basel Sound Principles.[24]

18 These initiatives are all very welcome and should help strengthen substantially the management and supervision of liquidity risk by individual firms, taking more explicit account of system-wide interactions. Strengthening the robustness of the individual institutions is an important precondition to contain incentives for banks collectively to take excess system-wide liquidity risk. As recent academic work has highlighted, however, there are some difficult and challenging issues governing the design of future financial regulation to take full account of such system-wide risks.[25] Further research and analysis should over time yield additional insights that may help promote further improvements to policy design and implementation over and above those currently in hand. To support that process in relation to liquidity risk, the BCBS and CGFS are setting up a joint research programme on the measurement of systemic funding liquidity risk, as recommended by the Financial Stability Forum.[26]

19 As re-emphasised recently in the Turner Report,[27] the design of regulation must balance both costs and benefits. While it is clear that standards of financial regulation must be toughened to lower the probability and impact of future financial crises, it is also important to bear in mind the impact of regulation on financial intermediation and the wider economy in drawing the appropriate balance. In relation to the design of liquidity regulation, the high-level objective is to reduce the frequency and severity of system-wide liquidity crises, while recognising, as highlighted in the introduction, the economy-wide benefits of maturity transformation and of banks taking sustainable liquidity risks. Gauging the appropriate level of intervention to balance the costs and benefits of financial regulation is a formidable challenge for policy makers, as the Turner Report highlights, and is an important area for further research.

20 Set against this broad background, there are a number of high-level objectives that in my view should influence the future development and design of a framework for liquidity regulation as research and analysis continues. These are set out below. The following section provides a preliminary assessment of some of the issues and challenges in meeting the objectives.

21 Five high-level objectives are proposed below:

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[24] FSA (2008).
[25] For example, see Brunnermeier, et al. (2009) and Perotti and Suarez (2009).
[26] FSF (2009).
[27] Turner (2009).

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Objective 1: Liquidity regulation should encourage prudent liquidity risk management by individual banks. Defences should be robust to both the crystallisation of firm-specific and market-wide stress.

Objective 2: Liquidity regulation should provide a disincentive for banks to increase liquidity risk. The disincentive should take into account the impact of liquidity risk distress at the bank on the overall financial system.

Objective 3: Liquidity regulation should guard against the crystallisation of system-wide liquidity risk. Disincentives to contain liquidity risk should increase as system-wide liquidity risk rises.

Objective 4: Regulatory standards should be applied consistently internationally, to prevent regulatory arbitrage and leakage.

Objective 5: The design and operation of central bank facilities should underpin incentives for banks to manage liquidity risk prudently, in the long-run interests not only of the banking system but of the wider economy.

4. ISSUES AND CHALLENGES IN MEETING THESE OBJECTIVES

22 The objectives set out above are designed to fit together as a package. That should be borne in mind as a number of the issues and challenges in fulfilling these high-level guidelines are highlighted in turn below.

Objective 1: Liquidity regulation should encourage prudent liquidity risk management by individual banks. Defences should be robust to both the crystallisation of firm-specific and market-wide stress.

23 As emphasised in the revised Basel Sound Principles,[28] a bank is responsible for the sound management of liquidity risk. The bank should establish a robust liquidity risk management framework that ensures it maintains sufficient liquidity, including a cushion of unencumbered, high quality liquid assets, to withstand a range of stress events, including the loss or impairment of both unsecured and secured funding sources. To support confidence in the strength of liquidity risk management, it is vital that banks build up defences that are useable to meet potential liquidity demands under conditions of severe market stress. To contain system-wide spillovers and risks, prudent liquidity risk management by individual

[28] Basel Committee on Banking Supervision (2008b).

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banks must ensure that use of the defences does not have a major adverse impact on the rest of the financial system.

24 Objective 1 consequently supports banks holding increased stocks of the highest quality safe liquid assets, such as cash and high quality government bonds, as proposed in the revised Basel Sound Principles document and the recent FSA Consultation Paper. These assets can typically be utilised to raise liquidity in private markets even under conditions of market strain, without prompting large haircuts or fire-sale discounts that add to stress on other banks and the financial system.

25 As I noted in a speech a year ago,[29] banks were poorly placed to use such defences in the current crisis, as many had economised on holdings of the highest quality assets in their internal treasury operations (see Charts 3 and 4), based on the erroneous assumption that higher-yielding, riskier assets would remain liquid. Rebuilding these defences is an important component of the strengthening of liquidity risk management in the medium term.

26 There are, however, a number of open and difficult questions in gauging the optimal size of defences to liquidity stress. As highlighted above, analysis and research on these questions must take into account the strategic interactions within financial markets that govern behavioural responses to liquidity stress: the incentive to run (or sell assets) rises, the greater the perception that other participants will run or sell. Higher reserves of liquidity will thus strengthen confidence; the higher the level of confidence, the less the likelihood that the reserves will be used. Given the aim of sustaining confidence, as Paul Tucker recently noted,[30] a time series showing low use of a liquidity reserve does not provide compelling evidence that a standard was too strict.

Objective 2: Liquidity regulation should provide a disincentive for banks to increase liquidity risk. The disincentive should take into account the impact of liquidity risk distress at the bank on the overall financial system.

27 The regulatory disincentive should encourage banks to seek longer maturity, more stable, funding sources and to improve the liquidity of their overall balance sheet. For example, the disincentive should rise in line with estimates of maturity mismatch the bank is running. Further analysis of the potential role of metrics such as the core funding ratio (the proportion of a bank's funding from more

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[29] Jenkinson (2008).
[30] Tucker (2009).

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stable, longer-term sources)[31] and net cash capital would be useful in this context.[32]

28 As emphasised in the introduction, the case for regulatory intervention to support the public policy goal of protecting system-wide stability rests on the market failure that banks have no natural incentive to take account of the adverse impact of their own distress on the financial system more broadly. Extending this argument, the regulatory disincentive should consequently take account of the system-wide impact of a firm's distress. As noted in the recent Geneva Report and in two recent speeches by Andrew Haldane, prudential regulation should thus be calibrated to such system-wide externalities.[33] To illustrate this argument, standards of resilience should be tougher for a large bank that plays a very active role in interbank markets and as a key market maker in capital markets, than for a small bank with few interconnections to the rest of the financial system. Liquidity stress will have a much more pronounced impact on the overall system in the former case.

29 Developing a formal approach to implement this objective remains an important challenge for researchers and policy makers. In particular, research to develop robust indicators of the importance of individual institutions in financial networks and of system-wide spillovers in distress remains in its infancy. There are some promising ideas, such as the so-called CoVar (or more generally co-risk) approach developed by Brunnermeier and Adrian that delivers estimates of the correlation of tail risks.[34] And research within the Bank of England is attempting to model liquidity spillovers.[35] But considering how best to redesign prudential regulation to capture system-wide externalities more effectively warrants much further analysis and research.

Objective 3: Liquidity regulation should guard against the crystallisation of system-wide liquidity risk. Disincentives to contain liquidity risk should increase as system-wide liquidity risk rises.

30 System-wide liquidity risk has both cross-section and time-series dimensions. The discussion of objective 2 above highlights the importance of taking into account the role played by each bank in the financial system, and of imposing more stringent standards on institutions that pose the greatest threat to the stability

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[31] See Turner (2009).

[32] Net Cash Capital is generally defined as Long-Term Funding *minus* Illiquid Assets *minus* Illiquid Portion of Securities.

[33] Brunnermeier, et al. (2009) and Haldane (2009a and b).

[34] See Brunnermeier and Adrian (2008).

[35] Aikman, et al. (2009).

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of the financial system if they come under pressure. There is, however, also an important time-series aspect to add to this cross-section story. For example, system-wide liquidity risk is more likely to crystallise at times when maturity mismatch across the system as a whole is high than when it is low. That suggests that there is merit in trying to develop reliable indicators of system-wide liquidity risks that could be used to support macro-prudential objectives. Under this approach, incipient signs of an excessive build-up of system-wide liquidity risk would lead to a strengthening of disincentives to take liquidity risk.

31 Academic economists have highlighted that system-wide liquidity risk depends on the interactions and interconnections between banks. For example, Hellwig provides an example of a funding chain along the following lines: bank 1 takes deposits at sight and lends them for one week to bank 2; which then, in turn, lends the one-week deposit for two weeks to bank 3; which on-lends the two-week funds for three weeks to bank 4 and so on…[36] Maturity mismatch by each bank is limited to one week. But system-wide maturity mismatch for a chain of n banks extends to n weeks – an attempt by the initial depositors to demand full repayment of their sight deposits would ripple through the system and, absent any liquidity reserves, would ultimately depend on the liquidity of the n week maturity assets owned by the nth bank.

32 This stylised example illustrates the inherent difficulties of developing regulatory approaches to guard against *system-wide* liquidity risks, based purely on measures of maturity mismatch by *individual* banks. That said, signs that a large number of banks were extending their individual maturity mismatches would provide an important amber light.

33 Another approach that might yield dividends would be to develop supplementary indicators that could act as proxies for system-wide liquidity risk. Such proxies could in principle provide valuable macro-prudential signals that could guide supervisory standards and help to dampen the financial cycle.

34 More research and analysis is needed to develop and review such indicators. Some candidates are beginning to emerge. For example, Drehmann and Nikolaou have developed an interesting measure of system-wide funding risk based on the bidding pressure for central bank funds.[37] Nonetheless, one problem with this indicator for the task above is that the measure is a highly contemporaneous indicator of system-wide liquidity pressures at a particular point in time, whereas

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[36] Brunnermeier, et al. (2009).
[37] Drehmann and Nikolaou (2009).

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the prudential requirement is for an indicator containing strong leading indicator properties.

35 One indicator that might have some value in this regard is a measure of aggregate leverage (see Chart 5). High leverage may provide an advance indication of the potential for a large drain in financial market liquidity, should market sentiment change and banks and other market participants seek to de-lever at the same time. The Basel Committee is currently examining the case for introducing a supplementary measure such as a leverage ratio to bolster the capital framework. A possible by-product of the introduction of such a measure is that it might also restrain system-wide liquidity risk, although more research and analysis is needed to review the robustness of this link.

36 A further option could be to try to derive a measure of system-wide maturity mismatch that strips out the impact of the interbank market (the internal part of the 'Hellwig chain' outlined above) by focusing on transactions with non-banks. A good measure of the aggregate maturity breakdown of banking system assets and liabilities with non-banks could provide such a guide. There is currently no such indicator readily to hand for the UK: deriving one from the major banks' balance sheets may yield interesting insights.

37 Another possibility worth exploring further is a market-based estimate of the compensation for liquidity risk, for example, derived from a decomposition of corporate bond spreads (see Chart 6).[38] While bearing in mind that structural factors such as market transparency and corporate governance will affect the long-run sustainable compensation for liquidity risk, an indication that such compensation was falling well below historical norms may provide a useful warning sign of a build-up of market liquidity risk (see Chart 7).[39] That, in turn, could threaten the stability of banking system funding given the strong links between market and funding liquidity.

Objective 4: Regulatory standards should be applied consistently internationally, to prevent regulatory arbitrage and leakage.

38 The three objectives spelt out above are designed to strengthen system-wide resilience to liquidity risk by improving risk management by individual banks, taking into account the system-wide spillovers and externalities from liquidity stress

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[38] Webber and Churm (2007).

[39] This chart combines the illiquidity premia (proxied by the residual from the corporate bond spread decomposition) from four markets (US investment grade and high yield, UK investment grade and high yield) according to their size.

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and that such system-wide risks may alter over the economic cycle. They are silent, however, on international issues. These raise additional important challenges.

39 To date, standards and regulations for containing liquidity risk have been developed and applied at the national level. Although unsurprisingly there is much commonality of the high-level approach, in line with successive Sound Principles guides prepared by the Basel Committee (1992, 2000 and 2008),[40] there is also considerable diversity of detail.[41] In part, the diversity may be explained by differences in structural features of national economies and financial systems that influence liquidity risks, such as deposit insurance arrangements and insolvency and bank resolution regimes. For example, a jurisdiction with relatively weak deposit insurance arrangements may ask banks to hold stronger liquidity reserves to provide similar protection against a retail deposit run-off to a jurisdiction with strong deposit insurance. Likewise, a jurisdiction with weak banking resolution arrangements may require banks to hold higher reserves because the costs of banking failure are higher than in a jurisdiction with a stronger regime. That needs to be factored in when assessing the consistency of national approaches to liquidity risk supervision. But also in part, the diversity simply reflects the fact that regimes have been developed nationally over a long period.

40 The international financial authorities are working together closely in the Basel Committee and CEBS to improve both the robustness and the international consistency of liquidity risk regulation and supervision. The recent G20 Communiqué[42] committed the BCBS and national authorities to:

> 'Develop and agree by 2010 a global framework for promoting stronger liquidity buffers at financial institutions, including cross-border institutions.'

Given the scope for arbitrage and leakage that could undermine the effectiveness of regulation, it is very important that standards are applied consistently internationally.

Objective 5: The design and operation of central bank facilities should underpin incentives for banks to manage liquidity risk prudently, in the long-run interests not only of the banking system but of the wider economy.

41 As no liquidity buffer can be proof against all circumstances, central banks provide liquidity insurance to the financial system to help contain the costs to the

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[40] Basel Committee on Banking Supervision (1992, 2000 and 2008b).
[41] Basel Committee on Banking Supervision (2008a).
[42] G20 (2009).

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wider economy of a crystallisation of the liquidity risks to which banks are exposed. The availability of insurance, however, may encourage moral hazard – banks may take excessive risks in the knowledge that such insurance is available.[43] As noted in the consultative paper on the Bank's market operations last year,[44] banks may temporarily make higher profits by running higher liquidity risks, but the potential costs to the wider economy of liquidity risk crystallising would increase.

42 The design and operation of central bank facilities should consequently support incentives for the prudent management of liquidity risk. They should be time consistent so that banks can plan on the assumption that they will not be altered materially in the event that severe stress crystallises. But it is important to note that such incentives cannot provide a substitute for effective prudential regulation to correct for the misalignment between the costs of liquidity risks facing an individual bank and the broader costs to the financial system from such risks materialising discussed in detail above.

43 Absent any regulatory disincentive, a bank would be encouraged to take on excess liquidity risk and turn to the central bank should the risk crystallise. In these circumstances, the maximum cost to the equity holders of the bank would be the loss of their equity from failure. Society, through the central bank, would still be faced with the challenge of meeting the additional spillover costs from the bank's inadequate liquidity risk management on the overall financial system. As this example shows, the incentives for banks to run excessive liquidity risks from a system-wide perspective must be addressed through regulatory constraints on behaviour *ex ante*, as they cannot be offset by penalties and haircuts on central bank lending *ex post*.

5. CONCLUDING COMMENTS

44 I have set out above some high-level objectives that may help guide future research and analysis on the development of a framework to strengthen the regulation of system-wide liquidity risks. That must balance the containment of system-wide liquidity risks, to lower the likelihood and impact of severe financial system stress, against the benefits the financial system provides through maturity transformation and the taking of liquidity risk. Good progress has been made in some areas, such as developing strong standards for liquidity risk management at individual banks that take account of system-wide stress. In other areas, such as

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[43] Committee on the Global Financial System (2008).
[44] Bank of England (2008).

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calibrating the potential contribution of individual banks to potential system-wide liquidity strain and reviewing how best to address spillovers and externalities from both a micro-prudential and macro-prudential perspective, research is just beginning.[45] Developing these approaches is an important objective for the design of prudential regulation in the medium term.

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[45] See, for example, Perotti and Suarez (2009) and Brunnermeier, et al. (2009).

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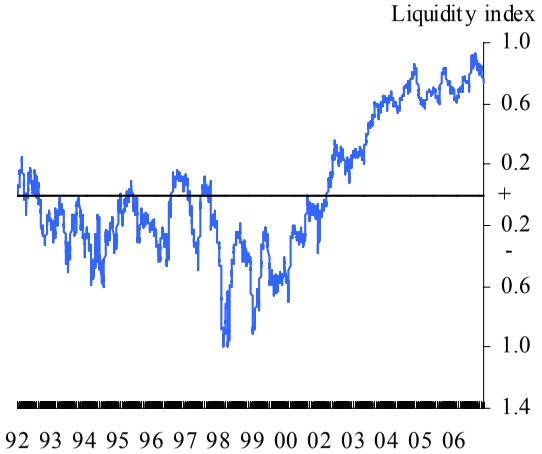
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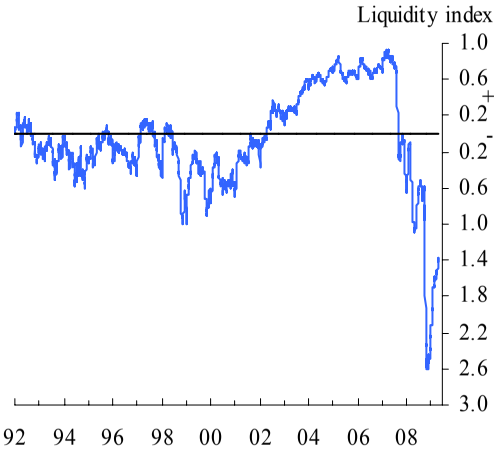
Chart 1: Financial market liquidity (a)



Sources: Bank of England, Bloomberg, Chicago Board Options Exchange, Debt Management Office, London Stock Exchange, Merrill Lynch, Thomson Datastream and Bank calculations.

(a) The liquidity index shows the number of standard deviations from the mean. It is a simple unweighted average of nine liquidity measures, normalised on the period 1999-2004. The series shown is an exponentially weighted moving average. The indicator is more reliable after 1997 as it is based on a greater number of underlying measures.

Chart 2: Financial market liquidity (a)

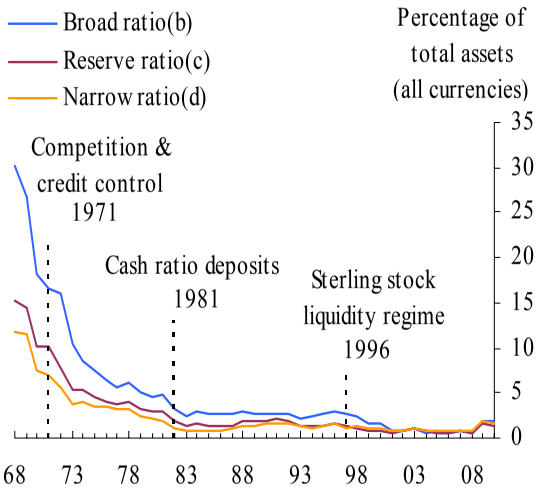


Sources: Bank of England, Bloomberg, Chicago Board Options Exchange, Debt Management Office, London Stock Exchange, Merrill Lynch, Thomson Datastream and Bank calculations.

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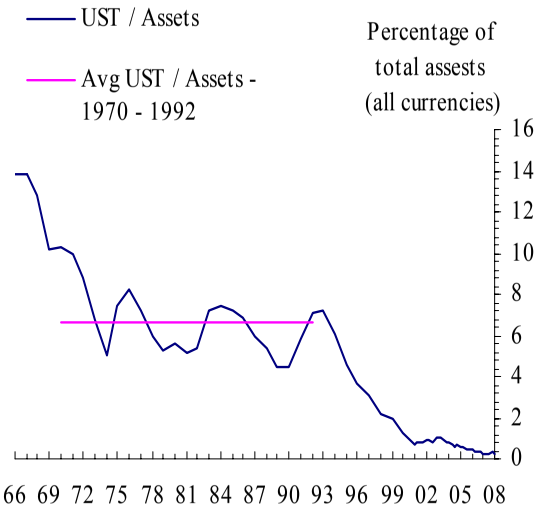
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Chart 3: Sterling liquid assets relative to total asset holdings of UK banking sector(a)



Source: Bank calculations.
(a) 2009 data are as of end March 2009.
(b) Cash + Bank of England balances + money at call + eligible bills + UK gilts.
(c) Proxied by: Bank of England balances + money at call + eligible bills.
(d) Cash + Bank of England balances + eligible bills.

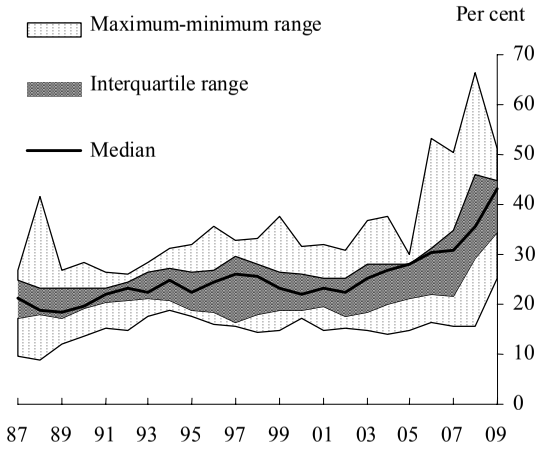
Chart 4: US banks holdings of Treasury Bonds



Source: FDIC Statistics on Depository Institutions.

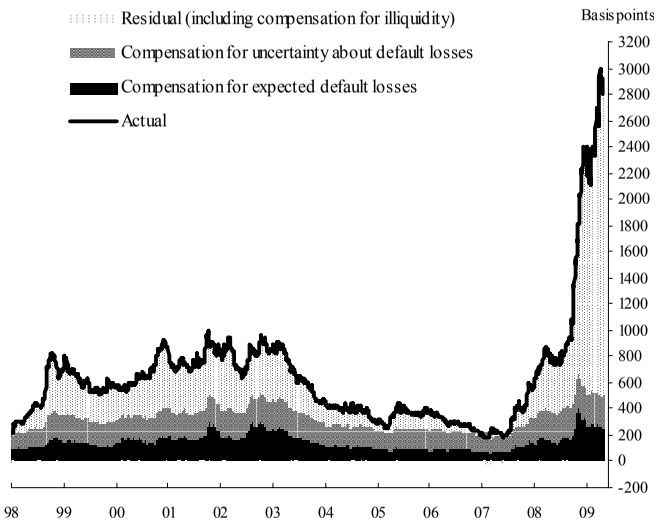
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Chart 5: UK banks' leverage ratio (a)(b)



Source: Thomson Datastream, published accounts and Bank calculations.
(a) Gross leverage measured by total assets divided by shareholders equity minus minority interests.
(b) Due to the mergers and acquisitions of banks, the chart includes data for the bank peer group as used in 'A new peer group to analyse large UK-owned banks resilience over time', Financial Stability Review, Box 7, December 2004, page 68.

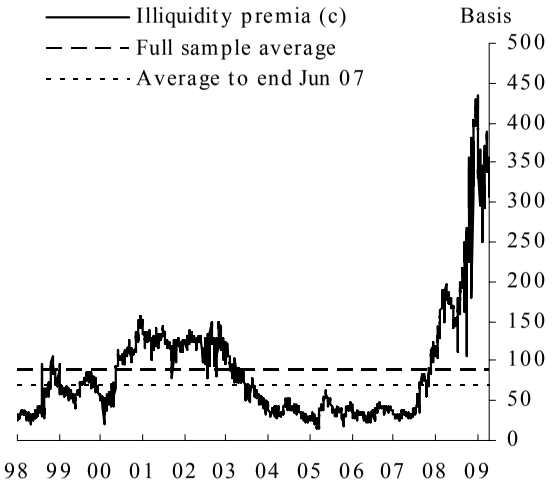
Chart 6: Decomposition of sterling-denominated high-yield corporate bond spreads



Sources: Bloomberg, Merrill Lynch, Thomsom Datastream and Bank Calculations.
(a) Webber, L and Churm, R (2007), 'Decomposing corporate bond spreads', Bank of England Quarterly Bulletin, Vol. 47, No. 4, pages 533-41.
(b) Option-adjusted spreads over government bond yields.

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Chart 7: Illiquidity premia in sterling and US dollar-denominated corporate bond spreads(a)(b)



Sources: Bloomberg, Merrill Lynch, Thomsom Datastream and Bank Calculations.
(a) Webber, L and Churm, R (2007), 'Decomposing corporate bond spreads', Bank of England Quarterly Bulletin, Vol. 47, No. 4, pages 533-41.
(b) Option-adjusted spreads over government bond yields.
(c) Average of sterling and dollar IG/HY illiquidity premia, weighted by market value of bonds outstanding.