

December 2011

Instruments of macroprudential policy

A Discussion Paper



BANK OF ENGLAND





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Prepared by Bank of England and Financial Services Authority staff

The FPC would welcome comments on this paper. Comments should be sent by 10 February 2012 to:

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Background information on the FPC

In June 2010, the Chancellor of the Exchequer set out a plan for fundamental changes to the system of UK financial regulation. In July 2010 and February 2011, the Government published consultation documents on the proposed changes, and in June 2011 published a White Paper⁽¹⁾ outlining further steps towards the legislative enactment of the Government's proposed regulatory framework. The proposed reforms include the establishment of a Financial Policy Committee (FPC) charged with identifying, monitoring and taking action to remove or reduce systemic risks with a view to protecting and enhancing the resilience of the UK financial system.

In February 2011, the Bank of England's Court of Directors created an interim FPC to undertake, as far as possible, the future statutory FPC's macroprudential role. It also carries out preparatory work and analysis in advance of the creation of the permanent FPC.

The interim Financial Policy Committee:

Mervyn King, Governor

Paul Tucker, Deputy Governor responsible for financial stability

Charles Bean, Deputy Governor responsible for monetary stability

Hector Sants, Deputy Governor Designate responsible for prudential regulation and
CEO of the Financial Services Authority

Adair Turner, Chairman of the Financial Services Authority

Alastair Clark

Michael Cohrs

Paul Fisher

Andrew Haldane

Robert Jenkins

Donald Kohn

Tom Scholar and Jonathan Taylor have each attended FPC meetings as the Treasury member of the Committee.

Martin Wheatley, Managing Director of the Financial Services Authority's Consumer and Markets Business Unit and CEO Designate of the Financial Conduct Authority, also attends the FPC meetings as an observer.

(1) HMT (2011b).

Foreword by the Governor

The creation of the Financial Policy Committee (FPC) is a central element of the Government's proposed changes to the system of UK financial regulation. A significant contributory factor to the present financial crisis was the absence of an authority charged with taking actions to mitigate the build-up of risks which could threaten the system as a whole. The FPC will fill that void.

The Committee's ability to take actions to mitigate systemic risks will hinge on the powers granted to it by Parliament. Without the right instruments at its disposal, the Committee will not be able to take prompt, effective action to tackle emerging risks. To help inform this difficult judgement, the Government, through HM Treasury, requested that the interim FPC make recommendations on the set of statutory macroprudential instruments that the permanent FPC should have at its disposal. The interim Committee's formal advice to the Treasury is not due to be published until after the interim Committee's March meeting — and this paper does not contain the Committee's advice. Instead, this paper, which has been produced by staff at the Bank of England and the Financial Services Authority under the guidance of the interim FPC, is intended as a contribution to the debate on appropriate macroprudential tools. As set out in the executive summary and elsewhere, the Committee is actively looking to solicit feedback on the analysis contained in the paper.

The FPC has an important job to do. But for it to be a successful body, with the legitimacy to take actions to head off risks to our financial system, it is critical that it engages with interested parties on how macroprudential policy should be formulated and put into effect. This discussion paper is an important part of that process. I look forward to receiving your responses.

A handwritten signature in black ink, appearing to read 'M. Carney', is positioned above the date. The signature is fluid and cursive.

December 2011

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Instruments of macroprudential policy

A discussion paper prepared by Bank of England and Financial Services Authority staff.

Executive summary

A growing international consensus is emerging on the need to re-orientate regulatory frameworks to place stronger emphasis on mitigating risks in the financial system as a whole. In June 2011, the Government announced the details of its plans to reform the UK regulatory framework along these lines.⁽¹⁾ A key plank of these proposals is the establishment of a new committee at the Bank of England — the Financial Policy Committee (FPC). The FPC will be tasked with monitoring the stability and resilience of the UK financial system and using its powers to tackle those risks.

The FPC will have two main powers. The first is a power to make 'comply or explain' recommendations to the new microprudential regulatory authorities, the Prudential Regulation Authority and the Financial Conduct Authority. The second is a power to *direct* the microprudential authorities to adjust specific macroprudential tools that HM Treasury will set out in secondary legislation. Direction powers are necessary because macroprudential objectives are distinct from microprudential ones. Directions could also be valuable when action is required urgently.

HM Treasury has requested that the interim FPC share its analysis and advice on possible Directive macroprudential instruments for public scrutiny and debate. This paper, which has been produced by staff at the Bank of England and the Financial Services Authority under the guidance of the interim FPC, is intended as a contribution to the debate on appropriate macroprudential tools.

As outlined in the Record of its September meeting, the Committee has found it useful to partition the set of instruments under consideration into three categories: those that affect the balance sheets of financial institutions; those that affect the terms and conditions of financial transactions; and those that influence market structures.⁽²⁾

Balance sheet tools include maximum leverage ratios, countercyclical capital and liquidity buffers, time-varying

provisioning practices, and distribution restrictions. These tools influence the level of leverage and maturity mismatch in the financial system. Sectoral capital requirements or 'variable risk weights' could have a role in targeting emerging risks in particular exposure classes. At certain points in the cycle, it may be useful to apply different risk weights to new and old loans to influence the flow of new lending relative to its stock.

Tools that influence the terms and conditions of loans and other financial transactions include the ability to restrict the quantity of lending at high loan to value, or high loan to income ratios, and the power to impose and vary minimum margining requirements or haircuts on secured financing and derivative transactions.

Market structure tools include obligations to conduct financial trading on organised trading platforms and/or to clear trades through central counterparties. Targeted disclosure requirements could be used to enhance resilience by limiting uncertainty about specific exposures or interconnections. Adjusting risk weights on intra-financial system activities could also play a role in limiting excessive exposures building up between financial institutions.

The draft Financial Services Bill requires that FPC Directions be focused on system-wide, rather than firm-specific, characteristics. Directions must also be confined to areas where the United Kingdom has sufficient national discretion; the key hurdle here being that UK regulatory powers in some areas may be constrained by current and forthcoming EU legislation. In its earlier February 2011 consultation paper, HM Treasury outlined an additional criterion: that tools or instruments be specific, rather than broad or open-ended, so that powers of Direction only apply to measures that are defined precisely.⁽³⁾

The interim FPC has identified a range of additional characteristics that it will have in mind in assessing the relative merits of different instruments for inclusion in the permanent

(1) HMT (2011b).
 (2) Bank of England (2011b).
 (3) HMT (2011a).

FPC's Directive toolkit. The first is the effectiveness of a tool in mitigating systemic risk. This encompasses both the speed and durability of the effect of the tool and its robustness to regulatory arbitrage and international leakages. Consideration will also need to be given to ensuring the set of tools covers the range of likely systemic risks at all points in the credit cycle.

The second is the efficiency with which a tool achieves a given reduction in systemic risk. The FPC's proposed mandate does not authorise it to take actions that may have a significant adverse effect on the capacity of the financial sector to contribute to medium to long-term economic growth. And other things being equal, tools should not put an excessive administrative burden on banks and regulators.

The third is transparency about the nature and use of the macroprudential tool. Measures whose exercise is seen as arbitrary or difficult to understand are unlikely to be the most effective components of the macroprudential toolkit.

The fourth is the tool's coverage and independence. The set of tools should be sufficiently broad to offer the prospect of tackling the main sources of systemic risk. But degrees of overlap between different tools for targeting similar risks should be taken into account when deciding between them.

The Committee is minded initially to recommend a relatively narrow set of Directive tools. But, given that innovation and change within the financial system will give rise to new risks, it is highly likely that the set of tools will need to be refreshed from time to time. The procedure for introducing new powers of Direction needs, in the Committee's view, to be both clear and expeditious. Equally important in this regard is the FPC's responsibility to monitor the perimeter of regulation and make recommendations to HM Treasury on changes which may be necessary to safeguard systemic stability.

This staff Discussion Paper does not reach conclusions on the macroprudential toolkit. Rather, its aim is to solicit feedback on this interim analysis. Over the coming months, the interim FPC will undertake further analysis of potential tools, taking into account the comments it receives on this paper. The Committee plans to use its March meeting to reach a judgement on the permanent FPC's initial toolkit, and following that, it will report to the Treasury with its recommendations. For tools that are enshrined in secondary legislation, it will, where appropriate, subsequently issue policy statements setting out the circumstances in which each might be used.

The Committee would welcome comments on this paper. It would particularly value feedback on:

- Whether there are any additional tools that it should be considering.
- Whether it focused on the right instruments in its preliminary discussions at its September 2011 meeting.
- Whether the criteria that are set out to assess the merits of different tools are sensible and sufficient.

Comments should be sent by 10 February 2012 to:

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1 Introduction

The severity of the financial crisis and the economic contraction that has followed has raised fundamental questions about the role of the financial system. A growing consensus is emerging that one necessary dimension of the reform agenda is to re-orientate regulatory frameworks to place stronger emphasis on mitigating instability in the financial system as a whole.⁽¹⁾ One of the regulatory failures leading up to the current crisis, for example, was the lack of a clear mandate and powers for any UK authority to tackle systemic risk — risks across the system as a whole beyond those that arise when considering individual institutions in isolation.

In June 2011, the Government published its detailed plans, and draft legislation, for reforming the UK system of financial regulation to plug these gaps.⁽²⁾ A key plank of these proposals is the establishment of a new committee at the Bank of England — the Financial Policy Committee (FPC). The mandate envisaged for the FPC will be to:

'remove or reduce systemic risks with a view to protecting and enhancing the resilience of the UK financial system' where systemic risks are defined to include both those 'attributable to structural features of financial markets or to the distribution of risk within the financial sector' and those associated with 'unsustainable levels of leverage, debt or credit growth'.

In this role, the FPC will be tasked with monitoring the stability and resilience of the UK financial system as a whole and using powers at its disposal to tackle those risks. This staff Discussion Paper sets out an initial analysis of potential macroprudential tools or instruments that could be made available to the FPC. It is issued for public comment and solicits feedback from interested parties.

The FPC's general powers will include the authority to issue public pronouncements and warnings; the authority to influence macroprudential policy in Europe and internationally; and a broad authority to make recommendations to bodies other than the Prudential Regulation Authority (PRA) and the Financial Conduct Authority (FCA).

The FPC will have two main powers with respect to the PRA and FCA:

- The first is a power to make Recommendations to the PRA or the FCA, supported if necessary by a requirement for them to comply-or-explain (ie to comply with the recommendation as soon as practicable or explain in writing and in public to the FPC why they have not done so);
- The second is a power to Direct the PRA or the FCA to adjust specific macroprudential tools or instruments. Directions

must be complied with as soon as is reasonably practicable. The FPC will only be able to give Directions in respect of macroprudential tools that HM Treasury has set out in secondary legislation. Under the provisions of the draft Financial Services Bill, the FPC may be required to issue policy statements setting out how it plans to employ such tools and the circumstances in which they might be used.

There are likely to be situations in which FPC Recommendations will be the most suitable course of action — this will allow for greater public discussion and weighing of costs and benefits before implementing specific policy changes. But the power to Direct the PRA or FCA to make policy changes is a necessary complement to Recommendation powers. This is for two reasons. First, macroprudential objectives are distinct from microprudential ones — the overriding goal is the stability of the system and so the stable provision of financial intermediation services rather than the health of individual firms. Second, Directions could be particularly valuable in circumstances in which action is required urgently. The rest of this paper focuses on the FPC's potential powers of Direction.

The draft Financial Services Bill requires that FPC Directions be focused on system-wide, rather than firm-specific, characteristics. This is to distinguish the roles of micro and macroprudential regulation and prevent the FPC from being able to overrule the PRA or FCA's supervisory judgements on individual firms. Directions must also be confined to areas where the United Kingdom has sufficient national discretion. In its earlier February 2011 consultation paper, HM Treasury outlined an additional criterion: tools or instruments should be specific, rather than broad or open-ended, so that powers of Direction only apply to measures that are defined precisely.⁽³⁾

The key hurdle arising with the national discretion criterion is that the PRA and FCA's powers may be constrained by European Union law. In particular, the draft Capital Requirements Regulation (CRR) — which together with the Capital Requirements Directive (CRD) will implement Basel III in European Union law — is a so-called 'maximum harmonising' regulation.⁽⁴⁾ So too are the new European Market Infrastructure Regulation (EMIR) and the forthcoming Markets in Financial Instruments Regulation (MiFIR). These set out risk management standards for central counterparties (CCPs) and users of derivative markets, and stipulate products that must be cleared via CCPs or traded on exchange.

(1) See Bank of England (2009), FSA (2009a), Shirakawa (2009), Blanchard *et al* (2010), Goodhart (2010), Group of Thirty (2010), Borio (2011), Clark and Large (2011), Dombret (2011), Eichengreen *et al* (2011), FSB/IMF/BIS (2011), Hanson *et al* (2011), IMF (2011a) and Tucker (2011). Galati and Moessner (2011) review the academic contribution to this literature.

(2) See HM Treasury (2011b).

(3) HM Treasury (2011a).

(4) See European Commission (2011).

Maximum harmonisation of regulatory standards restricts the discretion for national authorities to tighten regulatory levers to guard against systemic risk. The main rationale for establishing common *minimum* standards is to avoid a 'race to the bottom' in international regulatory rules. The rationale for maximum standards is not clear from a prudential perspective. Indeed, the reason for allowing countries to set capital requirements above the common minimum is to allow them to prevent systemic risk.⁽¹⁾

At its September 2011 meeting, the Committee judged that the maximum harmonisation approach risked fundamentally impeding its ability to meet its proposed statutory objective. For this reason, it urged HM Treasury to continue its efforts to alter the course of European legislation in this area.⁽²⁾ Given uncertainty over the final shape of this legislation, the rest of this paper does not take account of these potential legal constraints.

In some cases, the FPC's actions may affect financial conditions in other jurisdictions. These effects will need to be considered by the FPC when using its Directive powers as, under European Union law, financial regulators are obliged to take account of the potential implications of their actions for European-wide financial stability. The European Systemic Risk Board (ESRB) will also have a role to play in co-ordinating macroprudential policy across the European Union.

HM Treasury has requested that the interim FPC share its analysis and advice on macroprudential instruments. The FPC's work mirrors a wider discussion in the international community over the development of macroprudential tools and frameworks — Box 1 summarises these discussions.

Noting its broad powers of Recommendation, the Committee was minded in its September discussion to recommend initially a relatively narrow set of Directive tools, which are well understood, to facilitate communication and enhance accountability.⁽³⁾ But given that innovation and change within the financial system will give rise in due course to new risks, it is highly likely that the set of tools will need to be refreshed from time to time. The Committee felt that the procedure for

introducing new powers of Direction needed to be both clear and expeditious. Equally important in this regard is the FPC's responsibility to monitor the perimeter of regulation and make Recommendations to HM Treasury on changes that may be necessary to safeguard systemic stability.

This staff Discussion Paper sets out a range of potential instruments for tackling systemic risk, alongside a preliminary analysis of their usefulness and some key characteristics which might be helpful in choosing between them. It does not recommend a specific set of tools; the interim FPC expects to do this after its meeting in March 2012. It also does not consider how tools could be co-ordinated with microprudential policy and the extent to which they complement monetary policy.

The aim of the paper is to solicit feedback on the Committee's interim analysis. In particular, the Committee would welcome views on the following questions:

- Are there any additional tools that the Committee should be considering?
- Has the Committee focused on the right instruments in its preliminary discussions at its September 2011 meeting?
- Are the criteria that are set out to assess the merits of different tools sensible and sufficient?

The paper is organised as follows. Section 2 sets out an analysis of the sources of systemic risk; a related annex (Annex 1) outlines some potential indicators of systemic risk that may be helpful for risk assessment and monitoring purposes. In the core of the paper, Section 3 links these sources of systemic risk to a framework of policy instruments, and presents the set of macroprudential tools that the Committee focused on in its preliminary discussions. Some tools that the Committee believes may warrant consideration, but which it provisionally decided not to focus on at its September meeting, are described in Annex 2. Section 4 outlines the criteria that the Committee propose using to assess the merits of these tools. Section 5 concludes.

(1) IMF (2011b).

(2) See Bank of England (2011b) and King (2011).

(3) See Bank of England (2011b).

Box 1

International developments on macroprudential tools and frameworks

In October 2011, the Financial Stability Board (FSB), together with the International Monetary Fund (IMF) and Bank for International Settlements (BIS), produced a progress report to the G20 on macroprudential tools and frameworks.⁽¹⁾ The report highlights that, while work in this area is still developing, important steps have been taken on new policy instruments, consolidating understanding of the effectiveness of instruments, and in designing governance frameworks to support macroprudential policies.

Considerable progress has been made in the past year in developing new macroprudential tools. The Basel III Capital Accord introduces a countercyclical capital buffer whose purpose is to support the stability of the financial system;⁽²⁾ Section 3 of this paper outlines the design of this tool and its rationale in more detail. Another notable achievement has been the agreement over the FSB's framework to tackle risks posed by systemically important banks.⁽³⁾ This framework includes a methodology for assessing global systemic importance and additional equity capital commensurate with this assessment. Work is ongoing internationally in assessing the merits of additional macroprudential instruments. For example, within the context of the overall work on shadow banking, efforts are under way to consider the case for establishing minimum margin requirements on secured financing and non-centrally cleared derivative transactions.⁽⁴⁾

International work has also examined the effectiveness of alternative macroprudential tools by drawing on experiences of countries where such measures have been tried. A recent cross-country study by the IMF notes that many tools have been used, especially in emerging markets, though not necessarily always with explicit macroprudential objectives. It finds tentative evidence that some of these policy actions have been effective in mitigating systemic risk and dampening procyclicality.⁽⁵⁾ But caution is required when extrapolating from such experiences to the United Kingdom given differences in the structure of economies and financial systems.

A number of jurisdictions have begun putting in place institutional arrangements to support macroprudential policy. The European Systemic Risk Board was established in January 2011 to monitor risks to the stability of the European Union's financial system and recommend actions to rectify such risks. In the United States, the Financial Stability Oversight Council established under the Dodd-Frank Act is charged with identifying threats to financial stability.⁽⁶⁾

Recent papers by the IMF and BIS highlight that, while there are some common elements, significant differences exist in the design of macroprudential frameworks across countries.⁽⁷⁾ Powers to communicate risk warnings and to recommend adjustments in regulatory instruments are quite common. So too are transparency requirements to foster accountability. But decision-making arrangements differ substantially and not all national authorities currently have a statutory financial stability mandate.

(1) See FSB/IMF/BIS (2011).

(2) Detailed work is now being done on how this tool might be implemented in different jurisdictions, see, for instance, European Commission (2011).

(3) See FSB (2011a).

(4) See FSB (2011b) and FSB (2011c).

(5) Lim *et al* (2011). See also CGFS (2010).

(6) See Bernanke (2011) and Yellen (2011) for a description of the role of the Financial Stability Oversight Council.

(7) See Nier *et al* (2011) and BIS (2011).

2 Sources of systemic risk: concepts and evidence

In discussing the macroprudential instruments over which the FPC should have powers of Direction, a natural starting point is an assessment of the sources of systemic risk. The financial system provides a range of critical services for the economy including: payments; intermediating between savers and borrowers; and risk-sharing and insurance. These functions involve, among other things, banks and other financial institutions taking on leverage by funding some assets with retail deposits and other forms of debt liabilities (rather than equity) and undertaking maturity transformation by funding some long-term assets with short-term liabilities (ie lending long and borrowing short).

In considering these services, a useful distinction can be drawn between the aggregate financial sector's activity with respect to the real economy (ie 'net leverage' and 'net maturity transformation' with respect to end-savers and end-borrowers, whereby all intra-financial system claims are 'netted out') and intra-financial system activity, or 'gross leverage and maturity transformation'.

In terms of aggregate risks, overindebtedness of borrowers does not necessarily imply that the banking system is overexposed if capital and liquidity resources are adequate or if real money long-term investors hold much of the real-economy debt directly so that defaults deplete wealth. But systemic risk may arise at certain points in the economic cycle if end-borrowers come close to or exceed their budget constraints when financial sector leverage is high or there is excessive maturity transformation.

Intra-financial system activity heightens the connectivity and complexity of the system. Structural factors such as these may expose the system to excessive contagion or 'network' risk. Importantly, however, in common with real-economy lending, intra-financial system activity also exhibits procyclicality, creating a time-varying dimension to contagion risk.⁽¹⁾

In view of this, it is helpful to distinguish two distinct manifestations of systemic risk: (i) the amount of risk that the financial system takes at a point in time relative to its capital and liquidity resources ('time-varying' or 'cyclical' risk); and (ii) for a given amount of time-varying risk, structural features of the financial system, such as its connections and the distribution of risk across different participants, which create or exacerbate vulnerabilities ('cross-sectional' or 'structural' risk).⁽²⁾ Underlying these manifestations of risk are various amplifiers in the financial system, such as mispriced lending terms and excessive leverage, maturity mismatch, interconnectedness, concentration, complexity and opacity.⁽³⁾

These amplifiers may be traced to imperfections in financial markets.⁽⁴⁾ These include:

- incentive distortions, which can, for example, arise from contracts that reward short-term performance excessively;
- informational frictions, such as those linked to buyers doubting the quality of assets (adverse selection) or less than fully-rational processing of information;
- and co-ordination problems, where collective action, for example to step away from lending in a boom, may be in the interests of individual banks but there is no way to co-ordinate on this outcome.

The remainder of this section outlines some of the different drivers of 'time-varying' and 'cross-sectional' risk. In broad terms, time-varying risks motivate tools which affect the balance sheets of financial institutions or influence the terms and conditions of financial transactions, while tools affecting market structures relate more closely to cross-sectional or structural risk. Examples from both the current crisis and past episodes of financial instability are used to illustrate the various amplification mechanisms at work. Annex 1 outlines some potential indicators of systemic risk that may be helpful for risk assessment and monitoring purposes, including the credit-to-GDP guide referenced in the Basel III countercyclical capital buffer proposal.⁽⁵⁾

2.1 Time-varying risk

There is a strong collective tendency for financial firms, as well as companies and households, to overexpose themselves to risk in the upswing of a credit cycle and to become overly risk-averse in a downswing. Such procyclicality has a variety of underlying causes, including myopia about risk, short-termism and herding in financial markets.⁽⁶⁾ Together, these factors may contribute to unsustainable levels of debt or credit growth.

2.1.1 Balance sheets

Procyclicality in leverage and maturity transformation give rise to distinct risks and amplification channels. As noted above, in assessing these, it is useful to distinguish real-economy lending ('net' leverage and maturity transformation) from activity within the financial system.

(1) See Gai *et al* (2011) for a model which illustrates how intra-financial system activity can simultaneously contribute to both time-varying and structural contagion risk.

(2) This distinction draws on Borio and Crockett (2000) and the wider classification is broadly consistent with those adopted by others in the literature, including CGFS (2010), Group of Thirty (2010), IMF (2011a) and FSB/IMF/BIS (2011).

(3) See Brunnermeier (2009), Turner (2011a) and Tarullo (2011).

(4) See Bank of England (2009) for further discussion of these market failures.

(5) See Borio *et al* (2010a) and BCBS (2010b).

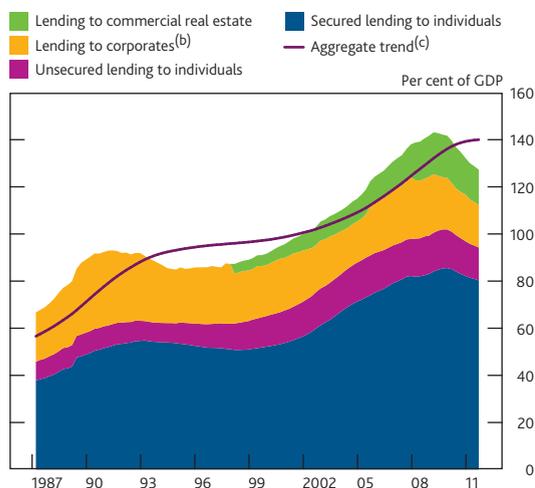
(6) See, for example, Scharfstein *et al* (1990), Froot *et al* (1992), Rajan (1994), Lux (1995), Acharya *et al* (2008), Gorton and He (2008), Aikman *et al* (2010), and Gennaioli *et al* (2010).

Real-economy lending: leverage

During upswings, credit and asset prices can be linked in a self-reinforcing cycle, leading to rising leverage and indebtedness in the real-economy.⁽¹⁾ When funded by banks operating at previous levels of capital and liquidity, such rapid expansions in real-economy lending heighten the risk of subsequent banking sector distress when imbalances unravel. And such systemic risks may be exacerbated if banking sector leverage increases at the same time, leaving the financial system vulnerable to even small increases in borrower default or falls in collateral values. Equity buffers might then prove insufficient to absorb losses and banks may be forced to deleverage. The resulting collective contraction in the supply of credit increases the likelihood of borrower distress, potentially affecting the real economy adversely and amplifying banking sector losses further.

Prior to the current crisis in the United Kingdom, the stock of bank lending to the real economy increased rapidly and the ratio of credit-to-GDP substantially exceeded its long-term trend (Chart 2.1).⁽²⁾ Lending to commercial real estate (CRE) companies was particularly exuberant, with the stock of credit to that sector relative to GDP doubling between 2002 and 2008. These developments coincided with a sharp increase in the leverage of UK banks (Chart 2.2). Thin capital buffers and inadequate provisioning meant that banks' solvency was threatened when losses were incurred, causing a sudden contraction in the provision of credit to all sectors of the economy, which intensified the downturn. A comparison with the late-1990s technology bubble is instructive when considering the role of excessive leverage. The collapse of dotcom shares led to significant volatility, but it was the wave of defaults on telecom debt that threatened banking stability.⁽³⁾

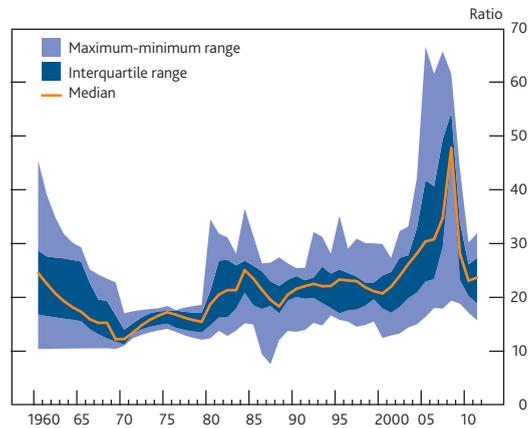
Chart 2.1 Decomposition of UK credit^(a)



Sources: Bank of England, ONS and Bank calculations.

- (a) Lending by UK-resident monetary financial institutions (MFIs) and specialist lenders to the private non-financial sector.
 (b) Lending to private non-financial corporations. The breakdown of corporate lending into commercial real estate (CRE) and non-CRE sectors is not available before 1998. Before 1998, CRE lending is included under 'Lending to corporates'. In addition, the CRE breakdown only captures MFI loans and reverse repos; the wider corporate lending series includes MFI holdings of debt securities in CRE companies.
 (c) Based on the guidance variable for the Basel III countercyclical buffer. This trend is based on a one-sided Hodrick-Prescott filter with a smoothing parameter of 400,000. For a full description of the calculation, see BCBS (2010b).

Chart 2.2 UK banks' leverage^{(a)(b)}



Sources: Published accounts and Bank calculations.

- (a) Ratio of total assets to shareholders' claims.
 (b) The data are a backwardly consistent sample of institutions providing banking services in the United Kingdom in 2011. The sample includes the following financial groups: Barclays, HSBC, LBG, National Australia Bank, Nationwide, RBS and Santander UK. Where data are consistently available for the UK component of the banking group, these have been used.

Excessive credit expansion, often in the real estate sector, has characterised the build-up to most financial crises in the past, from the Great Depression, to emerging market crises in Latin America and East Asia, to recent crises in developed countries.⁽⁴⁾ For example, the Japanese crisis of the 1990s was preceded by rapid growth in lending across a number of sectors, including to consumers, the real estate industry and small and medium-sized enterprises (SMEs). The Nordic crises in the late 1980s and early 1990s were also preceded by a boom in credit to the real economy — particularly in the household and CRE sectors.⁽⁵⁾ Although exuberance can also affect liquid markets, the importance of residential and commercial real estate to many past episodes of rapid credit expansion may partly reflect the fact that property is an illiquid asset whose price is determined in highly imperfect markets.⁽⁶⁾

Real-economy lending: maturity transformation

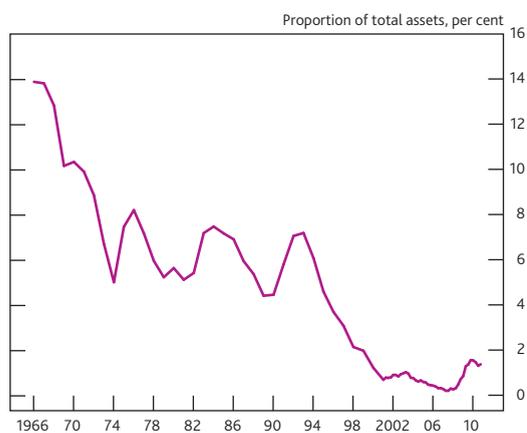
Systemic risk can also arise from the mismatch between the typically longer maturity of banks' assets relative to their liabilities. When taken to excess, lending long and borrowing short in this way can expose banks to the risk of runs and the possibility that they might need to hoard liquidity or sell assets at depressed market prices to meet withdrawals. If liquid asset buffers are insufficient, such risks may crystallise very quickly. But unstable funding structures in a wider sense may also leave banks exposed to periods of longer-term chronic stress. And these risks may be exacerbated by any currency mismatch.

Maturity transformation increased dramatically prior to this crisis. UK banks, in common with their international

- (1) Minsky (1986); Geanakoplos (2010); Turner (2011b).
 (2) For further analysis of the BCBS credit-to-GDP reference guide, see Annex 1.
 (3) See Mishkin (2008). Bank of England (2000) highlighted the risks to the financial sector of the heavy debts taken on by telecoms firms to finance purchases of licences.
 (4) See Kindleberger (1989) and Rogoff and Reinhart (2009).
 (5) See BIS (2004); and, on Japan, Ichinose (1999).
 (6) See Crowe *et al.* (2011).

counterparts, reduced their holdings of liquid assets (Chart 2.3) and became increasingly reliant on funding at shorter maturities (Chart 2.4). In part, this increase in mismatch may have reflected very strong demand for high-quality liquid assets from other market participants, including corporates, asset managers and sovereign wealth funds. But swings in liquidity played a role in driving the broader credit cycle, with the growth of bank balance sheets highly correlated with the proportion of funding sourced from short-term wholesale deposits.⁽¹⁾ When the crisis hit, many flighty sources of funding disappeared, contributing to a rise in liquidity premia and putting further pressure on banks' solvency and liquidity positions. These pressures amplified the downturn, with funding constraints a key drag on the supply of credit to the real economy.

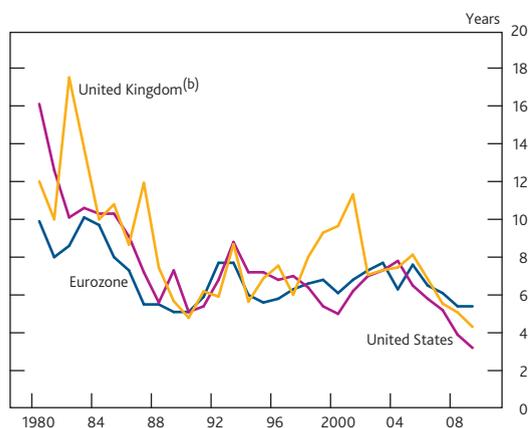
Chart 2.3 US bank holdings of US Treasuries^{(a)(b)}



Source: Federal Deposit Insurance Corporation (FDIC).

(a) US bank holdings of US Treasuries as a proportion of US banks' total assets in all currencies.
(b) Data cover FDIC-insured commercial banks only.

Chart 2.4 Average maturity of selected debt securities issued by banks^(a)



Source: Moody's Global Banking.

(a) Only covers bank debt securities rated by Moody's. Annual data for 1980–2009.
(b) UK data for 1983 have been interpolated using the average of the years 1982 and 1984.

Previous financial crises also demonstrate the importance of liquidity risk. Prior to the late-1990s East Asian crisis, for example, lending by banks in those economies was fuelled by short-term, foreign currency borrowing from abroad.⁽²⁾

The combination of maturity and currency mismatches were key amplification mechanisms during the crisis.

Time-varying intra-financial system activity (gross leverage and maturity mismatch)

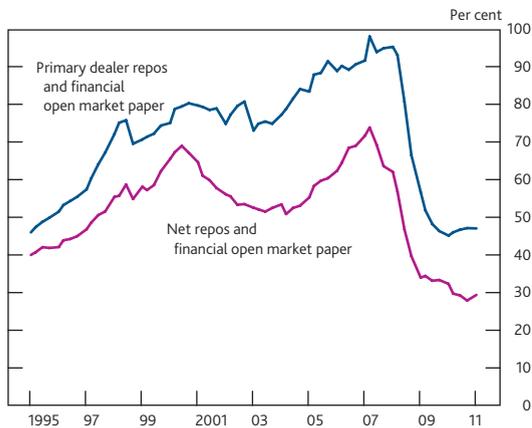
Links between financial institutions can help them to manage risk and distribute funds to where they can be deployed effectively.⁽³⁾ At the same time, intra-financial system activity can increase the tendency for real-economy lending to become excessive — for example, the dispersion of risk around the financial system associated with securitisation reduced incentives to screen and monitor lending, with this impairment in underwriting standards exacerbating overborrowing in the real economy. And funding chains between banks and other financial intermediaries can mean that system-wide maturity transformation may be high even though maturity transformation at any individual institution may appear small.⁽⁴⁾

But intra-financial system activity tends to exhibit procyclicality and can also contribute to time-varying risk in its own right by increasing the potential for contagion during exuberant periods. In particular, for a given level of lending to the real economy, a system with longer, larger or more opaque chains of intra-financial system claims is more prone to amplifying shocks through counterparty risk. Excessive intra-financial system activity also poses liquidity risks to the financial system. Due to its greater sensitivity to individual firm characteristics and market-wide sentiment, wholesale funding may be particularly flighty and shocks to one or more institutions can propagate through withdrawals of funding in interbank markets (liquidity hoarding) during times of stress.

Securitisation activities markedly lengthened the intermediation chain in the run-up to the latest crisis.⁽⁵⁾ In many cases, the same security was used repeatedly as collateral in repurchase agreements (repos) and financing markets.⁽⁶⁾ This type of activity was reflected in the dramatic rise and subsequent fall in the stock of repos and financial commercial paper relative to retail deposits in the United States (Chart 2.5). Such growth in intra-financial system activity extended well beyond banks and beyond the United States, with financial corporate debt (including banks and non-banks) accounting for some two thirds of the increase in the UK debt to GDP ratio between 2003 and 2007 (Chart 2.6). At the same time, banks became increasingly reliant on unstable, short-term wholesale funding, such as deposits from money market mutual funds.

- (1) FSA (2009a).
- (2) Bird and Rajan (2001).
- (3) See Kohn (2011a).
- (4) See Hellwig (1995).
- (5) Bank of England (2007); Jenkinson *et al* (2008); Shin (2009).
- (6) A repo transaction entails borrowing money using securities as collateral. It is structured as the spot sale of a security for cash, coupled with an agreement to repurchase the same security at the initial price plus a premium (reflecting interest) at a particular date in the future.

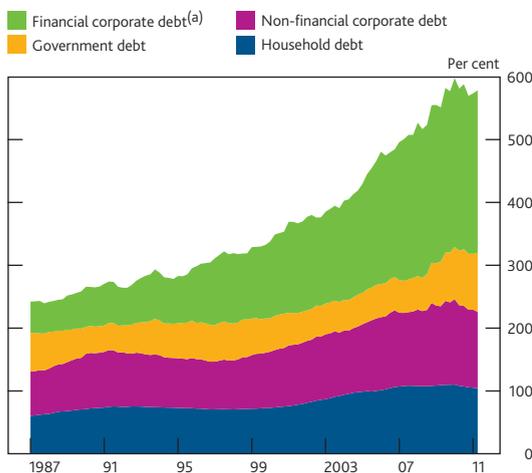
Chart 2.5 Repos and financial open market paper as a percentage of retail deposits in the United States^(a)



Sources: Federal Reserve Board Flow of Funds and Bank calculations.

(a) Financial open market paper consists of commercial paper and bankers' acceptances.

Chart 2.6 Sectoral breakdown of UK debt, proportion of GDP



Source: ONS.

(a) Debt of banks and other financial corporates. Excludes derivatives.

These developments left the system more exposed to deteriorating funding availability and market liquidity during 2007–08. As conditions deteriorated, financial institutions sought to hoard liquidity, propagating funding distress and contributing to a drying up of long-term unsecured interbank markets, including cross-border.⁽¹⁾ At the height of the crisis following the failure of Lehman Brothers in late 2008, concerns over the potential effects of contagious default caused a seizure in activity in funding markets, with direct effects on the real economy and global trade.

Similar patterns were evident in previous episodes of banking system stress. A key feature of the Japanese crisis, for example, was the growth of non-bank financial institutions. Financial engineering generated cheap funding for corporates, triggering a search for yield and widespread speculative investments in stock and real estate markets through dedicated investment funds called 'Tokkin'. These funds were, in turn, managed by the trust banks and linked to the wider

banking system through a complex web of cross-holdings among banks and corporates. At its height, it is estimated that up to 40%–50% of total reported profits from Japan's largest corporations could have been derived from such financial investments, fuelling the asset price bubble. In the early stages of the crisis, government intervention to bail out these 'shadow banks' was seen as necessary to prevent a loss of confidence in the core banking system.

2.1.2 Terms and conditions of transactions in financial markets

Systemic risk stemming from excessive leverage and maturity transformation both in relation to end-borrowers and within the financial system may be amplified by a relaxation of the terms and conditions on lending and transactions in financial markets. This might include higher loan to value (LTV) and loan to income (LTI) lending, a compression in lending spreads, lower margin or haircut requirements on secured financing transactions, and an easing of covenant restrictions or fall in the quality of collateral required on secured lending.⁽²⁾ Weakening real-economy lending standards increase the likelihood of excessive borrowing and subsequent default, and leave financial institutions more exposed to any losses that occur. And falling margins or haircuts within the financial system may increase systemic liquidity risk by making the system more vulnerable to corrections in margins that might spark liquidity hoarding or asset fire sales.⁽³⁾

Prior to the current crisis, lending spreads in the United Kingdom appeared to fall below their equilibrium levels in both the household and corporate sectors before rising sharply with the onset of distress in the banking sector (**Chart 2.7**). Pre-crisis exuberance was also evident in the increase in the share of new mortgages at both high LTV and LTI ratios (**Chart 2.8**) and the rising prevalence of self-certified and interest-only mortgages. Similar patterns were also evident in the United States, with typical LTV ratios increasing prior to the crisis, and higher LTV ratios subsequently associated with higher default rates.⁽⁴⁾

There was also a gradual erosion in wholesale lending terms prior to this crisis.⁽⁵⁾ Margining requirements on secured financing and derivatives transactions, including against risky or illiquid collateral, fell as conditions became buoyant. But following the emergence of concerns over subprime and complex asset-backed securities, margin requirements increased significantly, initially in relation to tainted collateral

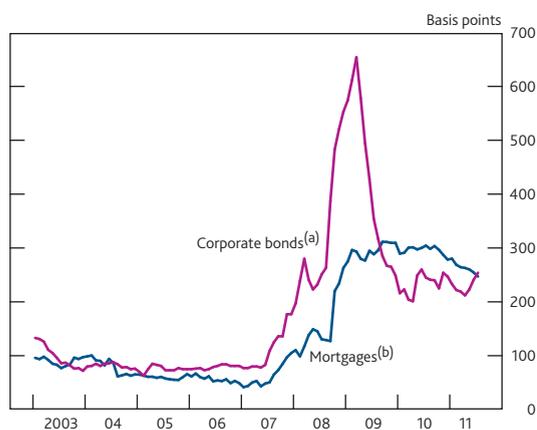
(1) Hoggarth *et al* (2010).

(2) When the cash lent on repo trades is lower than the current market value of the security used as collateral, the discount is referred to as the haircut. Haircuts thus act as the inverse of leverage. Conversely, the term 'margin' is used to describe the level of overcollateralisation required. If a firm lends £95 in cash against collateral of £100, the discount of 5% on the collateral is referred to as the haircut. The equivalent margin would be 5.26% ($5/95 \times 100$).

(3) See Brunnermeier and Pedersen (2009), Adrian and Shin (2010), Gorton and Metrick (2010) and Gai *et al* (2011).

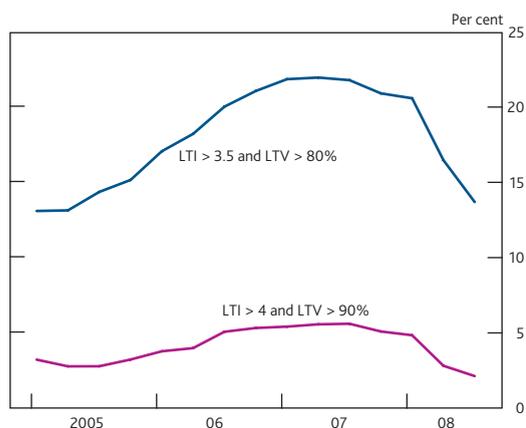
(4) Geanakoplos (2010).

(5) See CGFS (2009).

Chart 2.7 Spreads on mortgages and corporate bonds

Sources: Bank of America Merrill Lynch, Bank of England, Bloomberg and Bank calculations.

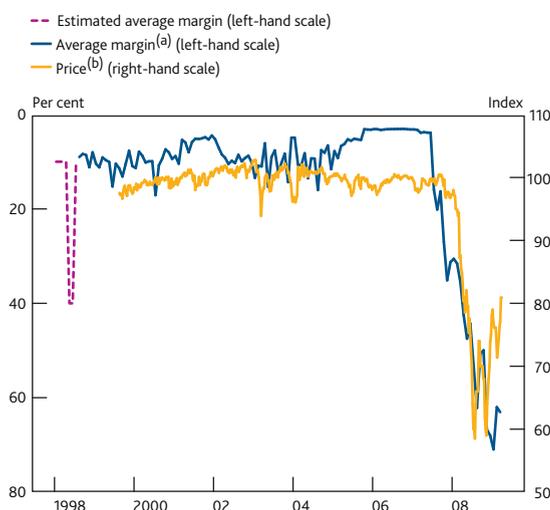
- (a) Investment-grade corporate bond spreads as measured by the Sterling Corporate Securities Index. Spreads are relative to government bond rates.
 (b) Spreads on 75% loan to value mortgages relative to appropriate reference rates.

Chart 2.8 High loan to value (LTV) and loan to income (LTI) mortgages as a proportion of new UK mortgages^(a)

Source: FSA Product Sales Database.

- (a) Regulated mortgages only. Excludes remortgages.

but eventually spreading to a broader range of asset classes (Chart 2.9 and Table 2.A). Rising margins combined with falling prices of the assets used as collateral and a flight from asset-backed commercial paper to generate funding liquidity pressures. The resultant liquidity hoarding and asset market illiquidity transmitted shocks across the system and contributed to the collapse in unsecured interbank markets.

Chart 2.9 Secured lending margins and prices of mortgage-backed securities rated AAA at issuance

Sources: Ellington Capital Group and JPMorgan. Taken from Geanakoplos (2010): 'Solving the present crisis and managing the leverage cycle', *FRBNY Economic Policy Review*.

- (a) Average margin offered by dealers to the hedge fund Ellington Capital Group on a hypothetical portfolio of collateralised mortgage obligations rated AAA at issuance. The margin axis has been reversed, because lower margins are correlated with higher prices. The portfolio evolved over time, and changes in the average margin reflect changes in the composition as well as changes in margins of particular securities. In the period following August 2008, a substantial part of the increase in margins is attributable to bonds that could no longer be used as collateral after being downgraded, or for other reasons, and hence count as 100% margin.
 (b) Price data are from the JPMorgan AAA prime floater mortgage index.

Table 2.A Typical haircut on term securities financing transactions, per cent^{(a)(b)}

	June 2007			June 2009		
	Prime ^(c)	Non-prime ^(d)	Un-rated ^(e)	Prime ^(c)	Non-prime ^(d)	Un-rated ^(e)
G7 government bonds						
Short term	0	0	0.5	0.5	1	2
Medium term	0	0	0.5	1	2	3
US agencies						
Short term	1	2	3	1	2	3
Medium term	1	2	3	2	5	7
Pfandbrief	0	0	1	1	2	8
Prime MBS						
AAA- rated	4	6	10	10	20	30-100
AA- and A- rated	8	12	25	100	100	100
Asset-backed securities	10	20	20	25	50	100
Structured products (AAA)	10	15	20	100	100	100
Investment-grade bonds						
AAA- and AA- rated	1	2	5	8	12	15
A- and BBB- rated	4	7	10	10	15	20
High-yield bonds	8	12	20	15	20	40
Equity						
G7 countries	10	12	20	15	20	25
Emerging economies	15	20	35	20	25	40

Source: Committee on the Global Financial System (CGFS) Report 'The role of margin requirements and haircuts in procyclicality'.

- (a) Data were gathered by a CGFS Study Group during bilateral interviews with market participants.
 (b) A 100% haircut implies that the relevant market was effectively closed.
 (c) Prime counterparty.
 (d) Non-prime counterparty.
 (e) Hedge funds and other unrated counterparties.

2.2 Cross-sectional risk

Market structure can also be a source of systemic risk. For any given level of time-varying risk, the systemic consequences of a shock will depend on structural features of both the banking and other financial sectors. That will be influenced by the distribution or concentration of risk within the financial system, which can affect systemic risk even when holding both the *level* of intra-financial system activity and terms and conditions on transactions in financial markets fixed. It will also depend on the opacity — lack of information or insufficient transparency — and complexity — difficulty of assessing information — of financial products, institutions and connections.

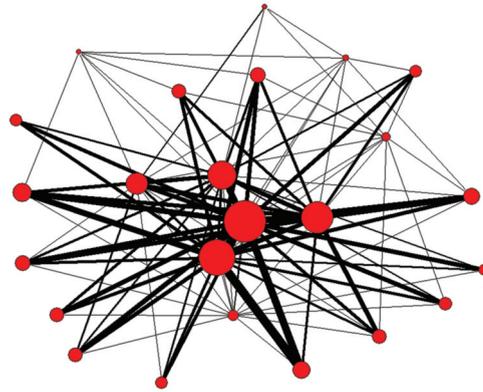
2.2.1 The distribution of risk

When a given amount of risk is concentrated in a small number of institutions or markets, or when the provision of financial services is highly concentrated, the system is likely to be more vulnerable than if risks and the provision of services are more evenly distributed.⁽¹⁾ Distress or failure of a systemically important entity can trigger significant spillovers to other financial institutions or the wider economy. These network externalities arise because individual institutions or infrastructure providers typically fail to take sufficient account of the effects of their actions, or failure, on others. Their systemic significance may give rise to expectations of state support which further distort funding costs and perceptions of risk.

These risks have often been potent during the current crisis. The high concentration of the UK interbank network (**Chart 2.10**) exacerbated the risks from the growing interconnectedness discussed in Section 2.1.1. The systemic importance of American International Group (AIG) led to the US authorities bailing it out in September 2008. There were many channels through which a failure of AIG could have had a wider impact on the economy. **Chart 2.11** shows that banks' credit exposures to AIG arising from collateral posted to underpin CDS contracts were, in several cases, a significant portion of capital.

The problem of concentrated risk is not unique to this crisis. The failure of the Vienna bank Credit Anstalt in May 1931 is commonly regarded as the proximate cause of the European financial crisis of the early 1930s.⁽²⁾ The importance of the bank in providing credit to Austrian industry meant that the government felt obliged to support it. This led to overstretch of the Austrian sovereign. Confidence in other countries' banking sectors was shaken, leading to crises in Germany, Eastern Europe and the United Kingdom.

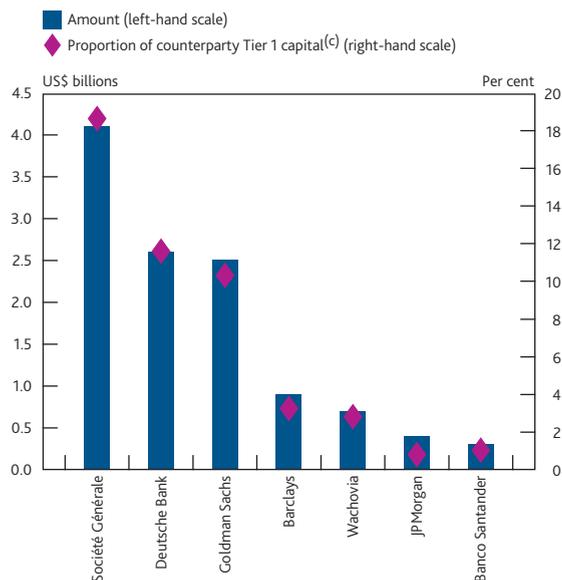
Chart 2.10 Network of large exposures between UK banks^{(a)(b)(c)}



Source: FSA regulatory returns.

- (a) A large exposure is one that exceeds 10% of a lending bank's eligible capital at the end of a period. Eligible capital is defined as Tier 1 plus Tier 2 capital, minus regulatory deductions.
 (b) Each node represents a bank in the United Kingdom. The size of each node is scaled in proportion to the sum of (1) the total value of exposures to a bank, and (2) the total value of exposures of the bank to others in the network. The thickness of a line is proportionate to the value of a single bilateral exposure.
 (c) Based on 2006 Q4 data.

Chart 2.11 Selected counterparty exposures to AIG at the time of its failure^{(a)(b)}



Sources: American International Group^(d) and Capital IQ.

- (a) The chart shows collateral that AIG returned between 16 September and 31 December 2008 to retire CDS obligations which existed at the time of its failure.
 (b) Selected counterparties shown. Does not represent total exposure to AIG.
 (c) Tier 1 capital as of 30 June 2008 as reported in each bank's accounts. Goldman Sachs data are for 29 August 2008.
 (d) AIG News Release, 15 March 2009, 'AIG discloses counterparties to CDS, GIA, and securities lending transactions'.

2.2.2 Opacity and complexity

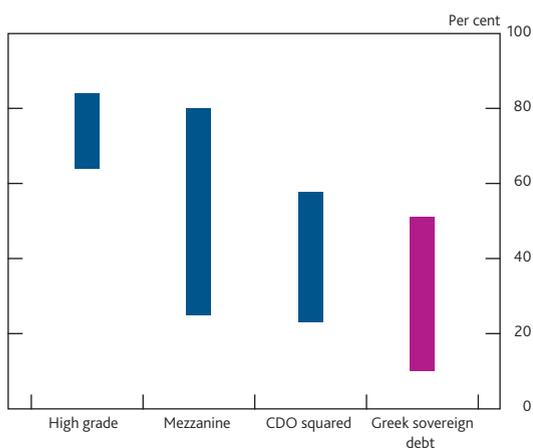
Systemic risk can be generated by the opacity and complexity of institutions, markets and instruments. These factors can amplify uncertainty, potentially driving perception-driven contagion,

- (1) For example, suppose that the gross amount of intra-financial system lending across the system is fixed and contrast two different structures: one in which each bank has a similar importance in interbank lending markets; and another in which there are a small number of key players surrounded by a periphery of smaller players. Catastrophic contagion may be more likely in the latter (concentrated) case due to the vulnerability of the system to a shock to one of the key players. See Haldane and May (2011).
 (2) Kindleberger (1986); Ahamed (2009).

contributing to a breakdown of market functioning and making institutions more difficult to resolve. Even during calmer periods, they may prevent stakeholders from exerting sufficient discipline over financial institutions. Complexity and opacity are also prone to evolve over time, for example due to financial innovation. And even seemingly benign innovations may heighten systemic risk unless the infrastructure keeps pace.

The experience of subprime debt exposures, and more recently of sovereign debt, has highlighted how the complexity and opacity of exposures and interconnections can amplify spillovers and contribute to strains in funding markets. Uncertainty over off balance sheet exposures and banks' widely differing valuations of the same complex structured products and sovereign bonds (Chart 2.12) led investors to put less faith in published balance sheets and to reduce their appetite for the most complex financial products. Such uncertainty contributed to severe perception-driven contagion, for example, among several US security dealer groups after the collapse of Lehman Brothers.

Chart 2.12 Ranges in reported valuations of structured credit products and sovereign bonds^{(a)(b)}



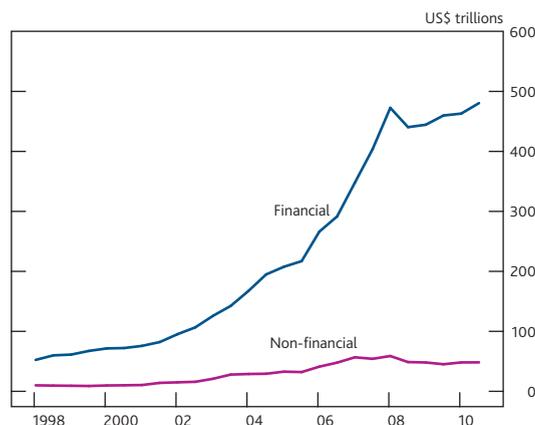
Source: Citigroup, SEC filings, company reports and Bank calculations.

- (a) Implied or reported marks on selected structured credit products by five banks expressed as a percentage of exposures at end-2007. The range of implied marks is not based on a like-for-like comparison of individual exposures, which might differ in their precise characteristics. So the chart should only be interpreted as an illustrative indicator of valuation uncertainty.
- (b) Impairment charges on available-for-sale holdings of Greek sovereign debt by 24 European banks as of 2011 Q2. Expressed as a percentage of amortised cost valuation.

Complexity can also arise from interactions between firms — for example, rapid growth in 'shadow banking' activities and over-the-counter (OTC) derivatives exposures prior to the current crisis (Chart 2.13) created a dense web of exposures, making counterparty credit risk more difficult to assess.⁽¹⁾ Such complexity and opacity may be exacerbated by a lack of, or inadequate, market infrastructure. The failure of Lehman Brothers highlighted that the network of exposures and positions in the OTC derivatives markets were not sufficiently transparent to participants or regulators.⁽²⁾ The difficulty of assessing counterparty credit risks in complex and opaque bilateral networks, and market practices such as the daily unwind process which resulted in the involuntary extension of intraday credit, were particular issues in the US triparty repo market during the financial crisis.⁽³⁾ And prior to the crisis, confirmation and assignment backlogs stemming from inadequate processes and infrastructure in CDS markets also

contributed to heightened counterparty credit risks as market participants did not have a clear view of their exposures. This was subsequently recognised by the authorities and appropriate action was taken to tackle it in co-ordination with market participants.

Chart 2.13 OTC derivatives outstanding by nature of counterparty



Source: Bank for International Settlements.

Innovation linked to complex trading strategies may also contribute to market stress by increasing both the volatility and correlation of prices. High-frequency trading strategies have been highlighted for their role in the 6 May 2010 US 'flash crash' because there is some evidence that such strategies drive withdrawals of liquidity in times of stress.⁽⁴⁾ More generally, algorithmic trading strategies could lead to destabilising feedback loops, which in turn may lead to sharp price falls, possibly across market venues.⁽⁵⁾

Previous episodes of financial innovation have also exacerbated systemic risk. For example, when the US Treasury bond repo market grew rapidly in the late 1970s, accrued interest on the securities was not part of the valuation, creating risks from exposures between institutions that were not fully taken into account. Following the collapse of Drysdale in 1982, the crystallisation of these risks led to a near halt of the repo market. After this episode, inclusion of accrued interest in the price of repo securities became standard. Separately, the dramatic growth in foreign exchange trading arising from financial liberalisation and advances in trading technology created significant exposures to foreign exchange counterparty settlement risk (Herstatt risk) — the risk that a counterparty pays away the currency it sold but does not subsequently receive the currency it bought. Concern among the authorities over the size of these exposures ultimately led to the establishment of the Continuous Linked Settlement (CLS) system in 2002.⁽⁶⁾

- (1) OTC transactions involve trading with only one counterparty, unobserved by the rest of the market. On the complexities introduced by 'shadow banking' activities, see Poszar *et al* (2010).
- (2) FSA and HM Treasury (2009).
- (3) CPSS (2010). A triparty repo is a repo in which a third party (eg a custodian bank, a clearing house or a central securities depository) is responsible for the management of collateral during the life of the transaction.
- (4) See Kirilenko *et al* (2011).
- (5) Government Office for Science (2010).
- (6) For details see Manning *et al* (2009).

3 Potential macroprudential instruments

The FPC is likely to need several different types of macroprudential instrument to tackle the different dimensions of systemic risk discussed in Section 2. At its September 2011 meeting, it categorised prospective tools into three types:

- (a) those that affect the balance sheets of financial institutions;
- (b) those that affect the terms and conditions of loans and other financial transactions; and
- (c) those that influence market structures.

The first two categories relate mainly to time-varying risks. The corresponding tools are more likely to be time-varying in nature — tightened in times of exuberance and relaxed when such conditions have receded. The third category covers tools primarily geared towards cross-sectional risk, though some of these tools can also have a bearing on time-varying risk and the most appropriate timing of implementation may still depend on economic and financial market conditions. Using these categories, **Table 3.A** classifies the set of potential tools that the FPC focused on in its preliminary discussions at its September 2011 meeting.⁽¹⁾

Balance sheet tools include maximum leverage ratios, countercyclical capital and liquidity buffers, time-varying

provisioning practices and distribution restrictions. These tools influence the aggregate level of leverage and maturity mismatch in the financial system. Sectoral capital requirements or 'variable risk weights' could have a role in targeting emerging risks in particular exposure classes. At certain points in the cycle, it may be useful to apply different risk weights to the flow of new lending relative to its stock as these tools indirectly influence terms of lending.

Tools that directly go to the terms and conditions of financial transactions include the ability to restrict the quantity of, or the capital requirements on, lending at high LTVs, or high LTIs. This category also includes the power to impose minimum margining requirements on secured financing and derivative transactions within the financial system and with end-users.

The third category includes targeted disclosure requirements to reduce uncertainty about specific exposures or interconnections amplifying cyclical or structural risks. Adjustments in risk weights on intra-financial system activities could also have a role to lean against excessive exposures of institutions within the financial system. And the design and use of organised trading platforms and/or obligations to clear trades through CCPs could bolster the resilience of markets that are central to the smooth functioning of the financial system, provided that those infrastructures themselves have robust risk management procedures.

Table 3.A Potential macroprudential instruments

Key amplification channels/tools	Time-varying risk			Cross-sectional risk: distribution of risk; opacity; complexity
	Leverage	Intra-financial system activity	Maturity transformation	
Balance sheet tools	Countercyclical capital buffers		Time-varying liquidity buffers	
	Restrictions on distributions			
	Maximum leverage ratios			
	Sectoral capital requirements targeted at real-economy lending	Sectoral capital requirements targeted at intra-financial system activity		
	Time-varying provisioning practices	Time-varying liquidity buffers		
Terms and conditions of transactions	Loan to value and loan to income restrictions	Margining requirements		
Market structures		Use of central counterparties		Use of central counterparties Design and use of trading venues (including 'circuit breakers')
	Disclosure requirements			

(1) See Schoenmaker and Wierdsma (2011) for another possible framework for categorising macroprudential tools.

Three overarching themes emerge when considering the effectiveness of these tools. First, practical experience of using such tools to meet explicit macroprudential objectives is relatively limited, especially in developed countries. As such, the FPC's understanding of how different instruments are likely to work and the extent to which they should be adjusted in response to changes in systemic risk should improve with their use.

Second is the extent to which regulatory standards will bind. In exuberant periods, banks may hold voluntary buffers over minimum requirements. While this is not a problem from a resilience perspective, it may limit the potency of time-varying tools in leaning against unsustainable levels of credit. In downturns, the usefulness of these tools may be impeded because solvency and liquidity standards demanded by market participants tend to rise in such situations. If buffers are sufficiently large at the peak of the cycle, there is greater reason to expect banks to be able to run these down without running up against market constraints once the incidence of severe shocks has passed.

Finally, the effectiveness of many macroprudential tools may be weakened by leakage from a variety of sources including: (i) lending via UK branches of foreign banks, which would not typically be subject to FPC decisions; (ii) direct cross-border activity from banks not subject to UK prudential requirements; (iii) activity by non-bank financial companies and broader financing in capital markets; and (iv) intra-group corporate lending.⁽¹⁾

As discussed in Section 3.1, reciprocity safeguards have been put in place for the countercyclical buffer under Basel III. Similar arrangements could be explored with other jurisdictions over a broader set of tools, bilaterally or as part of an international regime. Leverages to the unregulated (shadow banking) sector were a major factor in the run-up to the present crisis. Going forward, the FPC's remit will require it to monitor such activity regularly, and, where appropriate, make recommendations to HM Treasury on the appropriate boundary of regulation.⁽²⁾

The rest of this section discusses each of these potential tools in more detail, explaining how and when they might be helpful in meeting the FPC's objectives, assessing empirical evidence on their likely effectiveness, and describing key practical considerations including the potential for leakage and regulatory arbitrage.⁽³⁾ **Table 3.B** summarises. Other potential macroprudential tools that the Committee is currently not planning to focus on — subject to responses received on this discussion paper — are described briefly in Annex 2.

3.1 Balance sheet tools

3.1.1 Countercyclical capital buffers

- *This tool introduces a time-varying buffer over and above minimum bank capital requirements.*

Aim

The traditional approach to setting capital requirements is through static 'floors'. This is inherently somewhat procyclical: it places no brake on lending in the upswing when asset valuations are high and rising and when bank equity appears plentiful, but can force banks to reduce leverage rapidly in the downswing when unexpected losses arise, at a time when raising fresh equity is likely to be difficult.

Countercyclical capital buffers are intended to build resilience in the upswing, which should help to moderate this cycle.⁽⁴⁾ When credit growth and excessive leverage are judged to be endangering resilience looking ahead, the FPC would gradually increase capital requirements across the banking system as a whole, or part of it, to enhance resilience. That would provide incentives for banks to move back towards prudent lending and reduce leverage. Symmetrically, when the cycle turns, the FPC could release this buffer to enable banks to weather losses while maintaining the flow of lending once the incidence of shocks has passed. By making the system more resilient to the bust following the boom, the countercyclical capital buffer should help to maintain the supply of credit once losses from the boom crystallise.

Practical features

A key feature of this tool, as agreed in Basel, is the scope it provides for dealing with international 'leakages' — a substitution towards credit provided by branches of foreign banks operating domestically or provided cross-border. This is particularly important in the United Kingdom where branches of foreign banks account for a large share of the supply of domestic, non-household credit.⁽⁵⁾ Under Basel III, the leakage problem is to be mitigated by introducing mutual recognition of national countercyclical buffers. It is envisaged that the FPC's decisions will apply automatically to the UK exposures of foreign banks and, by the same token, UK banks' overseas exposures will carry a minimum buffer chosen by overseas regulators. This 'reciprocity' would be mandatory only for buffers of up to 2.5%.

(1) UK capital requirements are not applied to branches of EEA banks and investment firms. There are also practical difficulties in applying such requirements to other foreign branches, though there is greater scope to deal with any leakage. See Bank of England (2009) for a wider discussion of potential leakages.

(2) See FSB (2011c) for a description of the overall approach being taken internationally to strengthen the oversight and regulation of the shadow banking system.

(3) See Tucker (2009), Bean (2011), Elliot (2011) and Goodhart *et al* (2011) for analyses of macroprudential tools.

(4) See BCBS (2010b) and Carney *et al* (2011) for a description of this tool.

(5) In the United Kingdom, branches of foreign banks account for around 30% of monetary financial institutions' (excluding central banks) lending to other MFIs and around 20% of their lending to private non-financial companies and other financial companies.

Table 3.B Key features of macroprudential tools

Instrument	Key pros	Key cons	Historical experience
Countercyclical capital buffers	<ul style="list-style-type: none"> • Direct effect on loss-absorbing capacity; may moderate the cycle • Simplicity eases communication • Basel III reciprocity mitigates leakages 	<ul style="list-style-type: none"> • Crude tool if exuberance localised in particular sectors — may even encourage risking up • May be ineffective if risk weights are miscalibrated 	<ul style="list-style-type: none"> • Pre-crisis capital ratios were poor predictors of stress during the crisis
Sectoral capital requirements (variable risk weights)	<ul style="list-style-type: none"> • Targeted approach to nipping problems in the bud • May provide sharper incentives than countercyclical capital buffer • Adjusting risk weights on flow of lending relative to its stock could restrain lending in booms or encourage lending in downturns 	<ul style="list-style-type: none"> • May displace risk to other parts of the system — a 'water bed' effect • Implementation challenges to ensure consistent application across balance sheet • Data needs greater than with aggregate tools 	<ul style="list-style-type: none"> • APRA tightened risk weights on low-doc mortgages in 2004, preventing the market from taking off • RBI raised risk weights on CRE lending in 2005–06 — lending slowed. But less effect on non-bank financial lending in 2007
Maximum leverage ratios	<ul style="list-style-type: none"> • Less susceptible to arbitrage and mis-measuring risk than risk-based tools 	<ul style="list-style-type: none"> • No penalty for risk, so may create perverse incentives to 'risk-up' 	<ul style="list-style-type: none"> • Leverage was a better pre-crisis indicator of stress than risk-based capital ratios • Canadian banks restrained by leverage ratio
Time-varying provisioning practices	<ul style="list-style-type: none"> • Ensures early provisioning against prospective credit losses 	<ul style="list-style-type: none"> • Strong overlaps with countercyclical capital buffers and variable risk weights tools 	<ul style="list-style-type: none"> • Spanish regime built up general provisions, but had little impact on credit supply
Restrictions on distributions	<ul style="list-style-type: none"> • Limits risk of disruption to credit supply — useful in downturns 	<ul style="list-style-type: none"> • Uniform cap would penalise healthy banks • Cap linked to capital ratio may cause deleveraging 	<ul style="list-style-type: none"> • Fed introduced presumptive cap on cash dividends of 30% in 2011
Time-varying liquidity buffers	<ul style="list-style-type: none"> • Direct effect on banks' liquid asset holdings and maturity mismatch, increasing resilience • May also help to moderate the credit cycle 	<ul style="list-style-type: none"> • Limited international experience with liquidity requirements • Microprudential standards still under development 	<ul style="list-style-type: none"> • Croatian requirements for banks to hold low-yielding bills helped to slow credit growth • RBNZ introduced a core funding ratio in 2010
Loan to value and loan to income restrictions	<ul style="list-style-type: none"> • Directly limits risky lending, enhancing resilience to risks from real estate • May be less prone to foreign branches leakage 	<ul style="list-style-type: none"> • Difficult to calibrate the trade-off between financial stability benefits, economic activity and societal preferences for home ownership 	<ul style="list-style-type: none"> • HKMA has operated an LTV cap since 1994. Mortgage losses remained low in the aftermath of Asian crisis, despite property prices falling 40%
Margining requirements	<ul style="list-style-type: none"> • May reduce the risk of margin calls precipitating liquidity hoarding and asset fire sales • Enhances resilience of funding markets 	<ul style="list-style-type: none"> • May be prone to leakage/arbitrage across borders, market segments, and from unsecured lending • Capital and liquidity requirements could be used to deliver similar effects in terms of bank resilience 	<ul style="list-style-type: none"> • Fed sets minimum margins on stock purchases on credit, but minimum left unchanged since 1971. Limited impact on price volatility, but may have influenced volume of margin credit extended
Use of central counterparties	<ul style="list-style-type: none"> • Simplifies network interconnectedness and reduces the potential for contagion • Centralises risk management • Provides greater transparency 	<ul style="list-style-type: none"> • Increases systemic importance of infrastructure • Avoidance risk (eg through use of different instruments and moving activity overseas) 	<ul style="list-style-type: none"> • Central clearing in derivatives helped contain spillovers following the failure of Lehman Brothers • Despite crisis withdrawals from interbank triparty repo market, CCP-cleared repos remained resilient
Design and use of trading venues	<ul style="list-style-type: none"> • May help prevent sharp falls in liquidity and reduce extreme price volatility 	<ul style="list-style-type: none"> • May discourage participation, reducing liquidity • Avoidance risk (eg move activity overseas) 	<ul style="list-style-type: none"> • Limited empirical evidence
Disclosure requirements	<ul style="list-style-type: none"> • Reduces likelihood of information contagion • Enhances market discipline 	<ul style="list-style-type: none"> • Liquidity disclosure risks 'spooking' the market or making buffers less usable 	<ul style="list-style-type: none"> • Impact of US/EU stress tests largely through release of information about banks' exposures

Under draft European Union legislation, Member States will have to consider the level of the buffer each quarter. Banks will typically be given one year to comply with decisions to increase the buffer, although faster compliance can be required. Decisions to reduce the buffer will enter into effect immediately. Firms whose capital ratios fall below the buffer will be subject to restrictions on the distribution of capital such as dividends and share buybacks. Under the proposals, all banks and investment firms incorporated in the European Economic Area will be subject to these requirements. To promote consistent decision-making across jurisdictions, Basel III introduces a reference guide based on cyclical swings in the credit to GDP ratio — Annex 1 assesses the past performance of this guide.⁽¹⁾

Potential drawbacks

Uncertainty remains over how effective this tool will prove to be. One challenge arises from its reliance on robust measures of risk-weighted assets. Pre-crisis risk-weighted capital ratios were poor predictors of stress during the crisis.⁽²⁾ And if future risks are building in asset classes which have low risk weights, increases in the buffer could prove ineffective. This problem is related to the reliance on banks' own models to measure risk-weighted assets.⁽³⁾ Another challenge is that countercyclical capital buffers may be a blunt tool when risk-taking behaviour is building up in particular sectors. For example, consider banks that are engaged in highly profitable but risky lending to non-bank financial companies alongside less profitable lending to households and corporates. Faced with higher overall capital requirements, the banks may choose to conserve capital by slowing lending to the latter rather than the former.⁽⁴⁾

Empirical evidence

The effect of the tool on cycles in domestic credit is difficult to gauge. Some studies suggest that varying the capital buffer might have only a mild impact on lending in normal times.⁽⁵⁾ But there are obvious difficulties with analyses that extrapolate from historical experience given the regime-shift taking place. There may be parallels with central banks' experience of implementing monetary policy regimes, the effectiveness of which stems from their power in conditioning the behaviour and expectations of wage and price-setters. In a similar way, over time, countercyclical capital buffers may act to prevent incipient booms taking hold by conditioning expectations of market participants and banks of the capital resources they will need to ensure resilience, and so of their lending behaviour.

3.1.2 Sectoral capital requirements (variable risk weights)

- *This tool applies a buffer of capital over and above microprudential floors on exposures to specific sectors or asset classes.*

Aim

Countercyclical capital buffers may be a relatively blunt tool for dealing with the build-up of risk in particular sectors. Sectoral capital requirements offer a more targeted approach. The FPC could use this tool to require banks to hold a buffer of capital, over and above microprudential requirements, on exposures to specific sectors. For instance, in the face of heightened credit risks related to commercial real estate lending, or exposures to other, buoyant parts of the financial system, the FPC could increase the capital requirements or 'risk weights' on banks' exposures to the specific sector. In principle, distinct capital requirements could also be applied to the flow of new lending relative to the back book if the previous lending had been on reasonable terms, but the new lending was especially risky, or *vice versa*.

Practical features

This tool could be implemented via a capital add-on that is calibrated as a proportion of banks' exposures to the sector considered most at risk. Alternatively, risk weights could be altered directly. Most major firms use so-called 'Internal Ratings Based' models for determining credit risk capital charges. These models rely on firms' own estimates of key parameters such as probability of default and loss given default. A multiplicative scalar for the sector under consideration could be applied to the output of these models.

Pros and cons

There are challenges with operationalising this tool. The most important is the need to ensure that higher capital requirements apply to all exposures ultimately related to the exuberant sector. For instance, higher capital requirements on mortgage lending might well need also to apply to structured financial instruments backed by residential mortgages held in the trading book, where capital requirements are typically calculated on a portfolio basis. The data requirements to implement this approach will need to be handled.

The effectiveness of this tool is uncertain. Sectoral capital requirements concentrate capital in banks with exposures to the sector(s) identified as particularly risky from a systemic perspective. This is good for resilience if major losses are

(1) See BCBS (2010b).

(2) A study by the Basel Committee found no significant difference between the pre-crisis risk-weighted capital ratios of severely stressed and less stressed banks. See BCBS (2010c).

(3) See Bank of England (2011c).

(4) See Tucker (2009).

(5) A study by the FSB-BCBS (2010) estimated that a 100 basis point increase in capital requirements implemented over two years would result in a 1.4% fall in lending in the short run.

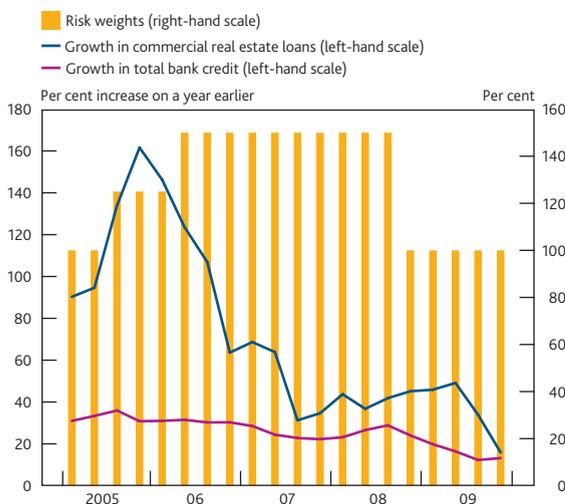
realised in those identified areas. But the tool is less robust if losses arise elsewhere in the system, either directly or through difficult-to-predict spillovers.

The sectoral approach might provide a clearer explanation and sharper incentives to curtail risk-taking than the countercyclical capital buffer. This could help nip emerging risks in the bud before they become deep-rooted. Such measures may, however, have the unintended side-effect of shifting risk to other areas, potentially undermining the impact on system-wide resilience — a so-called ‘water bed’ effect. In those circumstances, an initial use of sectoral capital requirements could be followed, where necessary, by raising overall capital requirements.

Empirical evidence

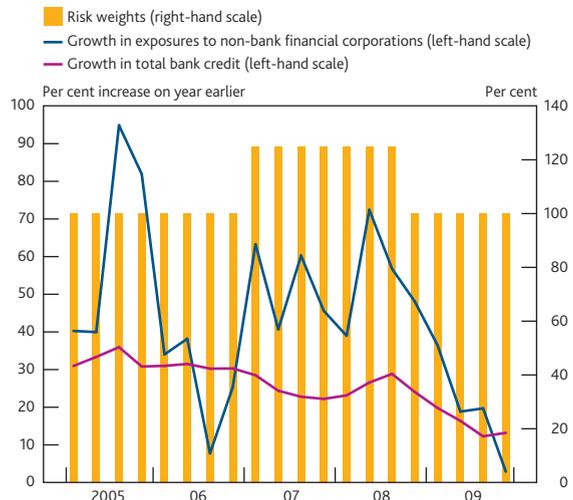
The empirical evidence on the impact of changes in risk weights on lending is mixed. The Australian Prudential Regulation Authority (APRA) raised risk weights on uninsured ‘low-doc’ mortgages in 2004. This is viewed as having helped to change bank lending behaviour and limit the growth of the low-doc market. The Reserve Bank of India (RBI) increased risk weights on CRE lending in 2005 and again in 2006. These actions were followed by a sustained reduction in the growth of credit to this sector (Chart 3.1). But the RBI also required Indian banks to increase their provisioning against this sector as part of its macroprudential actions and this is likely to have played a role in the observed slowdown as well. The RBI also increased the risk weights on lending to non-bank financial corporates in 2007, but with a less obvious impact on lending (Chart 3.2).⁽¹⁾

Chart 3.1 Risk weights against loans to commercial real estate in India



Source: Reserve Bank of India *Financial Stability Report*, March 2010.

Chart 3.2 Risk weights on exposures on non-bank financial corporations in India



Source: Reserve Bank of India *Financial Stability Report*, March 2010.

3.1.3 Maximum leverage ratios

- This tool could be used to cap the ratio of total (ie non risk-adjusted) assets to bank equity.

Aim

The key determinant of the size of capital requirements should be the riskiness of banks’ assets. The original Basel Accord initiated this approach by introducing coarse risk classifications for bank assets. Basel II took an essentially different approach, with the aim of reducing regulatory arbitrage, by refining the gradations of asset riskiness and seeking to fine-tune the size of capital requirements to the riskiness of the assets held by the bank.⁽²⁾

The current financial crisis has raised fundamental concerns about that approach.⁽³⁾ Before the crisis, the capital requirement on a £100 exposure to a senior AAA tranche of securitised subprime securities was only 56 pence. Sovereign bonds can still be held without requiring any capital at all. This miscalibration of risk weights contributed to a dramatic increase in banks’ leverage in the run-up to the crisis (see Chart 2.2). From a macroprudential perspective, a simple leverage constraint that weights assets equally has some notable attractions over the risk-weighting approach, particularly in terms of robustness to mismeasurement.⁽⁴⁾

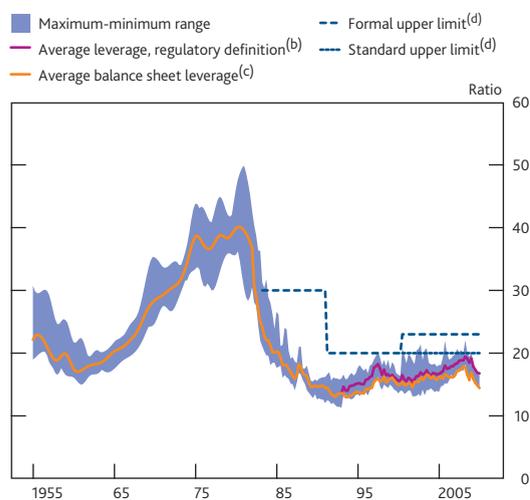
(1) The Swiss authorities are currently considering measures to increase capital requirements on real estate lending in Switzerland.
 (2) See Tarullo (2011) for an account of the evolution of regulatory capital requirements.
 (3) See Bank of England (2011c).
 (4) See King (2010). Morris and Shin (2008) describe the distinction between the riskiness of an asset and its systemic importance in relation to repo markets.

As a macroprudential tool, maximum leverage ratios could be used *dynamically* — that is, tightened during booms and relaxed again in a downturn. Indeed, to be a credible backstop to risk-based capital requirements, it may be necessary to move this tool in lock-step with the countercyclical buffer or otherwise when the environment becomes risky to a degree beyond that anticipated in the calibration of steady-state requirements.

Pros, cons and empirical evidence

The benefits of maximum leverage ratios are now being recognised internationally. Basel III will introduce a leverage ratio from 2018, which will limit the ratio of total assets — including derivative exposures and assets held off balance sheet — to Tier 1 capital to 33. This is seen as a backstop measure to guard against model error and the understatement of risk. The Swiss authorities recently introduced leverage limits for UBS and Credit Suisse. The Canadian authorities have significant experience with this measure, having operated a limit since the early 1980s.⁽¹⁾ As **Chart 3.3** shows, its introduction led to a dramatic reduction in leverage across the Canadian banking system. The Canadian authorities argue that it also successfully restrained balance sheet growth in the run-up to this crisis.⁽²⁾

Chart 3.3 Major Canadian banks' leverage ratios^(a)



Source: Office of the Superintendent of Financial Institutions (OSFI).

(a) The major banks are Royal Bank of Canada, Toronto-Dominion Bank, Bank of Nova Scotia, Bank of Montreal, Canadian Imperial Bank of Commerce and National Bank of Canada.

(b) On balance sheet assets plus certain off balance sheet items as a ratio of regulatory capital.

(c) On balance sheet assets as a ratio of shareholders' equity plus subordinated debt.

(d) From 1980, regulators set a limit of 30 on the assets-to-capital multiple for large banks, but in practice the constraint was tailored to individual banks. A formal upper limit of 20 was set in 1991. From 2000, multiples of up to 23 were permitted in certain circumstances.

The advantages of this tool are also its biggest drawback. Given there is no penalty for risk, banks seeking to maximise returns on equity might be expected to adjust their portfolios towards higher yielding, higher risk exposures.⁽³⁾ Deficiencies in the design of leverage metrics can also be a source of leakages and regulatory arbitrage. The US experience illustrates this well: the scope of the US leverage ratio was too

narrow (it initially excluded investment banks) and it failed to capture off balance sheet exposures. Thorny issues around the valuation of derivative positions and treatment of collateral arise in the practical implementation of this tool.

3.1.4 Time-varying provisioning practices

- *This tool would empower FPC to require banks to hold additional provisions to cover expected losses, over and above those required under relevant accounting standards.*

Aim

Historically, banks on average have made too few provisions in good times and have taken larger than expected losses in downturns, magnifying the impact of the downturn on their income and capital.⁽⁴⁾ In part, this has been a by-product of accounting conventions and tax rules: specific provisions can be made (and be tax-deductible) only once a loan is shown to have become demonstrably impaired. Moving towards a so-called 'expected loss' accounting regime may partly mitigate this problem by causing banks to set aside capital against prospective credit losses earlier in the economic cycle, thereby building capital across the system as risks are rising.

Experience suggests that the underestimation of risk and provisions is likely to continue even when the accounting and taxation regime is forward-looking. One way of tackling these concerns would be to decouple provisions for prudential purposes from those set by accounting and taxation authorities. The banking system could raise its level of provisioning beyond that required by accounting standards — in effect, supplementing countercyclical capital buffers against *unexpected* losses with a countercyclical provisioning requirement for *expected* losses. Alternatively, larger increases in the countercyclical capital buffer or application of sectoral capital requirements could be used to mitigate risks from inadequate provisioning.

Practical features

Time-varying provisioning requirements could be implemented via a rules-based scheme, along similar lines to that introduced by the Bank of Spain. Instead of being deducted from banks' profit and loss statements, the provisioning requirement could form an undistributable balance sheet reserve that is deducted from regulatory capital and made transparent to market participants. This would limit banks' ability to pay dividends

(1) The Swiss rules prevent individual institutions' leverage from exceeding 25 and consolidated groups' leverage from exceeding 33. The authorities have stressed, however, that they expect Credit Suisse and UBS to target a lower level of leverage than this in the cycle upswing. Canadian banks' leverage is limited to 20. The Office of the Superintendent of Financial Institutions, however, has the authority to relax this limit to 23 for banks meeting a set of regulatory requirements.

(2) See Bordeleau *et al* (2009).

(3) See, for example, Koehn and Santomero (1980). In the United States, the introduction of leverage ratios preceded the development of risk-based capital standards. One of the side-effects of the leverage requirement was a shift in asset allocation away from low risk, liquid assets towards off balance sheet transactions. This triggered proposals for risk-based rules in 1985 to mitigate these incentives.

(4) See, for instance, Laeven and Majnoni (2003) for empirical evidence.

and to buy back shares during the upswing, but could be released in bad times. The provisions could apply against specific sectors or in the aggregate.

Empirical evidence

The Bank of Spain's experience with dynamic provisioning is somewhat mixed. General provisions were built up in the run-up to the crisis. This gave Spanish banks greater capital than would otherwise have been the case.⁽¹⁾ A recent study estimates that US banks' need for TARP funds could have been reduced by half had a dynamic provisioning scheme been in place prior to the crisis.⁽²⁾ Since the introduction of dynamic provisioning in 2000, however, the ratio of private credit to GDP in Spain has more than doubled, growing at a faster rate than in the United Kingdom, the United States, Switzerland and Germany. Provisioning measures were also used by the Reserve Bank of India in 2004 and 2005 and are believed to have helped to cool real estate lending.

3.1.5 Restrictions on distributions

- *This tool could be used to limit the proportion of distributable profits paid to ordinary shareholders through dividends and share buybacks and to employees through discretionary remuneration.*

Aim

The aftermath of the banking crisis has created a dilemma for bank regulators: continued risks to the stability of the system have coincided with weak lending to the real economy, which risks impairing economic recovery and further increasing losses to banks. From a macroprudential perspective, one possible measure in such situations is to create incentives for banks to raise *levels* of capital.⁽³⁾ One method for doing this is to encourage banks to retain a greater share of earnings as capital by restricting the distribution of profits to shareholders or staff. This would help to reduce the likelihood of a costly disruption to credit supply.

There are precedents for imposing such restrictions. Earlier this year, the Federal Reserve, as part of their assessment of the capital distribution plans of the 19 largest US banks, introduced an aggregate presumptive cap of 30% on cash dividend payout ratios.⁽⁴⁾

Practical features

One method for implementing this tool is through a *uniform* limit on the share of profits paid to ordinary shareholders through dividends and share buybacks. The rationale for this approach stems from the possibility of a collective action problem: weaker banks face pressure to match the payout ratios of their stronger peers to avoid signalling their weakness to investors. There is significant evidence of such behaviour, with many weak banks continuing to pay dividends in recent years despite their deteriorating solvency position.⁽⁵⁾ The drawback, though, is that this approach affects the 'healthy' as

well as weaker institutions. It may also adversely affect banks' longer-term ability to raise capital.

An alternative method would be to condition the payout limit on a particular threshold capital ratio, perhaps under a stress test. Basel III follows this type of approach: banks whose capital ratios fall into the capital conservation buffer face a 'prompt corrective action'-style schedule of graduated payout restrictions. The FPC tool in this case would be the power to flex those restrictions as it judged necessary. The drawback here is that this may incentivise deleveraging through restricting lending to avoid the limit, although this risk could be mitigated by setting a target based on an absolute level of capital.

3.1.6 Time-varying liquidity buffers

- *This tool introduces a time-varying buffer over and above microprudential liquidity standards.*

Aim

Section 2 highlighted how excessive maturity transformation and intra-financial system activity could generate systemic liquidity risks by increasing the potential for bank runs, liquidity hoarding and asset fire sales. Swings in liquidity also play a key role in driving the credit cycle. Time-varying, or countercyclical, liquidity buffers aim to deal with these risks by enhancing banks' resilience to liquidity crises and helping to moderate credit cycles driven by cheap and plentiful liquidity.⁽⁶⁾

Increasing buffers of high-quality liquid assets when margins are compressed or funding is easily available would provide the system with larger reserves of outside liquidity that could be drawn down to meet margin calls or funding withdrawals as the boom gives way to bust. In turn, this could help to mitigate the need for destabilising liquidity hoarding or fire sales of assets. Increasing liquidity requirements in exuberant periods could also help to moderate cyclicality in maturity mismatch, curbing credit expansion fuelled by short-term flighty funding. Symmetrically, relaxing liquidity requirements from their cyclical peaks could help to underpin credit supply during the bust phase by lowering the average cost of funding.

Practical features

Microprudential liquidity standards remain under development, which may delay the detailed design of macroprudential instruments. But there is a broad range of possible tools. These could include the application of a variable buffer over and above the Basel III Liquidity Coverage Ratio (LCR), which requires firms to hold a stock of high-quality liquid assets sufficient to cover their net cash

(1) See Saurina (2009).

(2) See Fillat and Montoriol-Garriga (2010).

(3) See Hanson *et al* (2011).

(4) See Board of Governors of the Federal Reserve System (2011).

(5) See Acharya *et al* (2009) and Haldane (2010).

(6) Shin (2010).

outflows over a 30-day stress period.⁽¹⁾ This could be implemented either through a multiplicative scalar applied to the minimum requirement or as a change in the duration of the stress period. Alternatively, or as a simple backstop to the LCR, an unweighted liquid assets ratio (LAR), restricting the ratio of liquid assets to total assets, could be applied and varied for macroprudential purposes.

It may also be helpful to have instruments focused on the overall maturity mismatch positions of banks. One such possibility would be to vary the Basel III Net Stable Funding Ratio (NSFR), which seeks to put a floor on the amount of long-term funding banks hold against less liquid assets.⁽²⁾ The Core Funding Ratio (CFR) is a simpler alternative, which could be applied and varied as a temporary macroprudential backstop. It is designed to ensure that, regardless of asset profile, a given fraction of a bank's total funding will be in the form of retail deposits or wholesale funding of a specified minimum maturity.

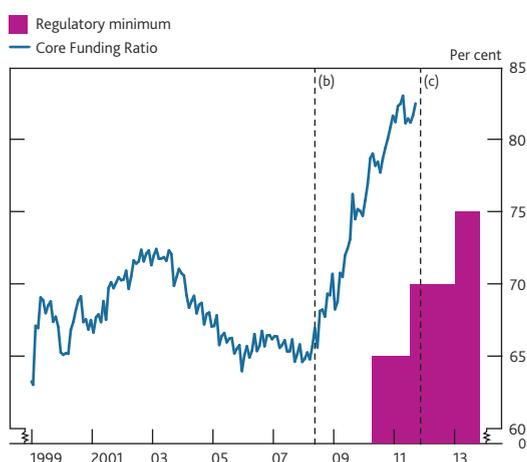
Since liquidity requirements are not linked to banks' internal models, they may be harder to arbitrage than macroprudential capital instruments, though cliff effects, introduced by the calculation of liquidity metrics over fixed time periods, may provide scope for circumvention. And the type of leakages discussed at the start of Section 3 could also reduce the effectiveness of liquidity tools in moderating unsustainable swings in credit growth and debt. Given the more favourable treatment of the use of secured funding under the LCR, macroprudential changes in it could also incentivise banks to increase asset encumbrance.⁽³⁾

Empirical evidence

Practical experience with time-varying prudential liquidity requirements is relatively limited. Croatia introduced a range of measures between 2003 and 2007 which broadly required rapidly growing banks to hold additional low-yielding central bank bills. There is some evidence that these interventions eventually helped to contain overall credit growth, though the policies needed regular adjustment to limit arbitrage.⁽⁴⁾ And the Reserve Bank of New Zealand (RBNZ) announced a minimum CFR requirement of 65% in 2008 for introduction in 2010 — banks' core funding increased as a result (**Chart 3.4**) but it is too early to assess the impact of this.⁽⁵⁾

Banks that failed during the crisis did tend to have a lower NSFR: there were several exceptions (**Chart 3.5**) but these might be expected given the interaction of solvency and liquidity in contributing to bank distress. Quantitative models suggest a significant reduction in the likelihood of a banking crisis at higher levels of LARs. For example, work by the Basel Committee on Banking Supervision (BCBS) suggests that a static increase in LARs by 25% or 50% lowers the annual likelihood of crises by around 35% and 55% respectively.⁽⁶⁾ There is also likely to be an impact on lending, though the estimates are subject to substantial uncertainty.⁽⁷⁾

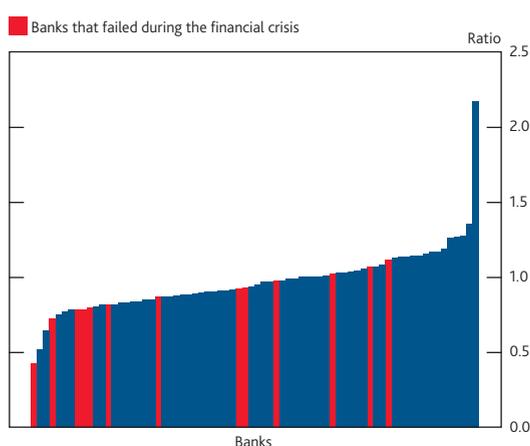
Chart 3.4 Core Funding Ratio in New Zealand^(a)



Source: Reserve Bank of New Zealand *Financial Stability Report*, November 2011.

- (a) Core funding is defined as all funding with a residual maturity of longer than one year, plus Tier 1 capital, plus a weighted sum of certain shorter-term funding instruments. The Core Funding Ratio (CFR) is core funding divided by total loans and advances.
 (b) The minimum CFR policy was first announced in May 2008. It was set at 65% from April 2010, rising to 70% in July 2011 and 75% in July 2012.
 (c) In November 2011, the increase to 75% was deferred by six months to January 2013.

Chart 3.5 Net Stable Funding Ratio and subsequent bank failures^{(a)(b)}



Source: IMF *Global Financial Stability Report* (April 2011).

- (a) The chart presents Net Stable Funding Ratio (NSFR) estimates for a range of globally oriented banks at end-2006. Banks that subsequently failed are depicted in red. See IMF (2011c) for further details.
 (b) The NSFR is defined as a bank's available stable funding divided by its required stable funding. Its construction is described in footnote (2) below. Under this definition, higher ratios are associated with more stable funding structures.

- (1) Liquid assets in Basel are defined as cash, central bank reserves, and high-quality government, corporate and covered bonds. For further details on the LCR, see page 3, paragraphs 15-16 of BCBS (2010d). The FSA's Backstop Individual Liquidity Guidance regime is based on a broadly similar approach to the LCR as a microprudential tool.
 (2) The NSFR is defined as the ratio of 'available stable funding' to 'required stable funding'. Available stable funding is the weighted sum of different types of liabilities, with the weights corresponding to the likely stability of the funding source over a one-year horizon. Required stable funding is the weighted sum of on and off balance sheet exposures, with the weights corresponding to the likely difficulty of 'monetising' each type of asset within a one-year horizon. For further details, see page 25, paragraphs 121-122 of BCBS (2010d).
 (3) Bank of England (2011c) discusses some of the risks associated with excessive asset encumbrance.
 (4) Ostry *et al.* (2011) and Galac and Kraft (2011).
 (5) Ha and Hodgetts (2011). The required minimum Core Funding Ratio increased from 65% to 70% in July 2011 and the RBNZ has signalled its intention to increase it again to 75% in early 2013.
 (6) BCBS (2010a).
 (7) See FSB-BCBS (2010).

3.2 Tools that influence terms and conditions on new lending

3.2.1 Loan to value and loan to income restrictions

- *Loan to value (LTV) restrictions limit the extension of mortgage credit beyond a particular fraction of the value of housing collateral.*
- *Loan to income (LTI) restrictions limit the extension of mortgage credit beyond a multiple of borrowers' annual income.*

Aim

LTV limits enhance banks' resilience by increasing the collateral backing mortgage credit and so restricting their losses in the event of default. Moreover, tightening LTV restrictions in a boom could act to restrict the quantity of credit extended (and *vice versa* in a downturn), thereby tempering the cycle in credit and house prices. LTI restrictions enhance banks' resilience to the extent that high LTI lending is correlated with higher default/arrears rates.

Practical features

A common approach to implementing LTV or LTI restrictions is via an outright cap, prohibiting financial institutions from extending mortgage credit beyond the cap. Some product types (buy-to-let and second-charge) are, however, not currently regulated by the Financial Services Authority (FSA). So if LTV or LTI caps were to be imposed in the United Kingdom, a change in legislation would be required to ensure that caps could be applied to all mortgages secured on residential property in the country. This approach is likely to be less prone to international leakages than prudential rules as it would apply to all branches of foreign banks in addition to domestic banks. The caps would apply to the flow of new lending rather than the stock of existing mortgages to avoid the situation where high-LTV or high-LTI borrowers would have to provide more collateral after a fall in house prices or income.

An alternative approach would be to require banks to fund high-LTV or high-LTI mortgages through higher amounts of capital. These higher risk weights could be applied either to the flow of new loans or to the total amount of such exposures. This is likely to discourage banks from becoming heavily exposed to these types of mortgages, without prohibiting the extension of individual loans that exceed the restriction. But higher risk weights would not apply directly to mortgages extended by branches of foreign banks, so international leakages could remain.

Pros, cons and empirical evidence

A number of countries have used LTV caps. Hong Kong has operated a cap since the early 1990s and the authorities have attributed the relative resilience of domestic banks despite the 40% fall in property prices in the late-1990s East Asian crisis in

part to this tool. More generally, while evidence from experience of LTV caps around the world has been somewhat mixed, the balance seems to suggest that tighter LTV limits lead to lower house prices, at least in the short run.⁽¹⁾ In the United Kingdom, the FSA found evidence of a correlation between LTVs and defaults between 2005 and 2009, whereas this was not the case for LTIs.⁽²⁾

On the downside, it may be problematic for the FPC to calibrate and adjust LTV or LTI restrictions to ensure an appropriate trade-off between financial stability benefits, economic activity and societal preferences for home ownership. The Hong Kong authorities, for example, introduced a mortgage insurance scheme in 1999, owned by the Hong Kong SAR government, thereby ensuring that first-time buyers had better access to the housing market. Some countries adopting LTV limits have also faced implementation challenges, including arbitrage through combining mortgages with unsecured credit.

3.2.2 Margining requirements on secured financing and derivative transactions

- *This tool could be used to stipulate static or time-varying mandatory minimum margins or haircuts on secured financing and derivative transactions.*

Aim

Stipulating static or time-varying minimum margins for both centrally cleared and bilateral trades could help to offset the type of procyclicality inherent in margining practices seen prior to the crisis, as discussed in Section 2.⁽³⁾ By ensuring that margins do not fall excessively during periods of low market volatility, its application could reduce the systemic risks from sharp margin spikes and enhance the resilience of funding markets.⁽⁴⁾ To the extent that the volatility of margins is reduced, the tool may also help to mitigate funding liquidity risks for the borrower — although margin calls precipitated by sharp swings in collateral values are unlikely to be eliminated.

Minimum margin requirements may also restrict banks' ability to expand their balance sheets beyond a prudent level. More generally, they could provide a useful device for limiting leverage in the unregulated 'shadow banking' system. As such, the tool could potentially help to offset cyclicality in intra-financial system activity.

(1) Crowe *et al* (2011).

(2) FSA (2009b). FSA (2011), concluded that the case for introducing an LTV or LTI limit was insufficient on consumer protection grounds alone. However, implementing such thresholds on macroprudential grounds was not being ruled out.

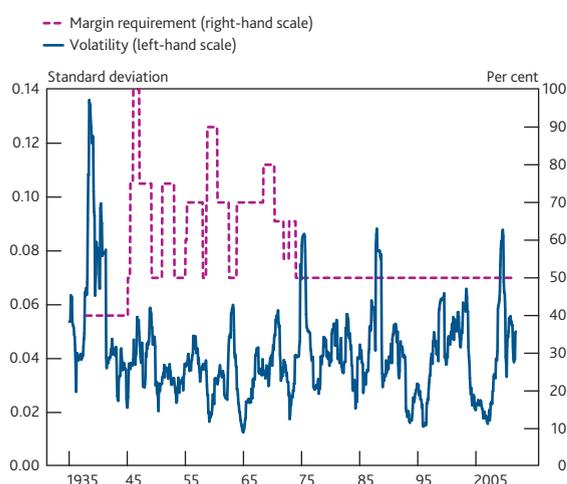
(3) In practice, minimum margins on bilateral trades might be set by the PRA or FCA, after Direction by the FPC, whereas CCPs will be regulated by the Bank of England itself, so action in relation to CCP margins is likely to be via Recommendations as the Bank could not be Directed by the FPC.

(4) Carney (2008); Haldane (2011a).

Empirical evidence

While there is limited experience with this tool, under 'Regulation T' the Federal Reserve Board has had the authority since 1934 to set the minimum margins that securities brokers and dealers (subsequently expanded to all lenders) must require of customers purchasing common stocks on credit. But minimum margins have not been varied since 1974. The consensus in the literature is that increases in margin requirements were unable to contain excess stock market volatility (Chart 3.6), but did seem to depress the volume of margin credit extended.⁽¹⁾ Minimum margin requirements may, however, prove to be a more potent tool in relation to other assets and may still enhance resilience even if they do not affect prices.

Chart 3.6 Volatility in monthly return on the S&P 500 and 'Regulation T' initial margin requirement^(a)



Sources: Bloomberg and Federal Reserve Board.

(a) Volatility is defined as the standard deviation of the monthly return on a twelve-month rolling basis.

Practical features and potential drawbacks

Minimum margin requirements might be arbitrated by making greater use of unsecured financing to offset any higher margin that may be required on secured financing, leaving total intra-financial system activity unchanged. Under current rules, although liquidity requirements on the borrowing bank would increase as a result of such a switch, it is unlikely that the lending bank would experience any increase in capital requirements. Credit risk limits, lending terms and eligible collateral could also be relaxed in response to interventions.⁽²⁾

Any margining instrument would also have to be designed carefully to minimise leakage and arbitrage across borders and market segments. Although there is currently no internationally agreed framework for setting either static or time-varying minimum margins, this is a major area of ongoing work involving the Committee on Payment and Settlement Systems, the International Organization of Securities Commissions, the Committee on the Global Financial System,

the BCBS and the FSB (Box 1). It is also important to ensure consistency of application of both static and time-varying standards on the entire range of trades, including those cleared via CCPs, as well as non-centrally cleared OTC derivatives and repos. And given that CCPs clear a limited number of contracts and generally accept only a narrow range of high-quality collateral, margins on bilaterally-cleared trades would have to apply to a much wider set of transactions and, under current arrangements, collateral types. So operationalising this tool would probably require the setting of differential minimum margins for a large number of different types of assets used as collateral as well as different market segments, such as securities lending, prime brokerage and inter-dealer.

These issues could make margining tools hard to implement in a robust manner and difficult to communicate. An alternative could be to adjust capital or liquidity requirements in response to a generalised compression in margins. For example, sectoral liquidity requirements could be used to force banks to hold more liquid assets against insufficiently collateralised borrowing.⁽³⁾ This could help to bolster the resilience of banks against the risks from procyclical margins, though it may not reduce vulnerabilities in the 'shadow banking' sector or among wider financing markets.

3.3 Market structure tools

3.3.1 Use of central counterparties

- *This tool could be used to mandate use of central counterparties for particular financial transactions.*

Aim

Over-the-counter (OTC) trading creates a network of bilateral exposures between participants, each with variable credit quality. Historically, the application of collateral requirements to manage these bilateral counterparty risks has been procyclical and destabilising, as in the case of the near-collapse of AIG.⁽⁴⁾ And in the event of a counterparty default (such as the default of Lehman Brothers in the CDS market), a lack of transparency regarding the distribution of exposures can lead to widespread uncertainty and a disorderly unwind of positions.⁽⁵⁾

CCPs redistribute counterparty risk, replacing the network of bilateral exposures between participants with a structure in which each participant has a single exposure to the CCP. Use of CCPs centralises risk control and default management in an entity (the CCP) which itself is subject to intensive oversight

(1) Hsieh and Miller (1990); Kupiec (1997).

(2) See CGFS (2009).

(3) Annex 2 discusses sectoral liquidity requirements as a potential macroprudential instrument.

(4) The AIG case is discussed further in FSA and HM Treasury (2009).

(5) See FSA and HM Treasury (2009).

against exacting standards.⁽¹⁾ By facilitating multilateral netting, CCPs may also reduce total exposures in the markets they clear. As a result, during the financial crisis, the use of CCPs helped support the functioning of some markets. For example, although there was evidence of a pulling back from many repo markets around the world during the crisis, notably including the inter-bank triparty repo market in the United States, the volume of CCP-cleared repos increased in many jurisdictions.⁽²⁾ The centralised unwind of positions in the event of a counterparty default also helped contain spillovers within centrally-cleared derivatives markets following the default of Lehman Brothers in 2008.

A tool allowing regulators to mandate that regulated institutions use a CCP to manage risks arising from defined transaction types can overcome private incentives or co-ordination difficulties which can impede the establishment of these infrastructures. Further, requirements that certain groups of institutions clear particular products as direct members of a CCP, thereby forcing them to meet the direct membership requirements, can mitigate the credit, liquidity and operational risks that arise when one institution is dependent on another for access to the CCP.⁽³⁾

G20 countries have committed to ensuring that all standardised OTC derivative contracts should be cleared through CCPs. Within the EU, the European Market Infrastructure Regulation (EMIR) is expected to establish that mandatory clearing requirements for OTC derivatives will be set by the European Securities and Markets Authority (ESMA). FPC powers to make Directions regarding the use of CCPs could supplement this by extending to the range of products not covered under EMIR, including, for example, repos and securities lending transactions.

Practical features

Several practical considerations must be managed to ensure the effective implementation of this tool. In particular, objective criteria may be necessary to determine which CCPs may be used to meet the requirements and which types of institutions and transactions should be in scope. For a product to be centrally cleared, it must be sufficiently standardised, there must be timely and reliable pricing sources, and there must be sufficient market depth and liquidity. Product-level requirements must also be suitably defined to avoid regulatory arbitrage, for example via innovating new bespoke products or shifting activities overseas. And although the Directions issued by the FPC (through the FCA and PRA) will capture banks and other financial institutions, other market participants may fall outside their scope.

Pros and cons

Central clearing requirements may have unintended consequences. Expanding the use of CCPs increases their systemic importance, emphasising the need for effective risk

management, stringent oversight and the establishment of resolution regimes for these institutions.⁽⁴⁾ Product-level requirements may generate higher total exposures for some market participants if other related products are not also centrally cleared and hence they are unable to continue netting exposures across these products.⁽⁵⁾ CCPs and existing clearing members also need to assess carefully the risk implications of any increase in clearing member heterogeneity that results from direct membership requirements.⁽⁶⁾ Direct membership requirements may also change members' incentives to provide clearing services to clients.

3.3.2 Design and use of trading venues (including 'circuit breakers')

- *This tool could be used to mandate particular financial securities or derivative contracts to be traded on a regulated, organised trading venue.*
- *It could also be used to impose design requirements, such as the use of 'circuit breakers', on a defined class of trading venue.*

Aim

Extreme price volatility in financial markets creates significant uncertainty and may discourage investors' participation in financial markets, undermining price discovery and ultimately limiting the efficiency of capital allocation. History teaches that markets occasionally experience crashes when a sudden disappearance of buyers causes sharp price falls, some short-lived (as in the October 1987 stock market crash), others longer-lived, as in the 1930s. Recently, extreme price movements such as those experienced in the 'flash crash' in the United States have been linked to changing market practices, such as the proliferation of automated trading, including high-frequency trading.⁽⁷⁾ Heightened volatility can also be exacerbated by insufficient transparency. The opaqueness of some forms of OTC trading means products traded in this manner may also be susceptible to such problems.

Requirements that a defined class of trading venue take specified actions to improve the management and/or transparency of potentially systemic trading activities may help to prevent sharp falls in liquidity and reduce extreme price volatility. Such requirements might be used to facilitate

(1) For a discussion of the risk-reduction benefits of CCPs, see Jackson and Manning (2007).

(2) See CPSS (2010).

(3) The financial stability implications of this are discussed in CGFS (2011).

(4) See Box 1 of Bank of England (2011c).

(5) This concept of 'un-netting' is explained in Duffie and Zhu (2010).

(6) Jackson and Manning (2007), Pirrong (2011) and CGFS (2011) discuss the implications of heterogeneous CCP membership. Increased diversity in the credit quality, size or market participation of clearing members could potentially, for example, make CCP governance more complex and complicate default-management arrangements.

(7) Although some studies have found that high-frequency traders ceased to provide liquidity during the 'flash crash', empirical literature on the impact of high-frequency trading is still in its infancy, and evidence of its overall impact on liquidity and volatility is mixed. See CFTC/SEC (2010) and Kirilenko et al (2011).

improvements in day-to-day market liquidity — for example, the FPC might require that a defined class of trading venue introduce market-maker arrangements, which can help to ensure continuous liquidity in all but the most extreme market conditions. The FPC could also require the introduction of controls to limit the impact of any market crash, for example by requiring that a defined class of trading venues introduce mechanisms for halting trading (so-called ‘circuit breakers’) in response to abnormal price volatility.

Circuit breakers were considered by the Brady Report in the wake of the October 1987 market crash.⁽¹⁾ This concluded that, on balance, the implementation of coherent and co-ordinated circuit breakers was beneficial but that to be effective in limiting financial disruption, implementation needed to be co-ordinated across markets. Variants of circuit breakers are now commonly found in trading venues around the globe. They have been attributed with helping to stall the ‘flash crash’.⁽²⁾ The empirical and theoretical literature on the overall effectiveness of circuit breakers, however, remains inconclusive.⁽³⁾

This tool could also be used to require particular financial securities or derivatives contracts to be traded on a regulated, organised trading venue (eg trading platform or exchange). Under certain circumstances, this may strengthen the resilience of key markets through increased market transparency and liquidity. The G20 commitment that all standardised OTC derivative contracts be traded on exchanges or electronic trading platforms, where appropriate, provides a precedent for the introduction of rules that mandate the use of recognised trading venues.⁽⁴⁾ Within the EU, these commitments are covered in the proposed Markets in Financial Instruments Regulation (MiFIR) and Directive (MiFID). In its current form, the draft MiFIR establishes that requirements to trade eligible OTC derivatives on organised venues will be set by ESMA. The draft Directives also contain requirements on trading venue design, although the scope of these requirements is yet to be finalised. Directive powers in this area could allow the FPC to supplement these initiatives.

Practical features, potential drawbacks and empirical evidence

Implementation of this tool will require the establishment of objective criteria to determine which types of transactions should be in scope and which trading venues may be used to meet the requirements. Because on-exchange trading does not allow for negotiation of contract terms or prices (as is the case with OTC trading), mandating that transactions take place on-exchange or on trading platforms will only be feasible for relatively standardised and liquid products. In making Directions regarding the use of a particular type of trading platform, careful consideration will also need to be given to the level of standardisation, the frequency with which the product is traded and the range of market participants

including, for example, the balance between institutional and retail participants.⁽⁵⁾

There is, however, currently little empirical evidence on the effectiveness of mandating the use of trading venues in reducing risk. Importantly, the opacity of OTC trading may actually increase liquidity. Affording transparency by bringing activity onto an organised venue could discourage participation, reducing rather than increasing liquidity.⁽⁶⁾ Requirements on the design of trading venues could also reduce incentives for market makers to participate, again potentially reducing market liquidity. Participants may also have incentives to arbitrage the requirements, for example by innovating new financial products or by shifting trading away from the United Kingdom, potentially reducing liquidity in the regulated market.

3.3.3 Disclosure requirements

- *This tool could be used to enhance financial firms’ regular reporting frameworks and, on occasion, to require disclosure on exposures to specific risks.*

Aim

Investors’ limited information on the risks being run by financial intermediaries amplified the recent credit cycle.⁽⁷⁾ In the upswing, opacity — coupled with complexity — contributed to the general mispricing of risk as investors badly underestimated the risks inherent in structured products.⁽⁸⁾ And in the downswing, as discussed in Section 2, contagion fed on fears over the financial health of counterparties, contributing to the general squeeze on funding. Improved disclosure can go some way towards alleviating these problems. Reliable, timely and granular information is a prerequisite for effective market discipline and the efficient functioning of markets.⁽⁹⁾

The authorities have a critical role to play in promoting improved transparency. Considerable effort is being made in response to the crisis, both domestically and internationally, to improve financial firms’ disclosure practices.⁽¹⁰⁾ Inadequate disclosure has also been an important theme of the discussions of the interim FPC so far. In June, it recommended greater disclosure of UK banks’ sovereign and banking sector

(1) See Presidential Task Force on Market Mechanisms (Brady Report) (1988).

(2) See Haldane (2011b).

(3) See Harris (1997).

(4) See FSB (2011b).

(5) See Smyth and Wetherilt (2011).

(6) It may be possible to impose transparency requirements independently of the trading model. If calibrated carefully, such requirements need not have an adverse impact on market liquidity.

(7) See Kohn (2011b).

(8) Anecdotal evidence suggests that the complexity of banks’ liability structures hinders market discipline. As does the practice of ‘window dressing’ (eg such as Lehman Brothers’ infamous ‘Repo 105’), which was particularly prevalent prior to the crisis — see Box 8 in Bank of England (2010).

(9) See Poshakwale and Courtis (2005) and Nier and Bauman (2006).

(10) See FSB (2011d) and the British Bankers’ Association’s Code of Practice for Financial Reporting Disclosure.

exposures to limit the potential for perception-driven contagion and more transparency over UK banks' forbearance practices.⁽¹⁾ As part of its ongoing macroprudential toolkit, this tool could be used by the FPC to enhance financial firms' regular reporting frameworks further and, on occasion, require disclosure of exposures to specific risks.

Pros and cons

It is sometimes argued that enhanced disclosure may reveal information that triggers an adverse market reaction. This risk is likely to be particularly acute for liquidity risks, given the potential for funding to dry up rapidly. Recent experience suggests certain types of disclosures can be helpful. Information revealed as part of the US Supervisory Capital Assessment Programme (SCAP) is thought to have helped to quell prevailing market stress.⁽²⁾ Indeed, market participants have generally placed more value on the disclosure accompanying US and European stress tests than the quantitative results themselves.

(1) See Bank of England (2011a).

(2) See Morgan *et al* (2010) and Greenlaw *et al* (2011). Hirtle *et al* (2009) describe details of the US SCAP stress tests.

4 Selection criteria

As stated in the Record of its September meeting, the interim FPC is minded to recommend initially a relatively narrow set of instruments for powers of Direction. While the set of tools should be sufficiently broad to offer the prospect of tackling the different sources of systemic risk identified in Section 2, their likely frequency of use should be taken into account when selecting among them. Beyond this, the Committee has discussed four overarching criteria that it values in choosing between the various policy instruments. These should be regarded as supplementary to the three HM Treasury criteria set out in Section 1.

The first is the effectiveness of a tool in mitigating systemic risk. Instruments are likely to differ in their suitability for tackling sources of systemic risk, and their appropriateness may vary over time and according to circumstances. While the FPC will continue to undertake further work to analyse the transmission channels and impact of various tools, ultimately, knowledge will improve through practical experience. Given this, the Committee will place particular importance on tools for which there are clearly articulated transmission channels.

Effectiveness also depends on the speed and durability of an instrument's impact on systemic risk and its robustness to uncertainty, regulatory arbitrage and international leakage. Policies that take a significant amount of time to take effect may leave the financial system exposed to risk for too long. Experience of financial regulation, ranging from Glass-Steagall to Regulation T to the Basel Capital Accords, has highlighted how policy interventions may over time be rendered impotent due to circumvention of rules or the overseas migration of activities.

The second criterion is the efficiency with which a tool successfully achieves a reduction in systemic risk in relation to its costs, adverse effects and unintended consequences.

In its February 2011 consultation paper, HM Treasury emphasised that the FPC's mandate does not *'require or authorise the Committee to exercise its functions in a way that would in its opinion be likely to have a significant adverse effect on the capacity of the financial sector to contribute to the growth of the UK economy in the medium or long-term'*.⁽¹⁾ Clearly, some macroprudential interventions may have short-term implications for economic activity. But they should reduce the likelihood of financial crises and the large output costs associated with them, and thus prove beneficial to the smooth functioning of the economy over the medium to longer term. This weighing of costs and benefits may, however, differ across different instruments.

Efficient tools should also limit the potential for adverse, unintended consequences on financial institutions and the efficient functioning of financial markets. And other things being equal, tools should also be simple and congruent with microprudential regulation so as to reduce the administrative burden on firms and regulators, including, for example, the data, systems and personnel needed to comply with regulations and to enforce them.

The third criterion is transparency about the nature and use of the macroprudential tool. Measures whose exercise is seen as arbitrary or difficult to understand are unlikely to be the most effective components of the macroprudential toolkit. Using tools that are well understood will help the Committee to explain its actions to market participants and account for them, including through Parliament, to the wider public.

The fourth criterion is the tool's coverage and independence. As noted above, the set of tools should be sufficiently broad to offer the prospect of tackling the main sources of systemic risk. But degrees of overlap between different tools for targeting similar risks should be taken into account when deciding between them.

(1) See HMT (2011a).

5 Conclusion and next steps

Effective macroprudential policy instruments are important to the FPC's ability to meet its objectives. This Discussion Paper describes a range of possible tools that may be helpful in tackling the sources of systemic risk, and discusses some characteristics that might be helpful in choosing between them. Comments and reactions are actively solicited on any of the ideas expressed in this Discussion Paper but particularly in relation to:

- (a) Whether there are any additional tools that the Committee should be considering.
- (b) Whether the Committee focused on the right instruments in its preliminary discussions at its September 2011 meeting.
- (c) Whether the criteria that are set out to assess the merits of different tools are sensible and sufficient.

Where appropriate, the FPC will revise its set of tools under consideration and selection criteria in light of comments received. Over the coming months, it will continue to undertake further analysis of potential tools. It will use its

March 2012 meeting to assess different tools against a set of selection criteria. Following that, it will report to the Treasury with its recommendations for the permanent FPC's toolkit. For tools that are enshrined in secondary legislation, it will, where appropriate, subsequently issue policy statements setting out how it plans to employ each tool and the circumstances in which it might be used. This will assist in providing firms and markets with some predictability in how the FPC intends to utilise the macroprudential tools at its disposal.

Going forward, the FPC's understanding of how different instruments are likely to work will improve with their use. When making macroprudential interventions, the FPC will explain its decisions and seek to specify the impact it intends to have in terms of the type of indicators outlined in Annex 1. The twice-yearly *Financial Stability Report* will also contain a regular section summarising the policy measures the FPC has taken and assessing their implementation and impact. The interim FPC has already adopted this process.⁽¹⁾ In addition to the *Financial Stability Report* and associated press conference, the Committee will communicate its policy decisions via the Record of its quarterly meetings, via Parliamentary committee hearings, via the twice-yearly meetings between the Governor and Chancellor, and via speeches by FPC members.

(1) See Section 4 of Bank of England (2011c).

Annex 1: Indicators of systemic risk

Section 2 discusses how systemic risk built up in a number of past crises. This annex complements that discussion by setting out an initial review of the types of possible indicators that may be helpful for the FPC in its risk assessment and monitoring role. The identification of such indicators is an important area for further work as analytical approaches develop and data availability improves. And market innovation is likely to mean that the value of indicators will evolve over time and new indicators will emerge.

The FPC will need to consider a broad range of information in reaching its judgements — there is no unique indicator of systemic risk. Good indicators of time-varying systemic risk would highlight a need to build resilience during a period of exuberance, tackling the build-up of imbalances and vulnerabilities in a timely manner, and conversely a need to return to more normal resilience levels once the unusual threats had receded. Quantity-based, priced-based and model-based indicators may all be useful in this regard. Structural indicators can help to identify concentrations of risk, complexity and opacity in the financial system. Market and supervisory intelligence are essential.

Quantity-based indicators

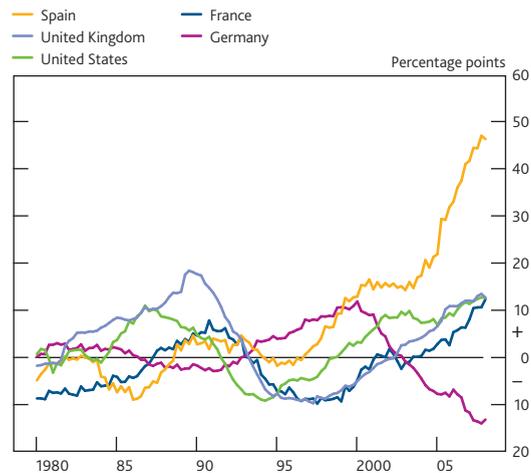
Studies have found that measures of excess credit growth can provide a useful forward-looking indicator of the risks of borrower default.⁽¹⁾ The Basel Committee on Banking Supervision has proposed the use of a credit-to-GDP gap measure — the difference between the ratio of the indebtedness of the household and corporate sectors to GDP and its long-term trend — as a guide for calibrating the countercyclical capital buffer.⁽²⁾ This indicator appears to have worked well as a signal of incipient vulnerabilities in various countries (Chart 2.1 and Chart A). Applied retrospectively, it signals a need to have increased UK banks' capital requirements prior to the recent crisis. But while these measures are useful indicators in the upswing, they tend to be a lagging indicator during the bust phase. So these (and other) measures need to be used with care.

A range of additional indicators could be developed building on the credit-GDP measure. For example, the Basel definition excludes intra-financial system credit, despite its potential cyclicity and importance in driving systemic risk. Augmenting the Basel measure to include exposures between financial intermediaries would have provided a stronger signal of vulnerabilities in the United Kingdom ahead of the recent crisis than the standard credit gap metric (Chart B).

Indicators of the resilience of lenders are also likely to be useful in signalling emerging risks. The simplest indicator to look at would be the leverage of major UK banks and globally significant international financial institutions. This measure

could also be illustrated in risk-weighted 'Basel' terms. Moreover, as discussed in Section 2, the terms and conditions in financial contracts, such as loan to value and margin requirements may also indicate rising risk appetite.

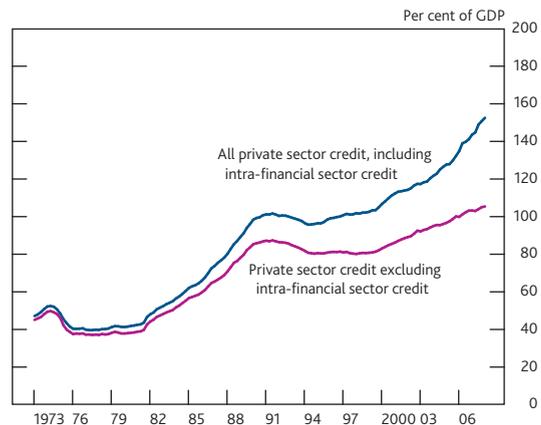
Chart A Credit-to-GDP gaps^{(a)(b)}



Sources: Bank for International Settlements, IMF *International Financial Statistics* and Bank calculations.

- (a) Based on the guidance variable for the Basel III countercyclical buffer. Credit is defined as claims on the domestic private non-financial sector. The credit-to-GDP gap is calculated as the percentage point difference between the credit-to-GDP ratio and its trend, where the trend is based on a one-sided Hodrick-Prescott filter with a smoothing parameter of 400,000. For a full description of the calculation see BCBS (2010b).
 (b) Last data point is 2007 Q4.

Chart B UK credit-to-GDP ratios: the role of intra-financial sector credit^{(a)(b)}



Sources: ONS and Bank calculations.

- (a) Credit defined as M4 lending.
 (b) Last data point is 2007 Q4.

(1) Borio and Lowe (2002, 2004); Borio *et al* (2010a); Aikman *et al* (2010); Schularick and Taylor (2012).
 (2) See BCBS (2010b) on the reference guide and Borio *et al* (2010a) for a more comprehensive review.

Price-based indicators

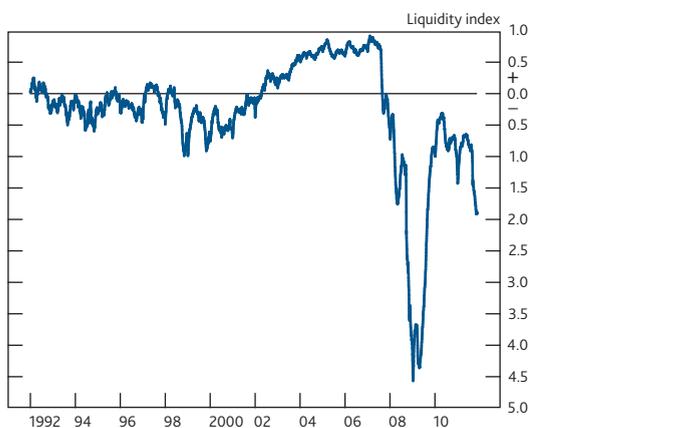
Changes in overall credit growth can be driven by both demand and supply factors. But expansions driven by unsustainable levels of supply may be more likely to signal building systemic risk.⁽¹⁾ This suggests there is value in analysing information derived from asset prices, such as equities, corporate bonds and property, alongside quantity-based indicators. Indeed, many studies have found property price inflation to be a consistent forward-looking indicator of borrower stress in its own right.⁽²⁾

Low long-term real interest rates and falling risk premia can be indicative of a 'search for yield' environment and relaxed credit supply in financial markets. For instance, the rise in equity prices from 2002 onwards was driven, in part, by low equity risk premia, which signalled increasing risk appetite across the financial system. Credit spreads in a broad range of sectors also became compressed during this period (**Chart 2.7**).

Composite and model-based indicators

Some studies have proposed composite indicators as a complement to price-based indicators. For example, the 'Systemic Risk Diagnostic' developed by the European Central Bank assesses the probability of a systemic event based on both macroeconomic and financial conditions.⁽³⁾ The Bank of England has produced an indicator of liquidity conditions, combining bid-ask spreads, liquidity premia and market depth measures into a single measure (**Chart C**). This picks up a degree of persistent exuberance in perceptions of liquidity before the crisis and a dramatic deterioration in conditions starting in late 2007.

Chart C Financial market liquidity^{(a)(b)}



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

- (a) The liquidity index is based on a simple average of several liquidity measures, and shows the number of standard deviations from the mean, normalised on the period 1999–2004. The series shown is an exponentially weighted moving average of the index itself. The index is more reliable after 1997 as more underlying measures are included after that date.
- (b) Until 2008, the index is based on original methodology, incorporating nine liquidity measures (published in previous issues of the Bank of England's *Financial Stability Report*). From 2008, the index has been revised due to data problems with one of the measures. By replacing that measure with a proxy, it is possible to continue with a revised index which closely tracks the original index during past periods.

Stress testing is an important forward-looking tool that can be used to assess the ability of the financial system to withstand severe outcomes in the economy and financial markets (see Annex 2 for a description of how the FPC could use this as a macroprudential tool). In the United Kingdom, the FSA runs regular bottom-up, bank-level, capital and liquidity stress-testing exercises. This is complemented by top-down macroeconomic stress tests run by the Bank of England. There is a growing recognition of the need to augment existing stress-testing techniques with amplification channels and feedback effects.⁽⁴⁾ The Bank of England's Risk Assessment Model for Systemic Institutions (RAMSI) is an example of a framework that is being developed to incorporate such effects.⁽⁵⁾

Indicators of concentration risk, opacity and complexity

These metrics relate to the cross-sectional dimension of systemic risk discussed in Section 2.2. Market or institutional concentrations of activity in key areas, such as credit provision, interbank markets or payment systems, may highlight structural vulnerabilities (**Charts 2.10** and **2.11**). And network techniques may be used to model contagion risk across financial intermediaries. Composite measures, such as proposed by the BCBS, or statistical measures based on market prices and correlations can also be useful in identifying systemic importance and thus changes in the distribution of risk.⁽⁶⁾

Opacity and complexity, by their nature, can be hard to measure directly. Instrument complexity could be indicated by wide variations or excess volatility of pricing (**Chart 2.12**), or the speed with which the market becomes illiquid during periods of stress. And market uncertainty in the prices of different issuers' funding instruments could signal opacity of the issuing institution.

Market and supervisory intelligence

Market intelligence complements quantitative metrics. Interactions with market participants can improve policymakers' ability to identify and highlight emerging risks and provide a better understanding of the complexities of financial markets. For example, market intelligence recently pointed towards the rapid growth and evolution of the exchange-traded funds industry.⁽⁷⁾ And well before the crisis, it highlighted the risks involved in collateralised debt obligations.⁽⁸⁾ Surveys provide another source of qualitative information: the Bank's *Systemic Risk Survey* quantifies and

(1) See Kannan *et al* (2009).

(2) For example, Borio and Drehmann (2009).

(3) Schwaab *et al* (2011).

(4) For example, see Brunnermeier *et al* (2011).

(5) Aikman *et al* (2009).

(6) BCBS (2011); Acharya *et al* (2010); Adrian and Brunnermeier (2011); Borio *et al* (2010b); Brownlees and Engle (2011).

(7) See Bank of England (2011d).

(8) See Rule (2001).

tracks, on a twice-yearly basis, market participants' perceptions of financial stability risks.

Going forward, as the PRA integrates into the Bank of England group, microprudential supervisory inputs will become increasingly helpful in spotting emerging risks. Problems identified at a small set of banks through the supervisory process could highlight the potential for more sector-wide/systemic concerns, which might need further investigation. Supervisory peer group analyses will also provide a rich source of information in this respect.

Annex 2: Additional macroprudential instruments

This annex outlines some potential macroprudential instruments that the Committee believes may warrant consideration, but decided not to focus on during their initial discussions in their September policy meeting. It may discuss these tools at its March meeting in light of responses to this Discussion Paper.

Sectoral liquidity requirements, limits on exposures to particular asset classes, restrictions on particular sources of funding, and stress testing are all primarily geared towards time-varying risk. Calibration of surcharges for systemically important financial institutions is more focused on cross-sectional risk.

Sectoral liquidity requirements

In the same way that variable risk weights target vulnerabilities in specific asset classes, sectoral adjustments could be made to the granular buckets which constitute potential macroprudential liquidity instruments such as the LCR and NSFR. This could help to discourage reliance on particular funding sources or over/underexposures to particular illiquid or liquid asset classes. By targeting concentrations of liquidity risk, use of such a tool could make the system more resilient to the loss of specific types of funding and/or promote changes in the asset profile of banks. By nipping emerging problems in the bud, the targeted approach could also help moderate credit cycles fuelled by funding from specific sectors. But, as with sectoral capital requirements, it could also result in risk being shifted to other sectors, thereby potentially undermining the intended increase in system-wide resilience — a ‘water bed’ effect. Sectoral requirements could also encourage opaque funding structures for arbitraging them. And they may become politicised, particularly if sectors were defined on the basis of residency.

The recent crisis highlights particular sectoral liquidity risks. For instance banks’ overreliance on funding from money market mutual funds (MMMFs) probably contributed to the collapse in interbank markets when funding was withdrawn. An increase in the outflow factors in liquidity rules with respect to MMMF funding could have assisted in discouraging excessive reliance on such funding and/or ensured that banks held liquid assets commensurate with its riskiness. Recent measures introduced in emerging economies in response to large capital inflows provide some illustration of how sectoral liquidity tools might work in practice. For instance, in early 2011, Brazil imposed liquidity reserve requirements on banks’ short dollar positions. This was a complementary measure to the reintroduction in March 2008 of a tax on capital inflows. The evidence suggests that this tax had some short-term effects on Reales/US dollar positions.

Limits on exposures to particular asset classes

This tool can be seen as the quantity-based or ‘quota’ equivalent of higher risk weights on risky assets and could be used to restrict exposures to exuberant sectors. The limits could be expressed relative to total assets or total regulatory capital. In the limit, banks could be banned from holding particular asset classes. An extension of the tool would be to ban products on a market-wide basis. A variant would be to apply the limits to single-name exposures as under the existing Large Exposure (LE) rules.

Quantitative limits on banks’ exposures to particular sectors would enhance the resilience of the financial system to shocks affecting specific sectors and help to lean against excessive growth in credit and leverage at the sector level. Similarly, varying LE rules or overall limits on intra-financial system exposures could help to reduce network risk. But the tool could be ineffective if it is not possible to define sectors sufficiently tightly or if risk is shifted, or redefined, into other sectors. Incorrectly calibrated limits could also entail economic costs if they prevent economically valuable loans from being extended. In an intra-financial system context, the limits may also constrain the efficient distribution of risk across institutions. Decisions which single out particular sectors could also become politicised as they have obvious distributional effects.

Limits on particular sources of funding or funding instruments

This tool can be seen as the quantity-based or ‘quota’ equivalent of sectoral liquidity requirements and could be used, for example, to limit banks’ reliance on particular funding sources or restrict the extent of covered bond issuance or asset encumbrance. The limits could be expressed relative to total balance sheet size or some measure of liquid assets. A limit of zero for a particular funding source would be equivalent to banning banks from using it. An extension of the tool would be to ban particular funding structures on a market-wide basis. And a variant would be to apply funding limits to single-name creditors — a ‘large liability’ restriction.

Quantitative limits on particular funding sources or issuance of certain types of funding instruments would strengthen the resilience of the financial system to sudden withdrawals of funding or drops in investor demand for particular instruments. Limits could also help to lean against unsustainable credit growth fuelled by a particular form of (potentially mispriced) borrowing by banks and/or financial institutions. But the tool could be ineffective if it is not possible to define sectors sufficiently tightly or if risk is shifted, or redefined, into other sectors, especially given the difficulty in identifying true end-investors in funding instruments. It may also constrain funding flexibility in a crisis scenario. Incorrectly calibrated limits could entail economic costs if they prevent economically valuable transactions from taking place.

Decisions which single out particular sectors could also become politicised, particularly if they are defined on the basis of residency.

Stress testing

This tool would allow the FPC to Direct the PRA to use a specific macroeconomic stress scenario to anchor firm-specific Pillar 2 capital requirements.⁽¹⁾ This could be used to build capital against specific risks, and as such, may overlap with the sectoral capital requirements tool described in the main text.

The FPC could adjust the scenario on a regular basis, according to its risk appetite and its assessment of systemic risk. In keeping with current practice, the anchor scenario could be disclosed to the market to enhance confidence in the ability of UK firms to withstand system-wide stress. The UK authorities do not set Pillar 2 capital requirements for incoming EEA branches so this tool will not affect such firms.

Calibration of surcharges for systemically important financial institutions

This tool would enable the FPC to change the calibration of prudential rules focused specifically on the group of firms designated as systemically important. Systemically important financial institutions (SIFIs) pose particular risks to financial stability because their failure or distress is likely to cause widespread disruption. Tighter capital or liquidity

requirements for SIFIs reduce the probability of their distress or failure and can help to limit moral hazard stemming from expectations of government support. They can also incentivise banks to reduce their systemic importance. At the same time, they may pose costs to the real economy. Power over the scale of such add-ons would allow the FPC to calibrate its position on this risk-resilience trade-off both to its risk appetite and to changes in the balance of the trade-off driven by structural change.

The G20 has agreed that SIFIs should be required to hold additional capital over Basel III standards. As a first step, they have agreed and announced a schedule of surcharges for global systemically important banks (G-SIBs) that increases in line with measured systemic importance.⁽²⁾ Separately, a number of countries have recently announced plans to introduce capital surcharges for their domestic systemically important financial institutions, including Ireland, Sweden, China and the Netherlands. In the United Kingdom, the Independent Commission on Banking has proposed a similar approach towards banks considered important to the domestic financial system.⁽³⁾ The FPC may only need to update its calibration stance on an occasional basis, suggesting that powers of Recommendation may be adequate for any action deemed necessary in this area.

(1) The FSA currently publishes the anchor scenario used as a basis for calculating firm-specific capital planning buffers within Pillar 2. These buffers are calculated to ensure the relevant firm has sufficient capital reserves to continue to operate through a severe, but plausible stress.

(2) See FSB (2011a).

(3) See ICB (2011).

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