

Financial Stability Report

October 2007 | Issue No. 22



BANK OF ENGLAND





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The Bank of England has two core purposes — monetary stability and financial stability. The two are connected because serious disruption in the financial system would affect the implementation and effectiveness of monetary policy, while macroeconomic stability helps reduce risks to financial stability.

The Bank's responsibilities for monetary stability are set out in the Bank of England Act 1998. Responsibility for financial stability in the United Kingdom is shared between the tripartite authorities — HM Treasury (HMT), the Financial Services Authority (FSA) and the Bank of England. Their roles are set out in a Memorandum of Understanding (MoU).⁽¹⁾

The Bank's responsibility for contributing to the maintenance of the stability of the financial system as a whole derives from its responsibility for setting and implementing monetary policy, its role in respect of payment systems in the United Kingdom and its operational role as banker to the banking system. The Bank aims to bring its expertise in economic analysis and its experience as a participant in financial markets to the assessment and mitigation of risks to the UK financial system including, if necessary, helping to manage and resolve financial crises. In so doing, the Bank works closely with authorities overseas on issues relevant to the stability of the UK financial system, including the international financial architecture and regulatory frameworks.

The *Financial Stability Report* aims to identify the major downside risks to the UK financial system and thereby to help financial firms, authorities overseas and the wider public manage and prepare for these risks. The *Report* is produced half-yearly by Bank staff under the guidance of the Bank's Financial Stability Board, whose best collective judgement it represents.

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This document was delivered to the printers on 23 October 2007 and, unless otherwise stated, uses data available as at 15 October 2007.

The *Financial Stability Report* is available in PDF at www.bankofengland.co.uk.

(1) The tripartite Memorandum of Understanding was revised in March 2006 and is available at www.bankofengland.co.uk/financialstability/mou.pdf.

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Overview

The resilience of the United Kingdom and the international financial system has been severely tested in the past few months. A gap between the information available to originators and end-investors, and leveraged position-taking by some investors, have magnified a rise in arrears on US sub-prime mortgages into a period of severe global market turmoil. Marked-to-market losses on assets linked to these mortgages have heightened uncertainty about the composition and value of all structured credit products. Leveraged loan markets have also been affected. The consequent loss of liquidity in these markets has left banks holding assets which they had expected to transfer off their balance sheets and facing obligations to off balance sheet vehicles whose normal commercial paper funding has dried up. This reintermediation of risks has led some banks to hoard liquidity to meet large, but uncertain, funding needs. In combination with increased counterparty risk, this has led to a sharp tightening in money markets, which has affected banks that are dependent on these markets for finance. In the United Kingdom, these pressures led Northern Rock to turn to the UK authorities for liquidity support (see Box A).

While it is too early to make a full assessment, some lessons are already clear including the need for greater focus on liquidity management, more rigorous stress testing, greater transparency in the composition and valuation of structured products and improved disclosure on institutions' risk exposures, including to off balance sheet vehicles. Within the United Kingdom, crisis management tools also need to be strengthened. Action in these areas and the continuing strong capital position of the UK banking system should anchor confidence as risk is repriced. There have been signs of a recovery in some markets, though a return to earlier conditions would be undesirable as that involved an underpricing of risk. A period of tighter credit conditions, especially for higher-risk borrowers, should be expected. And in the short run, the financial system in the advanced economies remains vulnerable to new shocks, whether in the credit markets which have been most affected to date or, for example, in the equity or commercial property markets.

Chart 1 The phases of the crisis



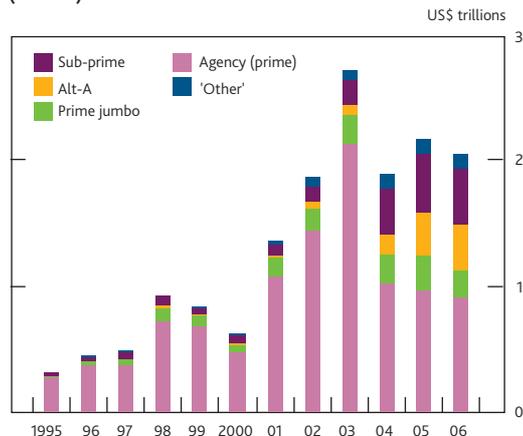
A severe shock to the financial system

The resilience of the United Kingdom and international financial system has been severely tested in the past few months. This *Report* provides an initial analysis of the causes of the market turmoil — the key phases of which are summarised in **Chart 1** — and the impact on UK financial stability. It also highlights areas where lessons need to be learnt to strengthen the system in the future.

What caused the turmoil?

A longstanding 'search for yield' in financial markets...
The backdrop to recent events was a longstanding 'search for

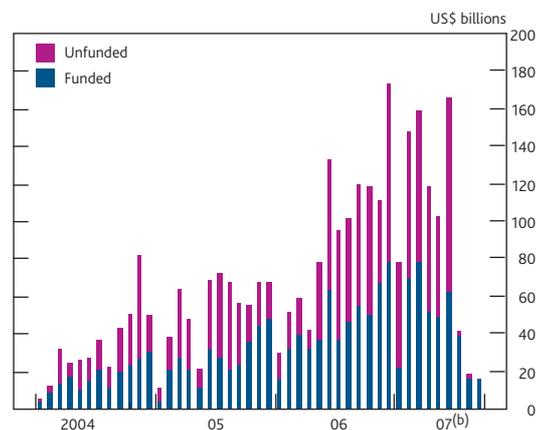
Chart 2 US residential mortgage-backed securities (RMBS) issuance^(a)



Source: UBS.

(a) Issuance is on a gross basis.

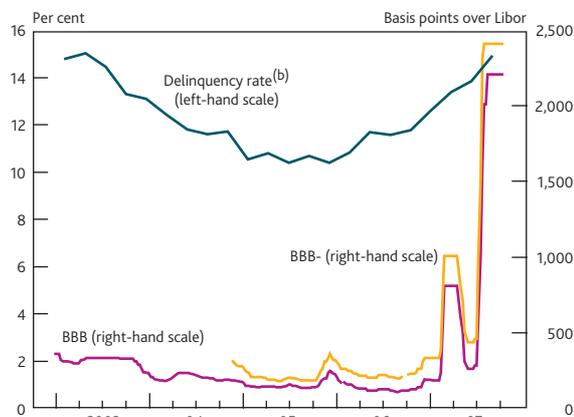
Chart 3 Global collateralised debt obligation issuance^(a)



Source: JPMorgan Chase & Co.

(a) Funded CDOs refer to instruments backed by corporate bonds; unfunded CDOs refer to instruments backed by credit default swaps.
 (b) Unfunded data for September not available.

Chart 4 US sub-prime mortgage delinquencies and home equity loan index spreads^(a)



Sources: Lehman Brothers, Mortgage Bankers Association and Thomson Datastream.

(a) The home equity loan asset-backed security sector is an amalgam of subsectors related to different underlying mortgage products, including first lien sub-prime mortgage loans, closed-end second mortgage loans, so-called 'high LTV (loan to value)' mortgage loans, and home equity lines of credit. This chart shows the higher-risk tranches of securities backed by such lending.
 (b) US sub-prime residential mortgages 30+ days delinquency rate.

yield' in financial markets — a desire by investors to maintain high returns in a low interest rate environment. This had boosted demand for a range of higher yielding and riskier financial products, including US sub-prime residential mortgage-backed securities (RMBS) (Chart 2) and leveraged corporate loans. It had also stimulated a wave of innovation, creating often opaque and complex financial instruments with high embedded leverage. Greater appetite for structured instruments was evident in the rapid rise in issuance of collateralised debt obligations (CDOs) (Chart 3).

For some time the Bank, the FSA and other official sector institutions had raised questions about the pricing of risk in these markets. Market contacts had also suggested that risk premia were too low, but were afraid to stand against the tide for fear of losing market share.

... and weakened credit risk assessment standards.

In the April 2007 Report, the Bank highlighted concerns about the depth and quality of credit risk assessment by those originating and purchasing credit instruments.⁽¹⁾ Financial institutions have been placing increased emphasis on the so-called 'originate and distribute' business model, which provides a source of finance for new loans, but also makes financial institutions' funding more dependent on sustained demand for credit instruments in capital markets.

This model has boosted credit supply and contributed to a large expansion of financial institutions' balance sheets in recent years. It has also allowed risk to be more widely dispersed across the system as a whole. But the model involves a long chain of participants from the original lender to the end-investor. Those at the end of this chain, who bear the final risk, have less information about the underlying quality of loans than those at the start. And those originating loans and constructing financial instruments may not face strong enough incentives to assess and monitor credit risk as carefully as end-investors would wish.

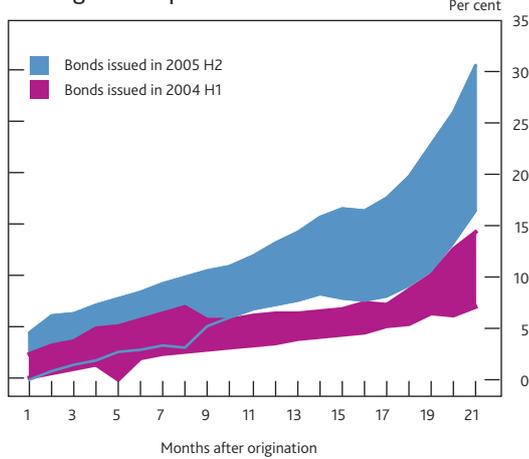
Market mechanisms have emerged which help address these weaknesses. But sustained benign economic conditions and previously buoyant market liquidity appear to have fostered complacency among some investors, undermining standards of due diligence. That has exacerbated the information and incentive problems inherent in the originate and distribute model. These problems have been a key source of the recent turmoil in markets.

How did the market turmoil unfold?

Arrears on US sub-prime mortgages had been rising gradually for some time (Chart 4). But in July this provoked a sharp

(1) See April 2007 Report, pages 6–7.

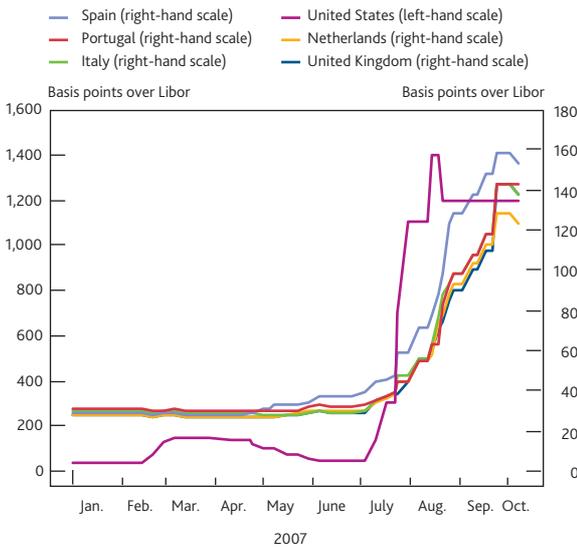
Chart 5 Range of delinquency rates on mortgages backing US sub-prime securities^{(a)(b)}



Sources: Bloomberg and Bank calculations.

(a) 60+ days delinquent, including foreclosures.
 (b) Range of five RMBS (on each date) issued by (the same) major issuers.

Chart 6 Residential mortgage-backed securities spreads across selected countries^{(a)(b)}



Source: Lehman Brothers.

(a) A-rated five-year spreads over Libor except for Spain which uses ten-year spreads over Libor.
 (b) All countries' data are prime residential mortgage-backed securities except for the United States which uses home equity loans, which will tend to be of lower quality.

increase in credit spreads on US sub-prime securities. Although the US sub-prime market is small in relation to the global financial system (as discussed in Box 1 on pages 20–21), information problems led to huge uncertainties about the nature and source of losses. These uncertainties spilled over with unexpected speed and force across global markets, affecting the United Kingdom and other banking systems.

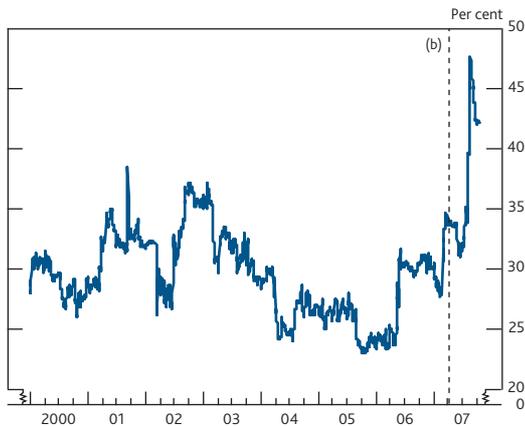
Rising uncertainty about structured credit instruments...

US sub-prime spreads had risen in early 2007, before rallying somewhat. A key trigger for the more recent rise in spreads was when delinquencies on some vintages of sub-prime loans rose to levels which threatened losses on ostensibly low-risk, highly rated tranches of sub-prime RMBS (Chart 5). Chart 5 also shows that the performance of different loan pools included in structured instruments began to diverge more sharply than in the past. The value of structured credit instruments is highly sensitive to assumptions about levels and correlations of default on underlying loans, as illustrated in Box 2 on page 22. As previous assumptions were called into question by events, so too were the valuations of these instruments.

These developments provided a wake-up call to those investors who had not discriminated sufficiently between different assets. Valuation uncertainty rose sharply. From July, spreads on asset-backed securities rose across the globe (Chart 6). Ratings downgrades and changes in agencies' methodologies further undermined the confidence of some investors, prompting further selling of these assets. In August, market contacts reported that primary markets for asset-backed securities (ABS) — both sub-prime and prime assets — were effectively closed in many countries. It appeared that, in the face of heightened uncertainty about valuation, investors were assuming that all such securities might be of poor quality. In secondary markets, asset price falls were compounded as investors sought to reduce leveraged positions in illiquid markets. These informational problems were greater still for more complex products, such as CDOs, with neither buyers nor sellers able to assess value accurately. As a result, issuance volumes dropped sharply (Chart 3).

A sequence of market events over the summer provided impetus to these developments. In the early summer, market contacts reported that the difficulties experienced by creditors of two hedge funds linked to Bear Stearns in realising the value of structured credit instruments held as collateral indicated severely impaired secondary market liquidity for these instruments. And the emergence in July and August of problems at IKB and Sachsen banks in Germany, and the announcement by BNP Paribas in early August that it was temporarily suspending redemptions from several funds, demonstrated the global spread of valuation difficulties. These

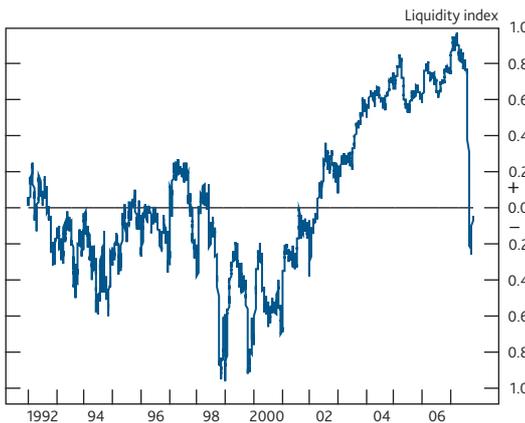
Chart 7 Comovement between option-implied volatility across assets^(a)



Sources: British Bankers' Association, Chicago Mercantile Exchange, Citi, Eurex, Euronext.Liffe, Royal Bank of Scotland and Bank calculations.

- (a) Proportion of variation in changes in three-month option-implied volatility of UK, US and euro-area equities, interest rates and exchange rates explained by the first principal component over a six-month rolling window.
 (b) April 2007 Report.

Chart 8 Financial market liquidity^(a)



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

- (a) The liquidity index shows the number of standard deviations from the mean. It is a simple unweighted average of nine liquidity measures, normalised on the period 1999–2004. Data shown are an exponentially weighted moving average. The indicator is more reliable after 1997 as it is based on a greater number of underlying measures. Data have been revised following methodological changes. See April 2007 Report, Box 2: Financial market liquidity, page 18.

events highlighted how inadequate information about the location of exposures in global credit markets could translate into sharply heightened uncertainty about counterparty risk.

...for a time affecting the pricing of all risky assets.

Problems in structured credit markets were associated with a rise in required asset returns, a synchronised rise in volatility (**Chart 7**) and markedly lower liquidity (**Chart 8**) across a range of markets. Corporate credit spreads rose sharply. And issuance in leveraged loan markets largely ceased in July as demand from collateralised loan obligations managers fell, removing a key financing channel for a large pipeline of leveraged buyout deals that had built up in previous months. Equity markets also declined, though the impact was temporary. The US dollar depreciated further, with contacts reporting an unwinding of yen-funded carry trade positions.

How were banks affected?

A reintermediation of risk...

The effective closure of (ABS) and leveraged loan markets left major financial institutions needing to fund growing warehouses of assets that they had not expected to retain on their balance sheets. In addition, the provision of support to IKB bank in Germany in late July highlighted the commitments of a number of banks to off balance sheet investment vehicles.⁽¹⁾ These vehicles hold long-maturity structured credit instruments, which are financed largely by short-maturity asset-backed commercial paper (ABCP). As uncertainty about the value of their assets increased, the cost and availability of funding to these vehicles tightened (**Charts 9 and 10**). In some cases, sponsoring banks have taken the assets in these vehicles back onto their balance sheets. In other cases, liquidity support lines have been called or vehicles have been wound down, increasing selling pressure in some markets.

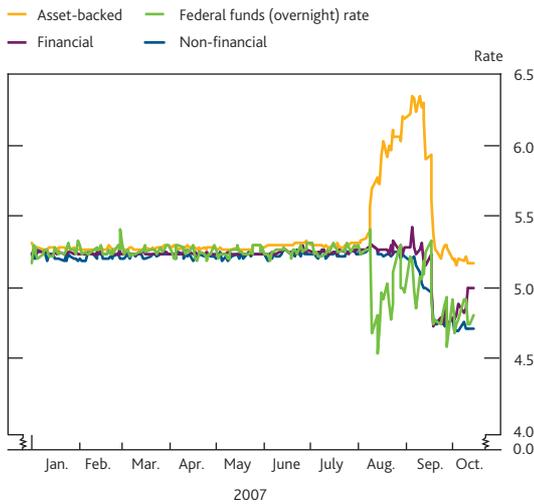
...leading to tighter money market conditions...

Market intelligence suggests that banks have stockpiled liquidity to fund the actual and potential expansion of their balance sheets. Some asset managers have also built up precautionary liquidity balances to cover potential redemptions. The increase in demand for liquid assets is one reason why yields on government securities have fallen in all the major economies. It also helps to explain why the compensation demanded by banks in the United Kingdom and other countries to lend to other banks over periods longer than overnight has risen (**Chart 11**) and why interbank lending has been increasingly concentrated at shorter maturities.

In principle, those funds that were invested previously in ABCP or in ABS should flow back as deposits to the banking system, and be redistributed through money markets to help meet

(1) A box in the *Bank of England Quarterly Bulletin*, 2007 Q3, page 348 provides details on different types of asset-backed commercial paper funded vehicles.

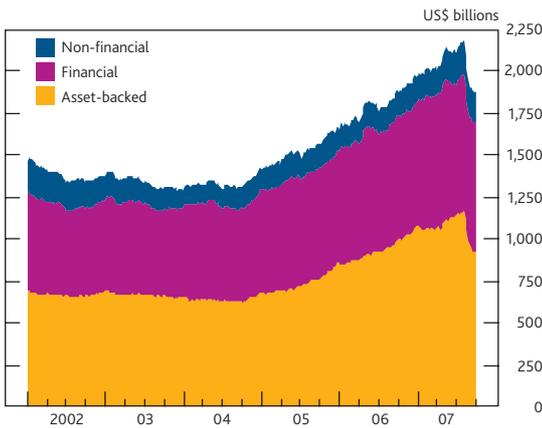
Chart 9 US\$-denominated commercial paper and Fed funds rate^(a)



Source: Board of Governors of the Federal Reserve.

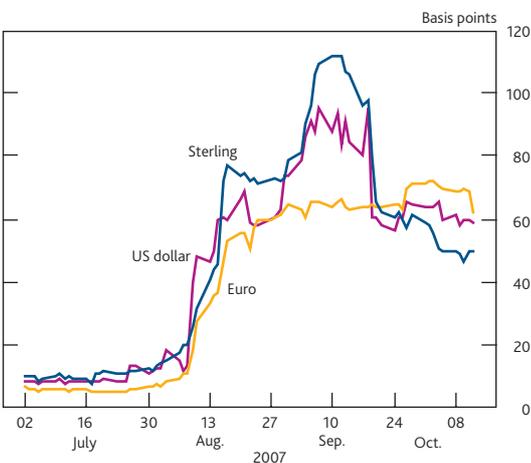
(a) 30-day, AA commercial paper rates.

Chart 10 US\$-denominated commercial paper outstanding



Source: Board of Governors of the Federal Reserve.

Chart 11 Spreads of international three-month interbank rates to three-month expected policy rates^(a)



Source: Bloomberg.

(a) Three-month Libor spreads over comparable overnight index swap rates.

banks' funding needs. In practice, stockpiling of liquidity to meet increased, but uncertain, needs, and heightened perceptions of counterparty credit risk have impaired this redistribution across the banking system. That has led to some tiering within the UK banking system, evident in a wider dispersion of market perceptions of credit risk (Chart 12). As term funding has matured, some institutions have been forced to raise additional funds in short-term markets, reducing their funding maturity. This 'snowballing' effect of increasing day-to-day funding needs has then further increased liquidity and counterparty risks.

...and particular problems at Northern Rock.

Northern Rock was particularly badly hit by problems in securitisation markets and by the concurrent disruption in money markets. As Box A discusses, these pressures led to Northern Rock turning to the UK authorities for liquidity support. In the light of the shock to the UK banking system following the subsequent depositor run, the Bank has also offered term liquidity to the banking system against a wider range of collateral than previously. In the period since that announcement and following a cut in US interest rates, UK term money market spreads have fallen to levels close to, and even below, those in the euro area and United States (Chart 11).

What lessons need to be learnt?

Most of the individual ingredients of recent stress in the UK financial sector had been highlighted in advance, including by the Bank in previous Reports — for example, the impact of the search for yield and risk transfer markets on credit risk assessment standards and the risks to those financial institutions with a growing dependency on wholesale funding markets of impaired market liquidity. But few had predicted that these ingredients would combine in such a way and with such force.

In moving forward, there are several areas in which further work is needed by market participants and the authorities in the United Kingdom and internationally to restore confidence in the financial system (Table A):

- **Liquidity arrangements and planning.** Even well-established capital markets are prone to large and sudden changes in price and volume. The problems at Northern Rock have highlighted starkly the risks associated with the high dependence of some banks on wholesale funding markets (Chart 13). The events have also brought home to banks and regulators the need for adequate contingency plans against the risks that this business model entails. Enhanced stress testing is a key tool for exploring the resilience of contingency liquidity plans in such scenarios. The authorities in turn need to ensure that

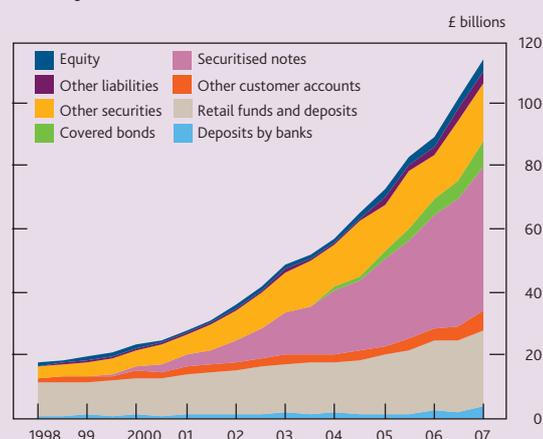
Box A

The funding crisis at Northern Rock

Background

On 1 October 1997, Northern Rock converted from a mutual-form building society to a stock-form UK bank. At the time of conversion it was a retail-funded lender, but from the second half of 1999 it embarked on a growth strategy which was increasingly dependent on securitisation and other secured borrowing (Chart 1) in a range of currencies and targeting investors in both UK and foreign capital markets.

Chart 1 Northern Rock: balance sheet growth and liability structure — June 1998-June 2007



Source: Northern Rock Interim and Annual Reports.

Northern Rock has published IFRS based balance sheet data from 1 January 2004. In its UK GAAP balance sheet presentation prior to this, non-recourse securitised lending was deducted from assets and the notes issued by the securitisation vehicle excluded from the group's debt liabilities. To achieve comparability with the later IFRS data these amounts have been included as securitised notes for the period 1999 H1 to 2003 H2.

Northern Rock's rapid lending growth and funding concentration has been transparent. The bank roughly trebled its share of the UK mortgage market in eight years⁽¹⁾ but this was at the cost of a compression in its lending spreads — in both absolute terms and relative to those of other lenders. In their assessments of Northern Rock, the rating agencies had identified liquidity as a relative weakness while noting the bank's success in funding at long maturities and its efforts to diversify sources of financing. Nevertheless, it was seen as being well capitalised and having a good quality mortgage book with no retained exposure to UK sub-prime borrowers. It had relatively little unsecured consumer lending and was running down its commercial property book, part of which had been securitised. In August 2006 (Standard and Poor's) and April 2007 (Moody's) raised its debt ratings by one notch.

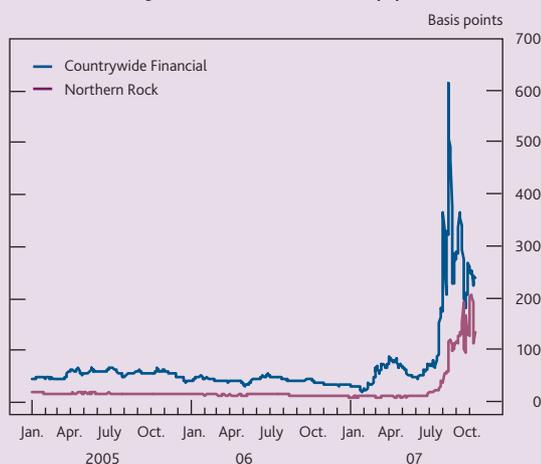
A potential weakness in the strategy was that, were the market appetite for securitisation notes or covered bonds suddenly to falter, Northern Rock would need to have in place alternative sources of funding to warehouse the increase in mortgage loans it would have otherwise expected to have securitised.

But the circumstances where its access to securitisation and covered bond markets became closed off could also be those where it would be confronted with difficulties in raising funds in wholesale money markets or in selling other good assets.⁽²⁾ In the event, this risk crystallised, with unexpected ferocity, despite the strength of other features of its business, including the quality of its assets, its operating cost efficiency and healthy capital position, all of which had appeared to make the risk of a sudden loss of market access remote.

Calm before the storm

Until late July, Northern Rock was untouched by US sub-prime problems. Its rapid growth and the change in the structure of its liabilities had had little impact on the markets' perceptions of its risk as a counterparty as measured by its CDS spread. Its experience had contrasted with the US mortgage lender Countrywide Financial, which had sub-prime exposure, and which was also subsequently to experience a short-lived run (Chart 2). During the first half of 2007, Northern Rock was able to raise £10.7 billion through its principal securitisation programme, Granite, and it completed three covered bond issues totalling £2.2 billion. Northern Rock's securitisations accounted for over 17% of all RMBS issuance by UK-based issuers in 2007 H1.

Chart 2 Five-year credit default swap premia

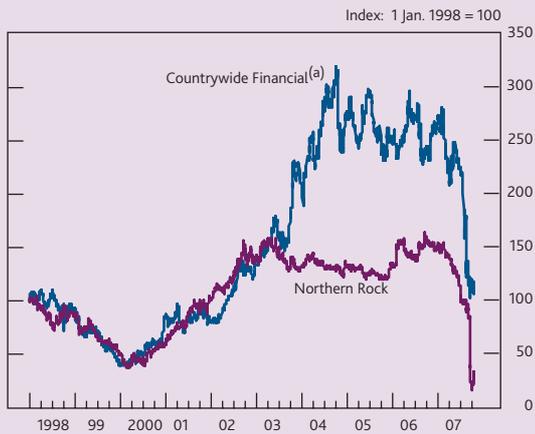


Source: Markit Group Limited.

While Northern Rock's credit spread remained stable, its share price had been under pressure from early 2007 because of concerns that earnings would be adversely affected if it were unable to expand its business at the pace planned (Chart 3). On 27 June it announced that it expected underlying profit growth in 2007 to be around 15%, at the lower end of the range 20% (+/- 5%) it had predicted at the time of its trading

(1) In 2007 H1 Northern Rock accounted for 9.7% (gross) and 18.9% (net) of UK mortgage lending. In 1999 H1 these shares had been only 3.6% and 6% respectively.

(2) This risk was identified in generic terms in the April 2007 Report, page 47.

Chart 3 Relative equity prices^(a)

(a) Countrywide's price is deflated by the S&P 500 index and Northern Rock's price by FTSE All-items index.

statement in April. By mid-August, press reports began to focus on the vulnerability of its earnings growth to the rising cost of wholesale funding.

Sub-prime problems spread to Europe...

In early August, the announcement that support had been arranged for IKB and Sachsen Bank, and difficulties experienced in valuing sub-prime related exposures by money funds sponsored by BNP and AXA, aggravated the uncertainty that had been building across credit markets globally. In money markets, funding costs increased sharply and maturities shortened significantly. In mid-August, Countrywide revealed accelerating mortgage-related losses and that it had drawn on contingent liquidity lines provided by a consortium of major international banks.⁽³⁾ Its credit spread rose, and its equity price fell, sharply. These and earlier developments soured the market for residential mortgage-backed debt generally, in the United States and elsewhere.

...embroiling Northern Rock

The system-wide deterioration in credit and money market conditions had been closely monitored by the tripartite authorities (the Bank, the FSA and HM Treasury). Northern Rock's CDS spread began to rise while its share price weakened further. On 14 August, the authorities discussed the potential problems that would be faced by Northern Rock were it to be unable to tap the securitisation and covered bond markets and face difficulties in securing new money market funding or rolling over existing market borrowing. Intensive liquidity monitoring arrangements were put in place and consideration began of the merits, mechanics and legal aspects of a support facility were this to prove necessary. Northern Rock itself continued to explore all possible financing and sale options. An overall solution to Northern Rock's funding problem was needed and as the prospects of a successful securitisation or takeover faded, it became clear that, individually, potential

wholesale lenders had little incentive to continue to provide funding given the bank's growing vulnerability.

By mid-September it had become apparent to Northern Rock that longer-term funding markets were closed to it. Rollovers were largely continuing but at shorter and shorter maturities. Unlike Countrywide, it lacked the option to draw on sufficient contingency liquidity and did not benefit from a third-party injection of capital. Instead the Northern Rock board sought an assurance of liquidity support from the Bank.

The authorities' response

Under the tripartite arrangements, both the FSA and the Bank are required to make separate assessments of the seriousness of threats to the financial system and both judged that the position of Northern Rock and the risks of contagion were sufficiently serious to warrant the Bank's support. The FSA also judged that Northern Rock was solvent, exceeded its minimum regulatory capital requirements and had a good quality loan book. On this basis, the Chancellor authorised the Bank to provide liquidity support.

To allay uncertainty, on 14 September the bank brought forward its profit warning. On the same day, a planned statement⁽⁴⁾ by the tripartite authorities confirmed that the Bank, in its role of lender of last resort, stood ready to make available facilities, both to Northern Rock and to other institutions that might face short-term liquidity difficulties in comparable circumstances, for the duration of the current period of market turbulence.

While the announcement contained the positive news that Northern Rock had access to a new source of funding, it also confirmed the extent of its difficulties and that led to a retail deposit run. Ways of combating this were discussed during the weekend of 15–16 September. On the evening of 17 September, the Chancellor announced that the Government would guarantee all Northern Rock's existing deposits during the current instability in the financial markets.⁽⁵⁾ That undertaking was extended on 20 and 21 September,⁽⁶⁾ when it was confirmed that the guarantee would cover existing (and renewed) unsecured wholesale funding.

(3) In Countrywide's case the announcement that its impaired access to market funding had required it to draw on contingent liquidity lines was greeted by a depositor run in some localities. However, the support given by the banks, including a subsequent equity injection by the Bank of America, together with the publication of detailed information on the bank's liquidity position, succeeded in stemming the outflow. US deposit protection arrangements also generally enable insured depositors to have access to their funds immediately, reducing the risk of a run beginning or spreading.

(4) Liquidity support facility for Northern Rock plc, www.hm-treasury.gov.uk/newsroom_and_speeches/press/2007/press_94_07.cfm.

(5) Statement by the Chancellor of the Exchequer on financial markets, www.hm-treasury.gov.uk/newsroom_and_speeches/press/2007/press_95_07.cfm.

(6) Northern Rock plc deposits, www.hm-treasury.gov.uk/newsroom_and_speeches/press/2007/press_96_07.cfm, and Northern Rock plc RNS, www.hm-treasury.gov.uk/newsroom_and_speeches/press/2007/press_northernrock_07.cfm.

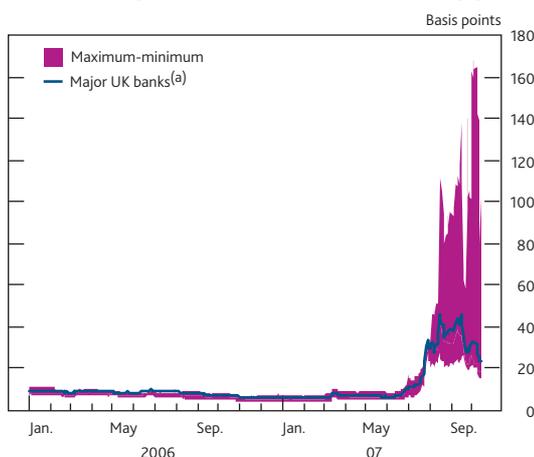
On 9 October, the scope of the Government’s guarantee was extended to cover new retail deposits, ie those initially made after 19 September.⁽⁷⁾ On 11 October, Northern Rock requested, and was granted, an additional facility from the Bank to enable it to pursue a full range of strategic options, and decide upon a course of resolution, which it committed to complete by February 2008.⁽⁸⁾ The additional facility (which is supplementary to the now frozen facility announced by the Bank on 14 September) is not subject to any specific borrowing

limit, is secured against all Northern Rock’s assets, and is repayable on demand. In view of the nature of the new facility, the Treasury has agreed to indemnify the Bank against any losses and other liabilities arising from its role in providing finance to Northern Rock during this period.

(7) Northern Rock plc deposits, www.hm-treasury.gov.uk/newsroom_and_speeches/press/2007/press_104_07.cfm.

(8) Extended guarantee and additional facility for Northern Rock plc, www.hm-treasury.gov.uk/newsroom_and_speeches/press/2007/press_107_07.cfm.

Chart 12 Major UK banks’ credit default swap premia



Sources: Bloomberg, Markit Group Limited, published accounts and Bank calculations.

(a) Asset-weighted average five-year premia.

Table A Key lessons from recent events

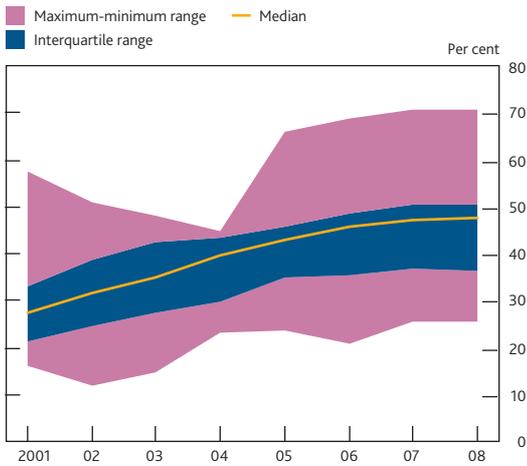
Area of weakness	Specific issues raised
Liquidity management	<ul style="list-style-type: none"> Underinsurance against closures of key funding markets. Inadequate recognition of contingent liquidity obligations to off balance sheet entities. Scenarios used in the stress testing of funding insufficiently severe.
Valuation of complex structured products	<ul style="list-style-type: none"> High dependency on models in valuation. Extent of investors’ reliance on a narrow ratings metric. Insufficient clarity in the composition and construction of instruments.
Opacity of structured credit exposures	<ul style="list-style-type: none"> Inadequate disclosure of exposures and losses. Lack of transparency in off balance sheet exposures.
Crisis management arrangements	<ul style="list-style-type: none"> Insolvency arrangements for banks. Deposit insurance regime. Improvements in tripartite arrangements. Underdeveloped practical arrangements for managing stress at an international institution.

regulation is providing the right framework for institutions to recognise and prepare for liquidity needs that can arise in their business, including those associated with off balance sheet commitments.

- The valuation of complex financial instruments.** The smooth functioning of markets in complex instruments depends on clarity about their content and construction. As discussed in Box 6 on page 56, rating agencies should support this process by clarifying the information available to investors on the risks inherent in products and the uncertainties around their ratings assessments. Recent events have demonstrated to investors the dangers of using ratings as a mechanical input to their risk assessment.
- Disclosure of institutions’ exposures.** In febrile financial market conditions, the benefit of the doubt is replaced by a fear of the unknown. Inadequate information about the final location of risk exposures has undermined the potential benefits of markets that transfer and disperse risks. Greater clarity about institutions’ exposures, including to structured instruments and off balance sheet entities, should help with counterparty risk assessment. As discussed in Box 7 on page 60, Basel II will require enhanced disclosure and will address some of the incentives under the current accord to shift risks to less visible parts of the financial system. As the new framework is implemented, it will be important to watch out for the emergence of any new and unintended distortions, and to ensure that disclosure delivers the uniformity and consistency needed to help market participants and the authorities gauge the size and distribution of exposures across the system as a whole.
- Domestic crisis management tools.** The crisis at Northern Rock has exposed shortcomings in UK crisis management tools. A recent tripartite consultation paper has highlighted several areas that need strengthening.⁽¹⁾ Tools used by the

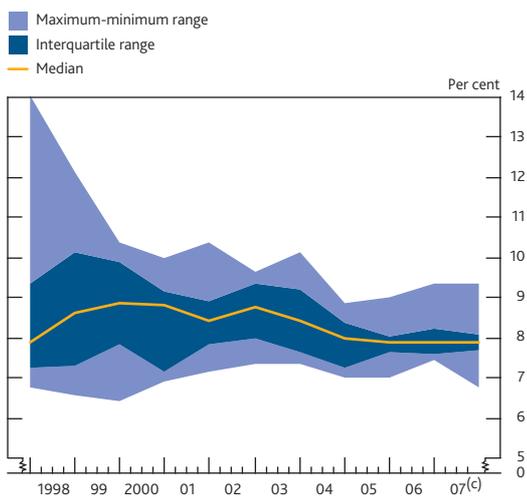
(1) HMT (2007), ‘Banking reform — protecting depositors: a discussion paper’, October 2007.

Chart 13 Major UK banks' wholesale funding as a percentage of total funding^{(a)(b)}



(a) 2007 data are as at 2007 H1.
 (b) Wholesale funding is defined as interbank deposits plus debt securities in issue. Total funding is wholesale funding plus customer deposits.

Chart 14 Major UK banks' Tier 1 capital ratios^{(a)(b)}



Sources: Published accounts and Bank calculations.
 (a) Tier 1 capital includes ordinary shares, associated reserves and retained earnings.
 (b) All ratios reported on a Basel I basis.
 (c) 2007 H1 figure.

Table B Price changes of risky assets

	Changes between:			Changes since: April 2007 Report
	31 Jan. 2003 to 29 June 2007	1 July to 31 Aug. 2007	3 Sep. to 15 Oct. 2007	
World equity index ^(a)	116	-3	8	10
MSCI emerging markets equity index ^(a)	265	1	18	36
Investment-grade bond spreads ^(b)	-74	26	3	25
Sub-investment grade bond spreads ^(b)	-432	125	-59	71
Emerging market bond spreads ^(b)	-506	55	-41	2
¥/US\$ exchange rate ^(a)	3	-5	1	-1
US asset-backed commercial paper spreads ^(b)	5	117	-68	51
Brent Crude oil price ^(a)	128	1	11	18

Sources: Bloomberg, Merrill Lynch, Reuters, US Federal Reserve and Bank calculations.
 (a) Per cent.
 (b) Basis points.

authorities in some other countries, such as a special insolvency regime for banks, are not currently available in the United Kingdom. The existing deposit insurance system has limitations. In addition, the retail run at Northern Rock brought home the danger that support from the central bank may stigmatise a bank and reinforce a loss of confidence, rather than allay it.

- **International crisis management arrangements.** Gaps in international arrangements for managing stress at a major global institution were not tested by recent events but are more pronounced than in a domestic context. Closing these gaps remains a priority for the Financial Stability Forum and EU authorities.

The outlook for UK financial stability

Markets are in a transitional state...

The strong capital position (Chart 14) and high profitability of UK banks entering the recent turmoil provide an anchor for the financial system during the transition from an environment in which liquidity and credit risks were underpriced to one in which they are assessed and managed more discerningly. The economic outlook also remains robust. This transition will, however, take some time and the path may not be smooth. The repricing of risks will require a much greater focus on the composition of structured instruments and on institutions' exposures to them. Losses will need to be distributed and disclosed across the financial system. Some investment vehicles may need to be wound up and some financial instruments may need to be restructured before market liquidity can be fully restored.

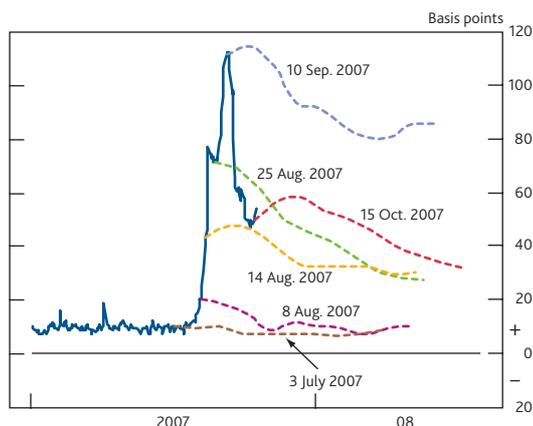
...with signs of a recovery in some markets

This transition is under way and there are signs of a recovery in some financial markets. Table B shows that sub-investment grade corporate credit spreads have fallen in recent weeks and there are also signs of greater issuance in leveraged loan markets. Equity markets have recovered and are near their pre-turbulence levels. ABCP spreads have fallen from their peak in early September, though remain high. The cost of borrowing for three months in interbank markets has fallen, though market participants expect spreads to remain high for some time and perhaps to rise further over the year-end (Chart 15).

But the financial system remains vulnerable...

While there are some encouraging signs of recovery, the near-term outlook for financial stability is uncertain. The structure of institutions' balance sheets and, in particular, their funding is more fragile than previously. And ongoing uncertainties about the valuation and location of exposures means that financial market expectations are sensitive to further shocks.

Chart 15 Risk premium on three-month UK interbank lending^(a)



Sources: Bloomberg and Bank calculations.

(a) Three-month sterling-Libor spread over sterling overnight index average swap rate. Dotted lines show three-month forward spreads.

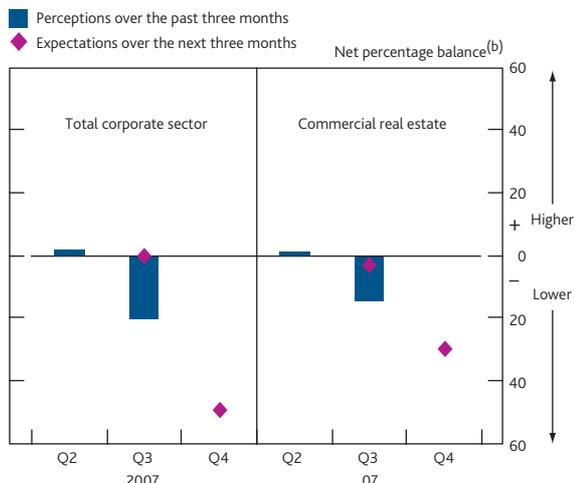
Table C Estimated capital and funding impact on major UK banks of unanticipated balance sheet expansion^(a)

	Extra funding (per cent) ^(b)	Extra risk-weighted assets (£ billions)	Change in Tier 1 ratio (per cent)	
			Current	Prospective ^(c)
Total	12.0	147.4	8.2	7.6
Of which:				
ABCP ^(d) -funded vehicles	7.7	109.1	-	(-0.40pp)
Leveraged buyouts	1.1	15.5	-	(-0.06pp)
MBS ^(e)	3.2	22.8	-	(-0.08pp)

Sources: Bank of England, Dealogic, Fitch Ratings Ltd and Bank calculations.

(a) Assumes a scenario under which banks cannot distribute any assets for the remainder of 2007 and are required to provide full liquidity support to all off balance sheet vehicles.
 (b) As a percentage of major UK banks' funding obtained from interbank deposits and debt securities in issue.
 (c) Assumes LBO pipeline, ABCP liquidity support lines subject to 100% risk-weighting, mortgages not securitised subject to 50% risk-weighting. Based on capital position at end-2006.
 (d) Asset-backed commercial paper.
 (e) Assumes value of mortgage-backed security (MBS) (defined as RMBS and CMBS) that cannot be issued by major UK banks is equal to average value of MBS issued by these institutions in 2006 Q3 and 2006 Q4.

Chart 16 Corporate credit availability^(a)



Source: Bank of England Credit Conditions Survey, 2007 Q3.

(a) A positive balance indicates more credit is available.
 (b) Net percentage balances are calculated by weighting together the responses of those lenders who answered the question. The blue bars show the responses over the previous three months. The magenta diamonds show the expectations over the next three months. Expectations balances have been moved forward one quarter so that they can be compared with the actual outcomes in the following quarter. See www.bankofengland.co.uk/publications/other/monetary/creditconditionssurvey070926.pdf for further details.

...to further problems arising from the market turmoil...

Against that backdrop, there is a risk that the pressures of recent months could persist. For example:

- US sub-prime defaults are likely to rise further and problems could begin to spread to other parts of the US housing market. That could lead to renewed concerns about asset valuations and heightened counterparty credit risk.
- The tightness in US ABCP markets appears to be easing. Several major banks have announced plans to launch a vehicle to pool assets held by conduits and structured investment vehicles. But problems could yet emerge, perhaps prompted by rating downgrades, leading to renewed selling pressure in markets.
- The impact of recent events on financial institutions may not yet be fully apparent, though results to date from a number of large global financial institutions suggest that their diversified activities have helped them weather the recent turmoil.
- Banks in the United Kingdom and in other countries are facing a possible prolonged expansion in their balance sheets. **Table C** — discussed in greater detail in Box 3 on page 32 — suggests that the impact of this reintermediation on capital ratios should be relatively modest. But higher funding costs in wholesale markets, at a time of substantially greater funding needs, could lead to a tightening in credit availability. That could expose fragilities among a small, but growing, cohort of more vulnerable non-financial borrowers, such as UK 'sub-prime' borrowers and highly leveraged companies, including those that have been the subject of recent buyouts.

...and to new shocks that might emerge...

Other downside risks, which have not surfaced in recent months, could also emerge.

- Problems could mount in the commercial real estate sector, where price inflation has weakened and a sizable development pipeline has raised the potential for future overcapacity. The Bank's Credit Conditions Survey for 2007 Q3 suggested that lenders had already sought to tighten terms to this sector (**Chart 16**), whose 9% share of major UK bank lending is above its previous peak in 1989/90.
- Equity prices, which have risen strongly in industrialised and especially emerging market economies in recent months despite the problems in credit markets, could be vulnerable to any further revision in growth prospects.

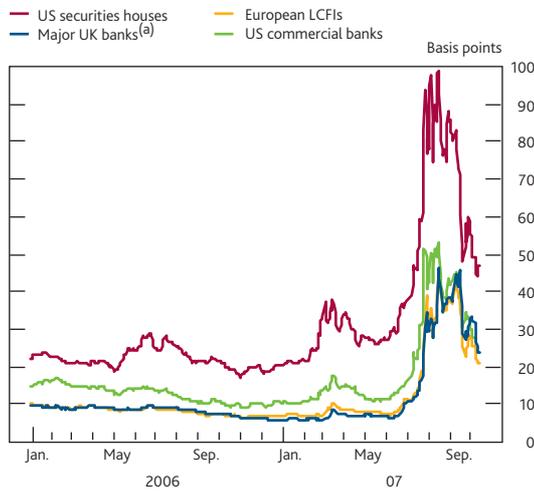
Table D Key vulnerabilities in the period ahead: change in assessment since April 2007

Vulnerability	Probability ^(a)		Impact ^(b)	
	A significant increase	A slight increase	Broadly unchanged	A slight decrease
Risk pricing uncertainty	A significant increase	A slight increase	Broadly unchanged	A slight decrease
Global corporate debt	A slight increase	A slight increase	Broadly unchanged	A slight decrease
LCFI distress	A slight increase	A slight increase	Broadly unchanged	A slight decrease
Infrastructure disruption	A slight increase	A slight increase	Broadly unchanged	A slight decrease
Global imbalances	A slight increase	A slight increase	Broadly unchanged	A slight decrease
UK household debt	A slight increase	A slight increase	Broadly unchanged	A slight decrease

Source: Bank calculations.

(a) Assessed change in the probability of a vulnerability being triggered over the next three years.
 (b) Assessed change in the expected impact on major UK banks' balance sheets if a vulnerability is triggered over the next three years.

Chart 17 LCFIs and major UK banks' credit default swap premia



Sources: Bloomberg, Markit Group Limited, published accounts and Bank calculations.

(a) Asset-weighted average five-year premia.

- The US dollar may also be vulnerable to a downwards correction, in particular if the change in investor sentiment towards US securities experienced recently were to persist.

...heightening financial stability risks in the near term...

Table D draws together the Bank's judgement on key vulnerabilities affecting prospects for UK financial stability. As Section 3 discusses in greater detail, the impact of all these vulnerabilities, were they to crystallise in the near term, is judged to be greater than in the past, given the current fragility of confidence and continued tightness in wholesale funding markets.

The low risk premia vulnerability identified in previous *Reports* has now partly crystallised. However, the nature and scale of this vulnerability has changed with problems emerging in valuing structured credit products. Markets are also less confident about the resilience of financial institutions, including the LCFIs (**Chart 17**), than before the turmoil. Vulnerabilities in household and corporate balance sheets could be exposed by tighter credit conditions. Infrastructure has coped well with high volumes in recent months. Finally, a disorderly unwinding of global imbalances, associated with a sharp fall in the US dollar, remains unlikely but could have a pronounced impact on global markets.

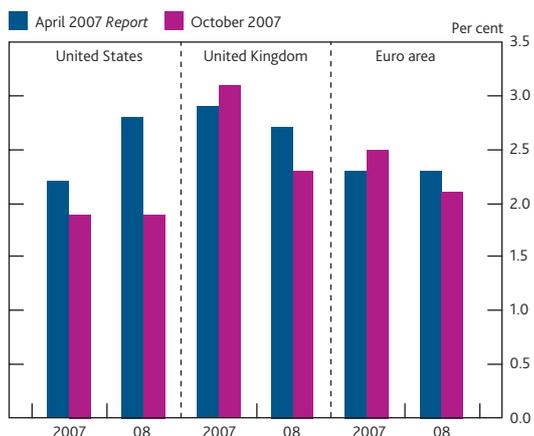
...though ultimately the system could emerge stronger.

A repricing of risk, especially in credit markets, was long anticipated and necessary. But the scale and breadth of the spillovers in the transition have caught market participants and the authorities by surprise. In the short run, financial systems in advanced economies are vulnerable to further shocks, either in credit markets or from new sources. Identifying and acting promptly to address weaknesses that have emerged are critical to rebuilding confidence and strengthening the system.

1 Shocks to the financial system

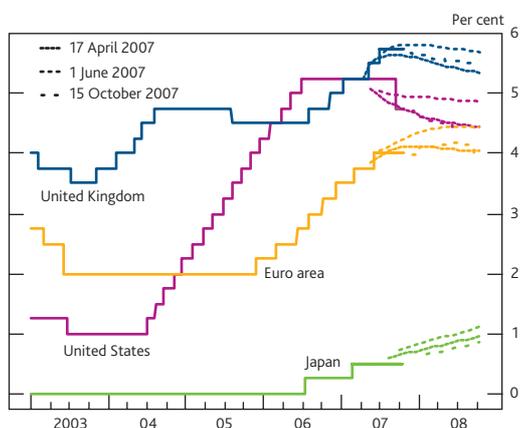
The recent turmoil in financial markets has occurred against a backdrop of strong global growth. Growing arrears in the US sub-prime housing market have exposed frailties in the market for structured credit products, as market participants have realised that these are both more illiquid and difficult to value than was previously appreciated. In consequence, markets for asset-backed securities seized up internationally during the summer. The inability to roll over short-term asset-backed commercial paper contributed to problems in core money markets, in the United Kingdom and internationally. While there are signs that credit markets are beginning to recover and the world economic outlook remains robust, the financial system in advanced economies could be vulnerable to further shocks from, for example, asset markets and the commercial property sector.

Chart 1.1 GDP growth forecasts



Source: IMF World Economic Outlook.

Chart 1.2 Official and expected interest rates^(a)



Sources: Bloomberg, Reuters and Bank calculations.

(a) Solid lines are official rates. Dotted lines are one-week forward rates, except for UK, US and euro-area rates on 15 October 2007 which are derived from sterling, dollar and euro-denominated overnight index swaps.

This section discusses developments in the global economy and financial markets affecting risks to the UK financial system since the April 2007 Report.

Global growth remains strong but is forecast to moderate in the developed world in 2008...

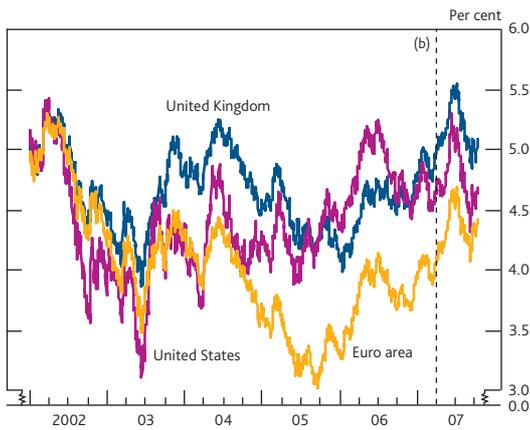
The financial market turmoil experienced from late July onwards came against a background of strong global economic growth. The IMF forecasts that world GDP will grow by 4.8% in 2008, a downward revision of just 0.1 percentage points since April. Global growth is expected to remain strong in 2008. But forecasts have been lowered for the developed economies since the April Report, particularly for the United States (Chart 1.1). The dispersion of private sector forecasts for the United States has also widened, with a pronounced downward skew.

...and expectations of policy interest rates have fallen...

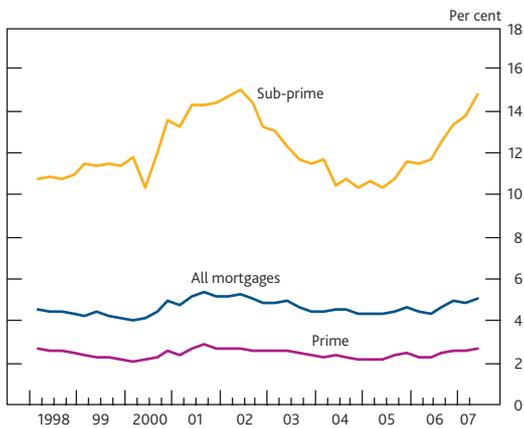
At the time of the April 2007 Report, market participants were expecting the US Federal Reserve gradually to cut the Fed funds target rate over the remainder of 2007 and into 2008 (Chart 1.2). The Federal Reserve did not cut the rate until September, but then did so by 50 basis points. Another cut is priced in by 2008 Q2. The Bank of England has twice increased Bank Rate by 25 basis points since the April Report, but financial markets now expect one of these increases to be reversed by the middle of next year. The market outlook for euro-area and Japanese official interest rates is broadly unchanged.

...as have long-term government bond yields.

Expectations of lower official interest rates in the near term, and a flight to quality during the recent market turmoil, have

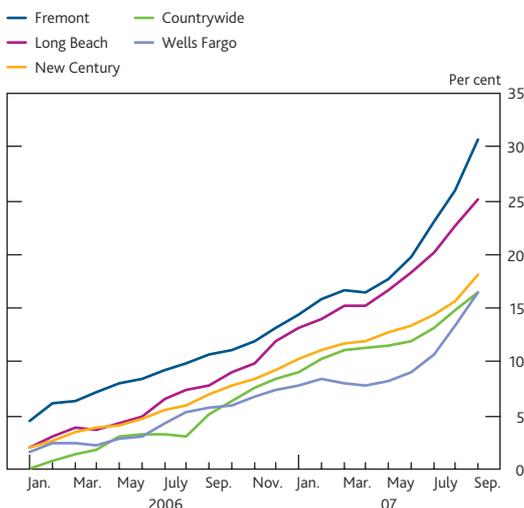
Chart 1.3 Government bond yields^(a)

Source: Bloomberg.

(a) Ten-year maturity.
(b) April 2007 Report.**Chart 1.4** US residential mortgage delinquency rate^(a)

Sources: Mortgage Bankers Association and Thomson Datastream.

(a) 30+ days delinquent.

Chart 1.5 US sub-prime mortgage delinquency rates by originator^(a)

Source: Bloomberg.

(a) 60+ days delinquent, including foreclosures for loans originated in 2005 H2.

led to considerable falls in long-term government bond yields in the past few months (**Chart 1.3**). For example, UK ten-year bond yields have fallen back to 5.0% from a high of 5.5% in July. These falls offset the rises in bond yields in earlier months, leaving ten-year bond yields little changed overall since the April 2007 Report.

The US housing market has deteriorated further...

The primary source of uncertainty surrounding the economic outlook has been the ongoing deterioration of the US housing market. Over the past two years, the average arrears rate on US sub-prime mortgages, which account for about 15% of total US mortgage debt, has risen from 10% to 15% (**Chart 1.4**). There have also been signs of increased distress in the next most risky mortgage category (Alt-A), although arrears on prime and large ('jumbo') mortgages remain low. More recently, there have been signs that delinquencies on US non-mortgage lending — including auto loans — may increase. And in the past quarter, US commercial banks have increased provisions for losses on this lending.

The US housing market is expected to weaken further. An increasing number of sub-prime borrowers are reaching the end of their low 'teaser' rates and the peak interest rate reset period is expected to continue until March 2008. Credit conditions have tightened considerably since these mortgages were taken out and house price growth has stalled, with prices falling quickly in some areas, hampering refinancing. As a result, significant numbers of houses backing foreclosed mortgages are expected to come on to the market, which may increase the overhang of unsold houses.

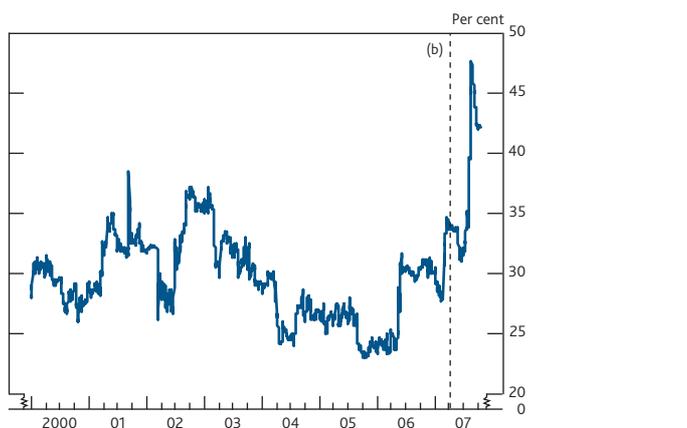
...causing losses on US RMBS...

Rising mortgage arrears and the worsening housing market outlook have caused large mark-to-market losses on residential mortgage-backed securities (RMBS) of US sub-prime loans. Within this, there has been a wide dispersion in the performance of specific pools of mortgages. Differences in regional housing market conditions and underwriting standards have contributed to wide variation in the arrears rates of mortgage originators (**Chart 1.5**). There have also been high rates of fraud which will significantly impair expected recovery rates. This is evidence of inadequate due diligence incentives in mortgage origination, highlighted in the April 2007 Report.

...and triggering wider market turmoil.

The downturn in the US housing market has been gradual and losses on sub-prime mortgages have risen steadily. In January and February, the prices of derivatives linked to these mortgages fell sharply, but subsequently made a partial recovery. In late July, however, sub-prime mortgage losses suddenly helped trigger a period of widespread turbulence across financial markets. By mid-August, global equity prices had fallen by 10% and the associated rise in implied volatility

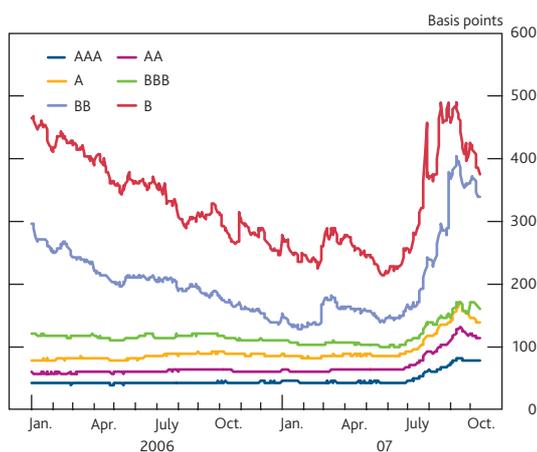
Chart 1.6 Comovement between option-implied volatility across assets^(a)



Sources: British Bankers' Association, Chicago Mercantile Exchange, Citi, Eurex, Euronext.liffe, Royal Bank of Scotland and Bank calculations.

(a) Proportion of variation in changes in three-month option-implied volatility of UK, US and euro-area equities, interest rates and exchange rates explained by the first principal component over a six-month rolling window.
(b) April 2007 Report.

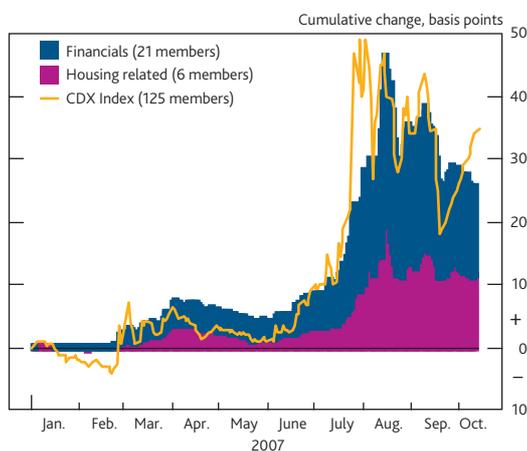
Chart 1.7 Sterling corporate bond spreads by rating^(a)



Source: Merrill Lynch.

(a) Option-adjusted spreads over government bond yields.

Chart 1.8 Contributions to change in credit default swap premia^(a)



Sources: Markit Group Limited and Bank calculations.

(a) The CDX index is an index of North American investment-grade credit default swaps.

on a range of equity price indices was well above the levels experienced in recent episodes of financial market turbulence — for example, in May/June 2006 and February/March 2007. The correlation between these implied volatilities also rose very sharply (Chart 1.6). The fact that many financial markets were moving together undermined the risk-reduction benefits of apparently diversified portfolios.

Corporate bond spreads rose rapidly across all ratings classes, although only reversing the falls in spreads seen since early 2006 (Chart 1.7). Within this, financial firms and housing-related companies accounted for virtually all of the rise in indices of investment-grade credit default swaps (Chart 1.8). In foreign exchange markets, the yen rose sharply as investors unwound 'carry trade' positions.

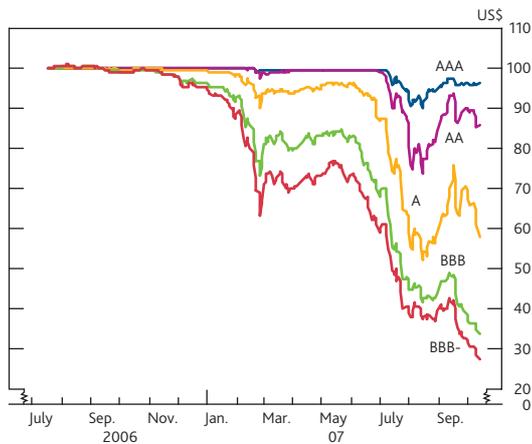
There was a complete dislocation in several important financial markets. Primary issuance fell sharply in many securitisation markets, especially those that repackaged sub-prime mortgages and leveraged loans. Secondary markets in those instruments became extremely illiquid. Investment vehicles issuing asset-backed commercial paper (ABCP) found it almost impossible to roll over maturing paper. Money markets and interest rate and foreign exchange swaps markets became very illiquid, making it harder for banks to manage their funding. The relative size of markets affected by the financial turbulence is reported in Box 1. It is striking that a market as small as US sub-prime RMBS, with a size of around \$700 billion, had such pervasive effects on much deeper and more liquid markets, such as the asset-backed securities (ABS) markets (with a size of \$10.7 trillion).

Losses on highly rated RMBS...

There was no single cause of this financial market turbulence, but a key development was the effect of mounting expected losses in the US mortgage market on the more highly rated tranches of sub-prime RMBS. Chart 1.9 illustrates that until early July the prices of AA and AAA-rated tranches had been largely unaffected as prices of more junior tranches had fallen sharply. But the pay-offs of these senior tranches are highly sensitive to assumptions about default probability and correlation and rates of loss in the event of default (see Box 2). As uncertainty about these assumptions rose, so too did uncertainty about the valuation of RMBS. The main rating agencies downgraded a small proportion of AAA-rated sub-prime RMBS in June and July, alongside a larger number of lower-rated tranches.

Falling prices of highly rated RMBS put pressure on investors who in their search for yield had highly leveraged positions in what they believed to be low-risk debt. Chart 1.10 illustrates the returns of an equally weighted portfolio of AA and AAA-rated sub-prime RMBS with fifteen times leverage and shows that while there can be excess returns in most periods, they can be subject to very large one-off losses. Losses also

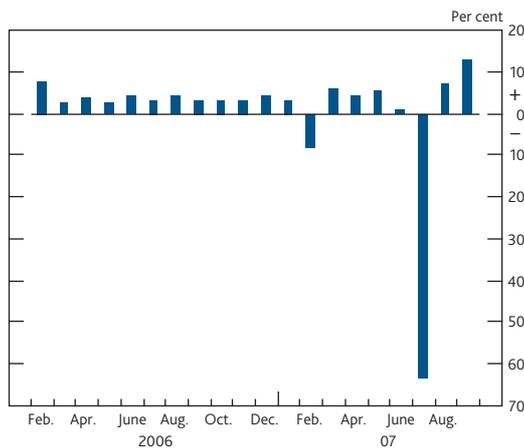
Chart 1.9 Prices of US sub-prime mortgage credit default swaps^(a)



Source: JPMorgan Chase & Co.

(a) 2006 H2 vintage.

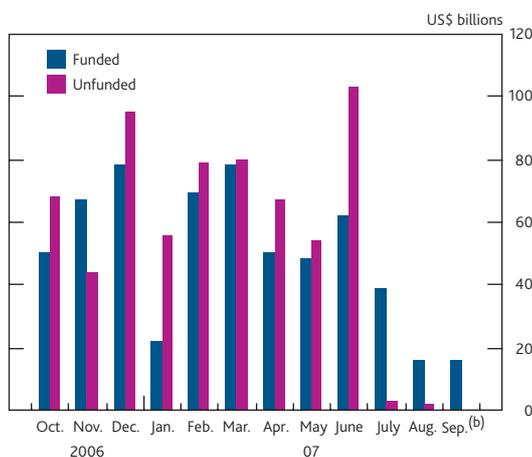
Chart 1.10 Monthly returns on a hypothetical portfolio of sub-prime mortgage credit default swaps^(a)



Sources: JPMorgan Chase & Co., Thomson Datastream and Bank calculations.

(a) Hypothetical 50:50 portfolio of AAA and AA ABX.HE indices that reference sub-prime mortgages originated in 2006 H1, funded at one-month dollar Libor, with fifteen times leverage.

Chart 1.11 Global CDO issuance^(a)



Source: JPMorgan Chase & Co.

(a) Funded CDOs refer to instruments backed by corporate bonds; unfunded CDOs refer to instruments backed by credit default swaps.

(b) Unfunded data for September not available.

began to appear in AA and AAA tranches of so-called mezzanine collateralised debt obligations (CDO) (which are the senior claims on pools of junior tranches of different RMBS). As a direct result, two leveraged funds of Bear Stearns collapsed in late June. As losses mounted and exposed funds tried to deleverage, secondary market liquidity in RMBS evaporated and prices fell further, amplifying mark-to-market losses.

...quickly spread to all structured finance products...

These losses in RMBS seemed to trigger a wider loss of confidence in all structured credit products and rating agencies' valuation models. A vicious spiral appeared to begin in which heightened uncertainty about the future value of complex assets and rising risk aversion caused many investors to want to sell but few to buy. Prices fell well outside the range of historical experience and in some cases there appeared to be no market-clearing price for some assets. Investors who had mistakenly made inferences about market and liquidity risk from credit ratings incurred large unexpected losses, contributing to further pressure to sell.

Price moves a long way outside the range of historical experience confounded pricing models and quantitative investment strategies. BNP Paribas suspended redemptions from three money market funds for two weeks in August because they did not feel they could fairly value their positions. As money market funds had previously been assumed to be low risk, this came as a further adverse shock to investors' expectations. In the absence of reliable information and confidence on the part of both buyers and sellers, markets in ABS largely shut and CDO issuance came to a near halt (**Chart 1.11**).

...and hit core money markets.

This fundamental uncertainty about the value of ABS began to cause problems in a wider set of markets. The near closure of primary issuance markets for collateralised loan obligations, and an increase in risk aversion among investors, left banks unable to distribute leveraged loans that they had originated earlier in the year. This exacerbated a problem banks already faced, as debt used to finance a number of high-profile private-equity sponsored leveraged buyouts (LBOs) had remained on their balance sheets.

At the same time, financial vehicles that fund long-term investments largely with short-term debt were finding it increasingly difficult to roll over their ABCP as key investors, including money market mutual funds, were concerned at the value of their assets. There are two main types of such financial vehicle: ABCP conduits, which are sponsored by banks that provide contingent liquidity lines worth up to 100% of the vehicles' liabilities, and structured investment vehicles (SIVs), which have much smaller liquidity lines and do not fund themselves exclusively with ABCP. By the end of 2007 H1,

Box 1 Mapping the financial system

The rise in delinquency rates on US sub-prime mortgages in recent months has increased investors' concern about RMBS. Investors have also become concerned about the market and liquidity risks inherent in these securities. These risks also apply to CDOs based on other types of collateral. This box puts the size of sub-prime RMBS and CDO markets into context, by comparing them with other securities markets.

Global capital markets

Figure A provides a quantitative decomposition of the world's largest securities markets. The biggest market is corporate equities, which had an estimated global value of \$50.6 trillion at the end of 2006. The value of this market has risen by 120% over the past four years.

Corporate debt markets are also very large and have grown rapidly. Corporate debt markets in Europe and the United States more than doubled in size in the four years to the end of 2006, reaching \$17.1 trillion in aggregate. They continued to grow rapidly in the first half of 2007. But government debt markets still dominate their corporate

equivalents. There was almost \$26 trillion of government debt outstanding at the end of 2006.

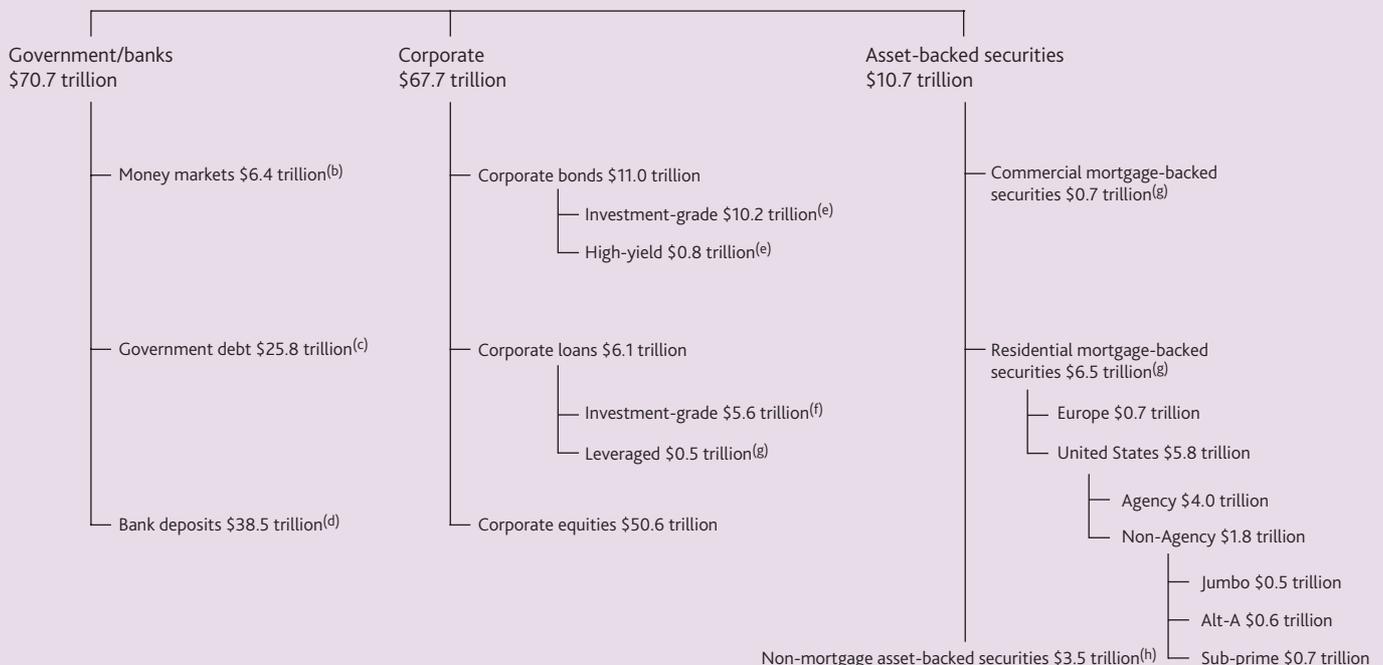
At the end of 2006, European and US money markets had an outstanding stock of \$6.4 trillion. Commercial paper makes up a significant part of the assets traded in these markets. European and US markets for all types of ABS were worth in excess of \$10.7 trillion at the end of 2006. They were dominated by securities backed by US residential mortgages.

The majority of US RMBS are based on conforming Agency mortgages.⁽¹⁾ Of the non-Agency US RMBS, around \$0.7 trillion are backed by sub-prime mortgages.⁽²⁾ This represents just 6.5% of the market for securitised assets. The size of this market may have shrunk as the value of ABS has fallen in the past few months, particularly those securities related to US sub-prime mortgages.

Structured product markets

Some of the underlying securities that have been mapped in Figure A are subsequently repackaged into structured products such as CDOs. The flow of European and US CDO issuance in 2006 can be split by the underlying collateral referenced (Table 1). The most frequently referenced collateral was RMBS and investment-grade bonds. But a higher *proportion* of

Figure A Size of global securities markets^(a)



Sources: BIS, Board of Governors of the Federal Reserve, European Securitisation Forum, Eurostat, Fitch Ratings Ltd, McKinsey Global Institute, ONS, Securities Industry and Financial Markets Association, Standard and Poor's, World Federation of Exchanges and Bank calculations.

(a) All data are global at end-2006 unless stated.

(b) Euro area, the United Kingdom, the United States and international money market instruments outstanding.

(c) Excludes local government debt and government agency debt. In the United States, for example, agency and municipal debt totalled \$4.6 trillion at 2007 end-Q1.

(d) End-2005 except for the United Kingdom and the United States.

(e) Aggregate of Africa, Europe, the Middle East and the United States.

(f) Aggregate of euro area, the United Kingdom and the United States.

(g) Aggregate of Europe and the United States.

(h) Aggregate of Europe and the United States. Includes securitised home equity loans, auto loans, consumer loans, credit card debt, student loans and other sorts of non-mortgage loans.

leveraged loan issuance — more than half of that issued in 2006 — was referenced in CDOs.

Table 1 Size of asset classes referenced by collateralised debt obligations^(a)

Collateral	Stock outstanding (end-2006) ^(b)	Issuance in 2006		
		Total	Referenced by CDOs	Percentage of issuance referenced by CDOs
Asset-backed securities (including residential mortgage-backed securities)	10.68	2.58	0.39	15
Investment-grade bonds	10.20	2.18	0.54	25
High-yield bonds	0.78	0.17	0.01	5
Leveraged loans	0.52	0.63	0.33	52
Other ^(c)	n.a.	n.a.	0.06	n.a.

n.a. = not available.

Sources: Bloomberg, Board of Governors of the Federal Reserve, European Securitisation Forum, Fitch Ratings Ltd, JPMorgan Chase & Co., Securities Industry and Financial Markets Association, Standard and Poor's and Bank calculations.

- (a) Data for Europe and the United States. CDOs include cash and synthetic collateralised loan obligations, collateralised bond obligations and collateralised mortgage obligations.
 (b) Total outstanding regardless of whether or not referenced by CDOs.
 (c) Includes CDO-squareds, CDOs backed by emerging market debt and CDOs backed by mixed collateral.

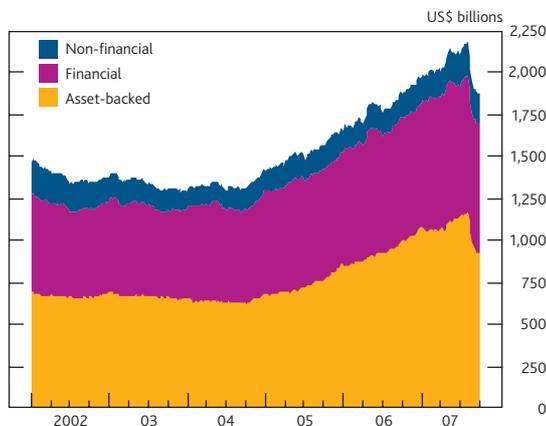
Data uncertainty

There are reasons to be cautious when considering a quantitative 'map' of the financial system. Statistics are drawn from many different sources. This raises the potential for overlapping or missing data.

Less uncertainty is attached to official numbers, such as outstanding government debt, or in markets that are continuously traded and valued, such as corporate equity markets. The size of the market for corporate debt may be underestimated, if issues are not syndicated and held to maturity. When securities are not continuously traded it can also be difficult to establish accurate valuations. For example, the value of some ABS related to US sub-prime mortgages may be overestimated because their value has fallen recently. And there is a lack of reliable data on corporate bond, loan and ABS markets outside of the United States and Europe.

- (1) A conforming mortgage is eligible for purchase by US housing Agencies Fannie Mae and Freddie Mac. It has a minimum Fair Isaac Corporation (FICO) credit score of 620, on a scale ranging from 300 to 900, and a maximum loan value of \$417,000.
 (2) A sub-prime mortgage has a FICO credit score below 620. At the end of 2006 there were around \$540 billion of US sub-prime mortgages outstanding that had not been securitised.

Chart 1.12 US\$-denominated commercial paper outstanding



Source: Board of Governors of the Federal Reserve.

ABCP conduits had accumulated over \$1.5 trillion in assets globally, while SIVs held over \$350 billion. The growth in these vehicles is reflected in the volume of ABCP outstanding (**Chart 1.12**).⁽¹⁾

Conduits and SIVs employ a wide range of investment strategies and their exposure to sub-prime mortgages varies widely, but SIVs have more concentrated exposures than conduits on average. Around one quarter of SIV assets are RMBS and a further 10% are CDOs, which may in turn contain RMBS exposures. At the end of July, a SIV sponsored by IKB, a German bank, reported losses on sub-prime mortgage exposures and subsequently failed to raise funding in the commercial paper market. Exposures of other banks to conduits and SIVs, and uncertainty about the quality of assets held by these vehicles, raised concerns about interbank counterparty risk. **Chart 1.13** shows how ABCP and Libor spreads over expected official rates rose together sharply during August.

Banks began hoarding cash in anticipation of potential future liquidity needs — for example, as liquidity lines to conduits were drawn. As banks became reluctant to lend even for quite short periods, three-month Libor in all the main currencies rose sharply above comparable index swap rates, reflecting the combined effect of the precautionary behaviour of banks and heightened counterparty credit risk.⁽²⁾ Moreover, market

- (1) The market for sterling-denominated ABCP is very small in comparison. But sterling funding can be raised by issuing ABCP denominated in euros or dollars and engaging in a currency swap.
 (2) As discussed in detail in the box on page 348 of the Market and operations section of the 2007 Q3 *Quarterly Bulletin*.

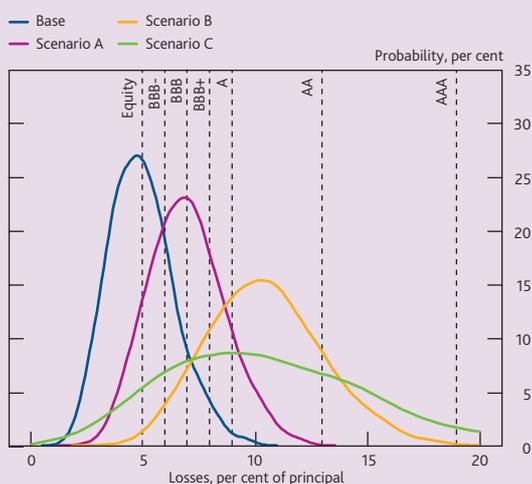
Box 2 Valuing sub-prime RMBS

The fundamental values of sub-prime RMBS depend on the prospective default losses on the mortgages to which they are linked. These appear particularly uncertain at present. It is unclear, for example, the extent to which weaker lending standards, increased fraud and the resetting of mortgage interest rates from teaser rates could raise the frequency of defaults. These factors have already generated wide variation in delinquency rates by originator, as illustrated in **Chart 1.5**. In addition, it is uncertain whether declining house prices could lead to lower recovery rates in the event of default. As these factors are common to many of the mortgages underlying sub-prime RMBS, default correlations, which govern the likelihood of mortgages defaulting together, could also rise.

This box uses a CDO valuation model to evaluate the effect on the value of sub-prime RMBS of different default rates, default correlations and loss given default rates.⁽¹⁾ The model is calibrated to a sub-prime RMBS backed by 1,000 mortgages, which have an average expected life of five years.⁽²⁾ The mortgages are assumed to recover 80% of their principal in the event of default in a base scenario and to default within five years with a probability of 25%.⁽³⁾ A default correlation of 5% is also assumed.⁽⁴⁾

Chart A shows the probability distribution of losses on the mortgage pool under various scenarios. The vertical lines in this chart show how the size of losses would affect different RMBS tranches. If losses on the mortgage pool had reached 5% of principal, for example, marginal losses would accrue to the BBB- tranche until total losses exceeded 6% of principal.

Chart A Distribution of losses on mortgages underlying sub-prime RMBS



Source: Bank calculations.

The modelled prices of sub-prime RMBS tranches are shown in **Table 1**. Relative to the base scenario, Scenario A has a higher default probability than the base scenario. This reduces the prices of all tranches, especially the junior ones, which **Chart A** shows have a higher chance of incurring losses in this scenario. Scenario B also has a higher loss-given-default rate than the base scenario. A higher loss-given-default rate has similar effects to raising the default probability. Scenario C is the same as Scenario B except that it also has a higher rate of default correlation. As **Chart A** shows, this increases the chance of extreme outcomes, raising the price of the BBB- tranche and reducing the price of the AAA tranche.

Table 1 Modelled prices of sub-prime RMBS tranches

Per cent	Scenario			
	Base	A	B	C
Default probability	25	35	35	35
Loss given default rate	20	20	30	30
Default correlation	5	5	5	15
Selected RMBS tranches (percentage of principal)	Price (par = 100)			
BBB- (5%–6%)	100.0	64.3	40.1	47.3
AA (9%–13%)	100.0	97.8	70.4	67.5
AAA (13%–19%)	100.0	100.0	96.8	89.7

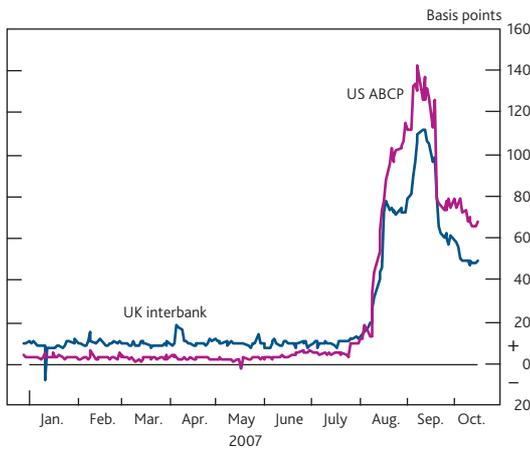
Source: Bank calculations.

Comparing **Table 1** with **Chart 1.9** suggests that expectations about both default rates and correlations may have increased during July and early August, as the prices of both junior and senior RMBS tranches fell sharply. Views about default correlation may subsequently have been revised down, however, with prices of senior tranches recovering while the prices of junior tranches have continued to fall.

The key finding from **Chart A** and **Table 1** is that plausible variations in assumptions about the future performance of sub-prime mortgages can make a very significant difference to the fundamental values of RMBS. CDOs of ABS, which often take RMBS as collateral, can be even more sensitive to such variation. This sensitivity in, and hence uncertainty about, fundamental value may help to explain the shortage of market liquidity in these instruments at present, and the significant volatility in their prices over the past few months.

- (1) See 'A simple CDO valuation model', Bank of England *Financial Stability Review* (December 2005), pages 105–06.
- (2) The expected life is much lower than the maturity of the mortgages due to anticipated early repayments.
- (3) The default probability was derived from the average spread of the mortgages over a safe interest rate. As such, it is a 'risk-neutral' default probability, which would be equal to investors' perceived default probability if investors were indeed neutral towards risk. In the more likely case that investors are averse to risk, however, the perceived probability of default will be lower than the risk-neutral measure.
- (4) This is consistent with Cowan and Cowan (2004), 'Default correlation: an empirical investigation of a sub-prime lender', *Journal of Banking & Finance*.

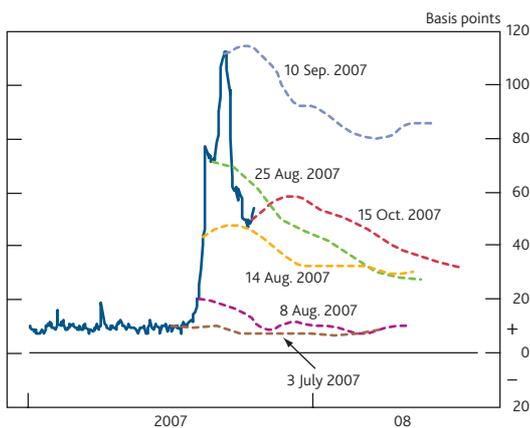
Chart 1.13 US asset-backed commercial paper and UK interbank risk premia^(a)



Source: Bloomberg.

(a) Three-month AA-rated US asset-backed commercial paper spread over US dollar overnight index swaps; three-month sterling-Libor spread over overnight index average swaps.

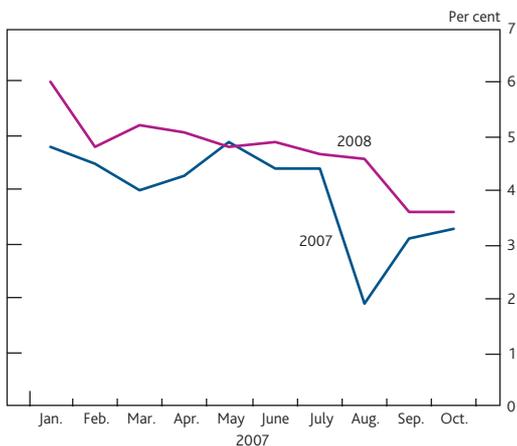
Chart 1.14 Risk premium on three-month UK interbank lending^(a)



Sources: Bloomberg and Bank calculations.

(a) Three-month sterling-Libor spread over overnight index average swap rate. Dotted lines show three-month forward spreads.

Chart 1.15 Forecasts of US corporate profit growth



Source: Consensus Economics Inc.

contacts suggested that actual trades in money markets at maturities beyond one month remained limited. This sharp movement in Libor spreads disrupted interest rate derivative markets which use Libor as a reference rate. And with money markets in many currencies affected, foreign exchange swaps markets also suffered from illiquidity.

Signs of recovery in some markets...

Looking forward, there are signs of some markets beginning to stabilise. Spreads of ABCP yields over expected policy rates have fallen significantly from their peak in early September, although they remain well above pre-turbulence levels. Spreads on non-ABCP, which spiked up with ABCP in early August, have largely returned to normal levels. Overnight and other very short-term interbank borrowing rates have fallen back close to official interest rates in the major currencies. Longer-term rates have also fallen, but remain elevated relative to levels earlier in the year. Three-month Libor rates, for example, are still 50–70 basis points higher than expected policy rates, which compares with a more usual spread of 5–10 basis points (Chart 1.14).

In mid-October, a group of major banks announced plans to launch a jointly managed vehicle to pool together some of the assets currently held by conduits and SIVs. It is hoped that this so-called Master Liquidity Enhancement Conduit (MLEC) will prevent the firesale of assets by SIVs as they are restructured, which might otherwise have generated further downward pressure on ABS prices.

Banks have also begun selling some of the debts associated with high-profile LBO deals that had been stuck on their balance sheets, albeit at a discount. Secondary market prices for leveraged loans have partially recovered, after falling sharply toward the end of July. Credit spreads have fallen from recent peaks, with spreads on investment-grade and 'crossover' credit default swap (CDS) indices returning towards pre-turbulence levels.⁽¹⁾ And investment-grade bond issuance rose modestly in September, while recent issuance in Europe has been oversubscribed.

The major equity indices in developed markets have gained around 10% since their low points in mid-August, while the MSCI index of emerging market equities has increased by one third. In contrast to credit markets, equity markets have recovered their pre-turbulence levels. This is despite forecasts for corporate profits growth being revised down in some countries (Chart 1.15).

...but the wider impact on UK financial stability...

The longer-run impact of this repricing of risk will depend on when the turmoil is expected to end. The term structure of money market yields provides some evidence on that.

(1) The crossover CDS indices are comprised of liquid CDS rated BB–BBB.

Chart 1.14 suggests that Libor rates are expected to rise further above expected policy rates as bank funding pressures intensify over the year-end. Thereafter, spreads are expected to fall, though they are not expected to return to pre-turbulence levels within the next twelve months. This suggests that increased counterparty credit risks among banks are expected to persist.

One of the main channels by which recent events could potentially affect the rest of the economy is a fall in the supply of credit from capital markets to high-risk borrowers. That in turn will depend on the response of various types of investors to recent events, as they influence the demand for capital market securities and thus funding costs.

...depends on how key investor groups respond, such as institutional investors,...

Pension funds have been large purchasers of fixed-income products over recent years. Structured finance products were specifically engineered to expand the pool of underlying assets that pension funds could hold, creating investment-grade rated tranches from higher-risk constituents. In August, global issuance of CDOs fell to one sixth of its average value in the preceding months of 2007. The closure of the ABS market has in large part been a reflection of the drawback by institutional investors in the face of uncertainty about the precise content of structured products and their valuation. If institutional investors have fundamentally reassessed their willingness to invest in structured credit products, then this could constrain the future supply of credit to high-risk borrowers.

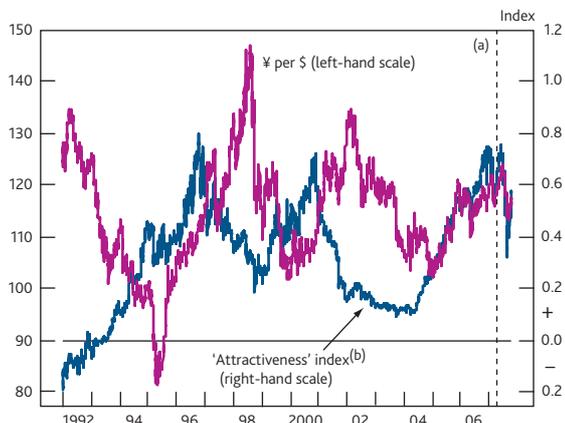
...other international investors...

For some years, international investors have purchased foreign currency claims from countries such as Australia, New Zealand, the United Kingdom and the United States, funded through borrowing in their domestic currency. These investors have been willing to accept currency risk in return for a yield difference between foreign and domestic assets. The yen carry trade is a popular form of this strategy, but the same characteristics apply to all unhedged cross-currency exposures. The yen attractiveness indicator in Chart 1.16, which compares the difference between US and Japanese short-term interest rates and the implied volatility of the exchange rates, illustrates how financial market volatility has undermined the incentive to invest in carry trades since July. And in August, for the first time in almost ten years, foreign investors were net sellers, rather than purchasers, of long-term US securities (Chart 1.17). Should this be indicative of a more sustained reassessment of investors' portfolio preferences towards dollar assets, it may lead to a further decline in the US dollar, which has already fallen by 7.7% so far this year in effective terms.

...and sovereign wealth funds.

Official sector reserve accumulation has also been an important source of credit supply. Reserves and other forms of

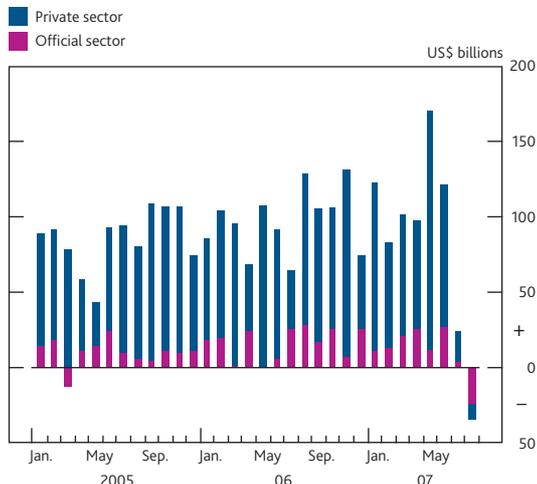
Chart 1.16 Yen-funded carry trade 'attractiveness' index



Sources: Bloomberg and Bank calculations.

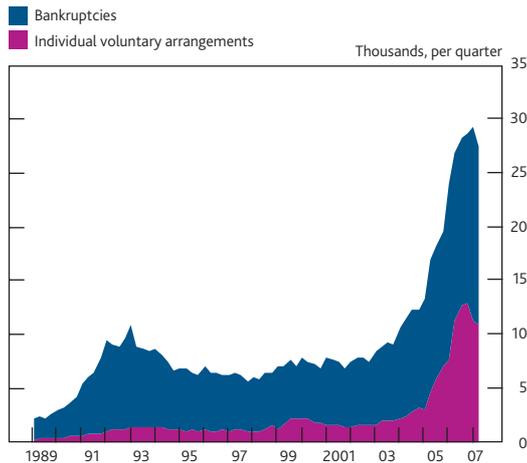
(a) April 2007 Report.
 (b) Spread between US and Japanese three-month interest rates per unit of three-month implied volatility of the US\$/¥ exchange rate.

Chart 1.17 US international capital inflows(a)

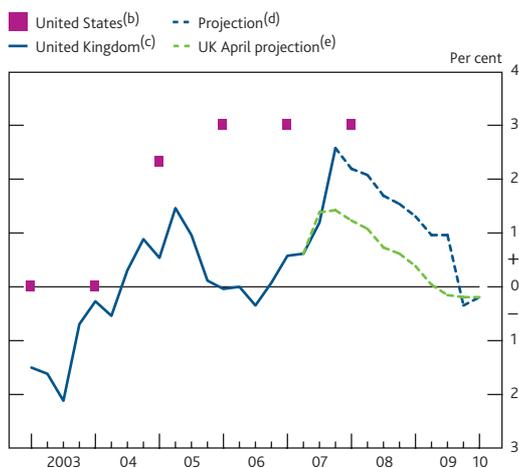


Source: US Treasury International Capital System.

(a) Net foreign purchase of US long-term securities.

Chart 1.18 Personal insolvencies in England and Wales

Source: Insolvency Service.

Chart 1.19 Interest payment change on refinancing of two-year sub-prime mortgages^(a)

Sources: Fitch Ratings Ltd, Moneyfacts, Thomson Datastream and Bank calculations.

- (a) Percentage point change in the mortgage interest rate for a sub-prime borrower replacing an existing loan with an equivalent one.
 (b) Annual data.
 (c) Calculated from rates published by Moneyfacts.
 (d) Assumes the higher spread over the swap rate in October remains for the foreseeable future, and the future swap rate evolves in line with the current forward curve.
 (e) The same projection as in (d) but as at the April Report.

official holdings have historically been in fixed income assets and bank deposits, predominantly government bonds. But in recent years there has been rapid growth in so-called sovereign wealth funds (SWF) which aim to increase the rate of return on foreign reserves by investing in riskier assets. SWF assets now total \$2–\$3 trillion. The activities of SWFs could mitigate any reduction in risk appetite by private sector financial institutions.

There is a tail of vulnerable UK households...

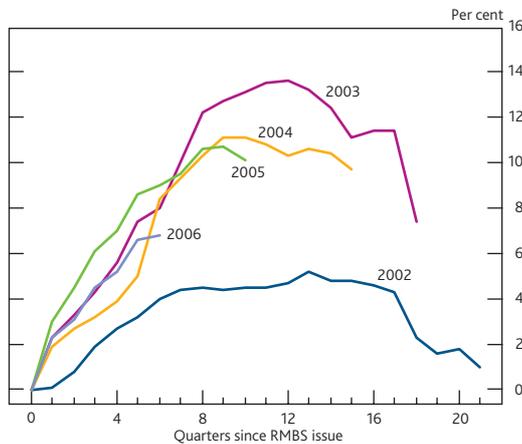
One set of high-risk borrowers potentially vulnerable to a rising cost of borrowing, or restricted credit access are UK households. Most households have very robust balance sheets. Strong increases in house and other asset prices have meant that the real value of net household wealth has risen by around two thirds over the past ten years. But over the same period, aggregate real household debt has almost doubled, giving rise to a growing tail of indebted households (see Box 5 in Section 3). Previous Reports have discussed the rise in personal insolvencies and stress in the unsecured household borrowing market. As noted in the April Report, lenders have tightened unsecured lending standards in the past two years, which has stabilised arrears rates. Another sign of improvement is the reduction in the number of individual voluntary arrangements (IVAs) and bankruptcies in the past two quarters (Chart 1.18). Mortgage arrears in the United Kingdom remain low and, at 1.1% of outstanding loans, are a sixth of their early-1990s peak. But although the overall UK household position is robust, there are a number of groups who might be more vulnerable to a tightening in credit availability.

...such as UK 'sub-prime borrowers'...

'Adverse credit' is the category of UK households most commonly compared to the US sub-prime sector. It includes borrowers who have previously been in significant arrears on mortgage or unsecured debts, and/or have had County Court Judgements, Bankruptcy Orders or IVAs. Although adverse credit is still a small part of the total UK mortgage market, its share has grown to about 3%–4% of the outstanding stock. This makes it about a quarter of the magnitude of the sub-prime sector in the United States, although the US definition is wider, extending to borrowers with high income and loan to value (LTV) multiples.

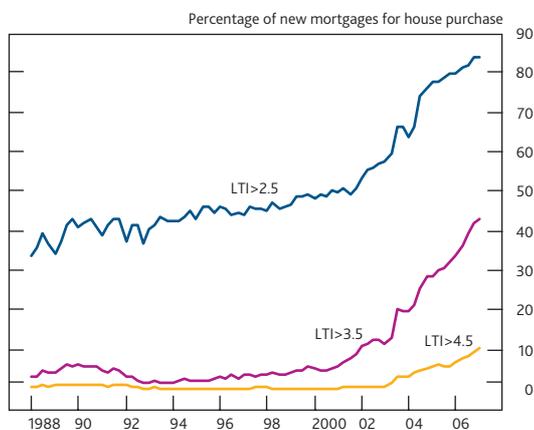
In contrast to the United States, high LTV ratios on adverse credit in the United Kingdom are relatively rare. However, the FSA recently reported weaknesses in many lenders' and intermediaries' underwriting standards. And, following the recent market turmoil, the specialist lenders who supply these mortgages have raised their lending spreads to adverse credit households by an average of around 100 basis points. Some UK lenders have also tightened non-price lending terms to adverse credit customers, for example by reducing maximum loan to value ratios, while others have withdrawn from the

Chart 1.20 90+ days arrears on UK non-conforming residential mortgage-backed securities, by vintage



Source: Lehman Brothers.

Chart 1.21 Loan to income ratios for UK first-time buyers^(a)



Sources: FSA, Survey of Mortgage Lenders and University of Essex.

(a) Chart illustrates proportion of new mortgages with loan to income ratios greater than 2.5, 3.5 and 4.5.

market entirely. Combining the rise in spreads with rises in interest swap rates over the past two years, this suggests that the upcoming interest rate reset shock (at the end of the initial fixed-rate period) for UK adverse credit borrowers could be quite high (Chart 1.19). This may lead to an increase in arrears on recent vintages of sub-prime lending (Chart 1.20). Nevertheless, at around 2.5 percentage points, the average payment jump is likely to be less than that experienced by US sub-prime borrowers. The UK housing market also remains stronger than its US counterpart, providing more scope for refinancing.

...recent first-time buyers...

Another group of potentially vulnerable households are recent first-time buyers. The increase in house prices relative to income in the United Kingdom may mean that they have had to stretch themselves more than would normally be the case in order to get on the housing ladder. This is evident in the sharp increase in the proportion of new mortgages with high loan to income multiples since 2004 (Chart 1.21). Alongside the rise in interest rates, this has resulted in interest payments reaching 20% of first-time buyers' average incomes, the highest share since 1991. These households may be hoping that house price inflation will remain high to lower their leverage ratio. But anecdotal evidence suggests first-time buyers are now feeling priced out of the market, which suggests that an important source of housing demand may drop out of the market.

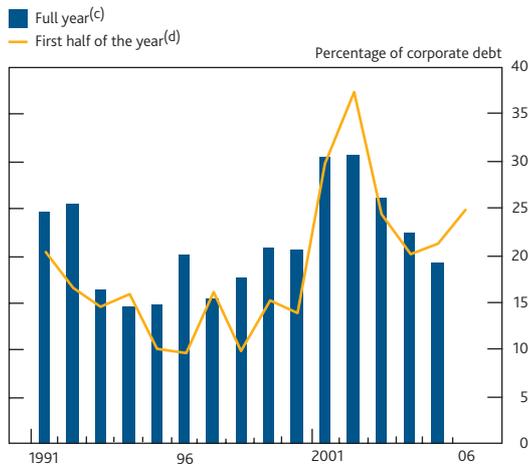
...and buy-to-let investors.

Buy-to-let yields continue to be squeezed, with rental growth remaining weak (relative to house price growth) and borrowing costs having risen. Net rental yields remain negative: Bank staff estimate that after deducting costs, the rental yield was about 2.3 percentage points lower than the mortgage rate in 2007 Q3. Recent investors are relying on continued house price appreciation to earn positive returns. Buy-to-let investors have often invested in new-built flats in the United Kingdom, which have experienced much lower rates of price appreciation than houses. Some UK property investors are also exposed to international property markets, where there are some signs that the cycle may have peaked.

Risks to the corporate sector have also risen...

As with households, most of the UK corporate sector is in a healthy financial position. The annualised corporate insolvency rate is at its lowest level since records began in 1975. Corporate profits have remained buoyant and returns on capital are historically high. Corporate liquidity is also high, providing an additional buffer against any tightening in credit conditions. Corporate sector capital leverage ratios look sound, although they are sensitive to the value of financial assets.

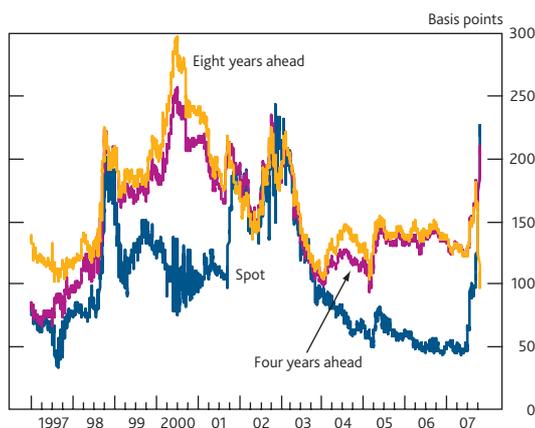
Chart 1.22 Firms with interest payments greater than profits: share of corporate debt^{(a)(b)}



Sources: Bankscope published by Bureau van Dijk and Bank calculations.

- (a) Non-financial firms of at least 100 employees.
- (b) Earnings before interest and tax.
- (c) Covering all company accounts filed in that year.
- (d) Covering company accounts filed in H1 only.

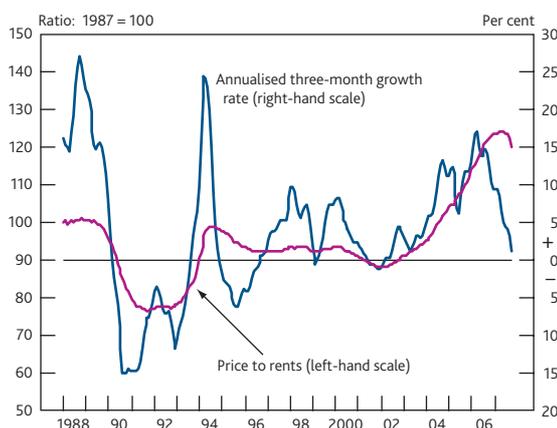
Chart 1.23 US forward corporate credit spreads^(a)



Sources: Merrill Lynch and Bank calculations.

- (a) One-year forward spread over government bond yields for BBB-rated US corporate bonds.

Chart 1.24 UK commercial property prices



Sources: Investment Property Databank, Thomson Datastream and Bank calculations.

But there is considerable variation in performance across the corporate sector. Profit growth and rising liquidity buffers have been concentrated in firms that were already strong. At the other end of the spectrum, 2006 company accounts data suggest that the proportion of corporate debt held by firms whose profits were not large enough to cover their debt interest payments has started to rise again (**Chart 1.22**). These more fragile companies could be exposed to rising borrowing costs and a squeeze on the availability of credit. The cost of floating-rate corporate debt has already risen in line with increases in Libor. Corporate bond spreads have increased for both investment-grade and sub investment-grade firms (**Chart 1.7**). They have also increased at all maturities (**Chart 1.23**), suggesting that this rise is not expected to unwind soon. This rise in spreads has, however, been largely offset by the sharp fall in risk-free rates. Since 2007 Q1, Bank staff estimate that the average cost of external finance for UK corporates has only increased by around 20 basis points.

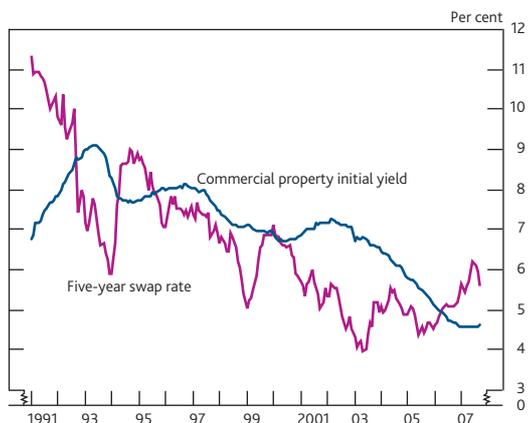
...particularly for leveraged firms taken private...

As highlighted in the *April Report*, one set of firms at increased risk are those which have been the subject of recent LBOs. Until early summer, private equity sponsored LBOs continued at a rapid pace. In the first half of 2007, their value in the United Kingdom reached £22 billion, almost surpassing the total for the whole of 2006. Bank staff estimate that by the end of June 2007, LBO-related debt accounted for around 8% of the total stock of UK private non-financial corporate debt. If anything, the non-price terms of these deals appeared to have loosened even further up until the summer. Market intelligence suggested that private equity sponsors had considerable market power to impose aggressive capital structures, tight spreads and weak covenants because investor demand was so strong. But in August, the flow of new LBOs came to a virtual standstill and the debt of a sequence of high-profile companies could not be sold.

...and commercial property companies.

Another potentially vulnerable component of the UK non-financial corporate sector is commercial property companies. Returns on commercial property companies are highly cyclical. Between 2002 and mid-2006, commercial property price inflation rose to a peak of 15% (**Chart 1.24**). With property prices growing considerably faster than rental yields, initial yields on commercial property have fallen substantially over the past few years and are now well below the cost of finance (as proxied by the five-year swap rate) (**Chart 1.25**). Since mid-2006, commercial property price inflation has weakened markedly, with the level of prices falling slightly in August. The price of commercial property derivative contracts suggests further falls. Contacts are surprised at the speed of this slowdown, which they expected to be more pronounced for secondary than prime commercial property.

Chart 1.25 Initial rental yield on commercial property and the swap rate



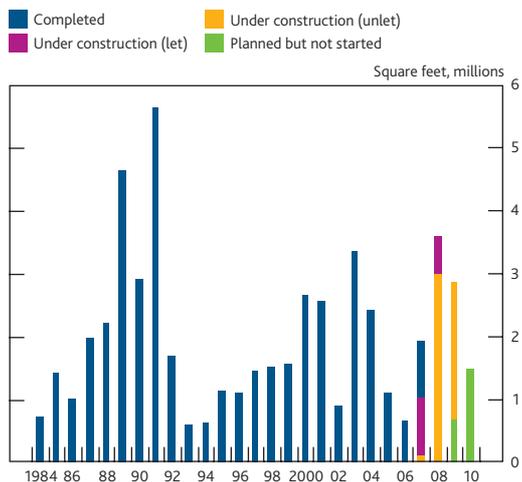
Sources: Bloomberg, Investment Property Databank and Thomson Datastream.

Strong price growth in recent years has stimulated property investment. Private sector investment in structures and buildings (other than dwellings) increased by almost 10% last year. The City of London office development pipeline is high, especially the amount of space to be completed by 2009 (Chart 1.26). And although vacancy rates are currently low, the potential for overcapacity would be further increased if recent financial market turbulence has a dampening effect on the demand for office space by the financial sector.

But emerging markets remain robust.

Historically, emerging market economies (EMEs) have been particularly vulnerable to financial market turbulence. But although their spreads have risen in line with a general repricing of risk, especially for lower-rated bonds (Chart 1.27), there have been few signs of distress so far. In recent years, most EMEs have improved their monetary and fiscal positions and frameworks, lengthened the maturity of their external government borrowing and increased the proportion issued in domestic currency. Many EMEs are also running current account surpluses and have accumulated large foreign currency reserves, thus reducing their vulnerability to external liquidity shocks.

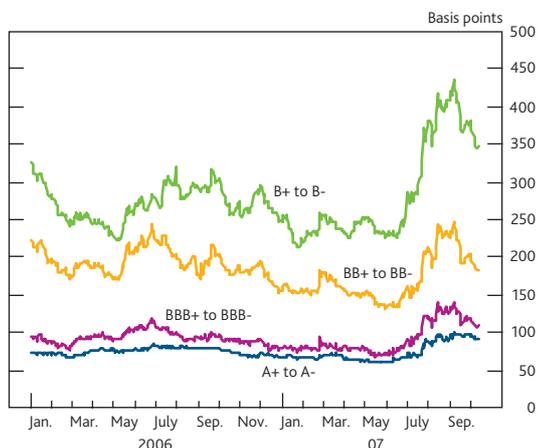
Chart 1.26 Development pipeline — city offices



Source: Richard Ellis St. Quintin.

But the overall resilience of the emerging market asset class may mask pockets of vulnerability. In emerging Europe and the Commonwealth of Independent States, many countries are experiencing very rapid credit expansion, financed partly through borrowing from abroad. In some of these countries, particularly in the Baltics and the Balkans, this is taking place in the context of very large current account deficits. These countries would be vulnerable if the current financial market turbulence resulted in a marked reduction in capital flows to EMEs.

Chart 1.27 EME sovereign external bond spreads by rating^(a)



Sources: Bloomberg, JPMorgan Chase & Co., Standard and Poor's and Bank calculations.

(a) Average spread of emerging market sovereign borrowers in the EMBI Global index within a given rating category.

2 Structure of the financial system

Some UK banks have experienced acute liquidity pressures over recent months, arising in large part from the closure of asset-backed securities (ABS) markets. Banks are exposed to these markets directly through their trading activities and wholesale funding plans and indirectly through the provision of contingent liquidity lines to vehicles that invest in ABS. Banks' ability to distribute leveraged loans has also been impaired. As funding pressures have mounted, banks have been reluctant to commit liquidity for any length of time in interbank markets, reducing the maturity profile of UK banks' funding. Perceptions of counterparty credit risk have risen as turbulence in financial markets has led to a reappraisal of the credit risk associated with banks, large complex financial institutions (LCFIs) and other financial institutions, including asset managers and hedge funds. The future profitability of the 'originate and distribute' banking model has also come under review. Although growth in UK corporate sector lending and secured lending to UK households has remained relatively strong, contacts report that the major UK banks have recently tightened credit conditions.

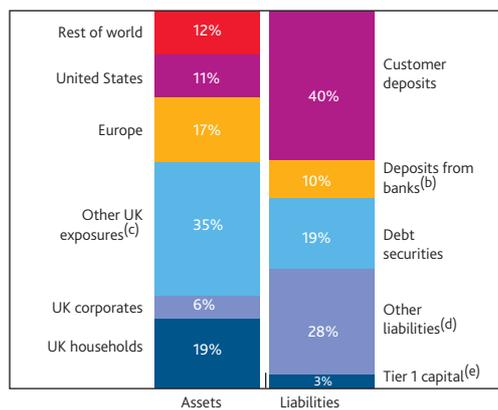
This section discusses recent developments among the set of financial institutions that are core to the structure of the UK financial system — the major UK banks⁽¹⁾ and UK-operating LCFIs⁽²⁾ — and among infrastructure providers.

Overview of risks to the UK banking sector.

The major UK banks, the largest intermediators of credit between UK residents, are a diverse set of institutions. Exposures to overseas borrowers, claims on which accounted for two fifths of the major UK banks' total assets at end-June 2007 (**Chart 2.1**), are concentrated among a few banks. All the major UK banks are exposed to domestic credit and interest rate risk through their lending to the UK household and corporate sectors, although this exhibits significant variation across the group (**Chart 2.2**). They are further exposed to counterparty credit risk through their lending to each other and to other financial institutions, most notably the non-UK LCFIs.

As Section 1 discussed, investor uncertainty about the valuation of products exposed to US sub-prime mortgages has resulted in disruption to a wide range of structured credit markets globally. A number of correlated risks to the major UK

Chart 2.1 Major UK banks' aggregate balance sheet as at end-June 2007^(a)

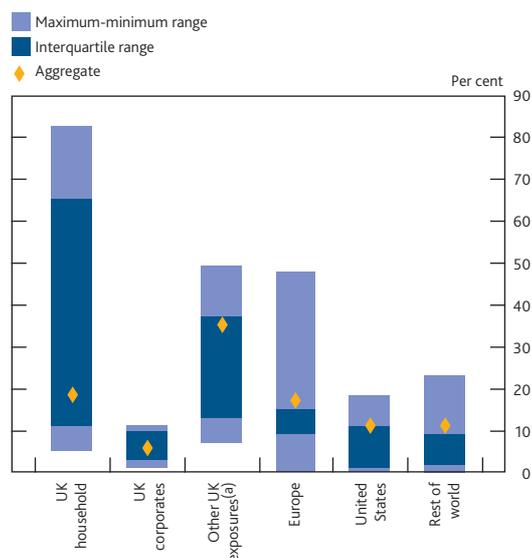


Sources: Bank of England, FSA regulatory returns, published accounts and Bank calculations.

- (a) Nationwide data are as at end-2006.
 (b) Includes borrowing from major UK banks.
 (c) Includes (among other items) loans to UK-resident banks and other financial corporations and holdings of UK government debt.
 (d) Includes Tier 2 capital, short positions, insurance liabilities and derivative contracts with negative marked-to-market value.
 (e) Assets are not risk weighted. As a percentage of risk-weighted assets, Tier 1 capital is 8%.

- (1) Membership of the major UK banks group is based on the provision of customer services in the United Kingdom, regardless of the country of ownership. The following financial groups, in alphabetical order, are currently members: Alliance & Leicester, Banco Santander, Barclays, Bradford & Bingley, HBOS, HSBC, Lloyds TSB, Nationwide, Northern Rock and RBS.
 (2) LCFIs include the world's largest banks, securities houses and other financial intermediaries that carry out a diverse and complex range of activities in major financial centres. The group of LCFIs is identified currently as: ABN Amro, Bank of America, Barclays, BNP Paribas, Citi (formerly Citigroup), Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC, JPMorgan Chase & Co., Lehman Brothers, Merrill Lynch, Morgan Stanley, RBS, Société Générale and UBS.

Chart 2.2 Major UK banks' exposures as a share of total assets as at end-June 2007^(a)



Sources: Bank of England, FSA regulatory returns, published accounts and Bank calculations.

(a) Includes (among other items) loans to UK-resident banks and other financial corporations, and holdings of UK government debt.

banks have subsequently crystallised. The residential mortgage-backed securities (RMBS) market has dried up, exposing the heavy reliance of some institutions on wholesale funding. The functioning of the interbank market has become severely impaired, exposing banks to increased rollover risk. Uncertainty about the source and cost of funding has placed future revenue streams at risk. And fee income has fallen for those banks that act as lead arranger⁽¹⁾ in leveraged loan deals or underwrite the issuance of structured credit products. Banks appear not to have adequately insured against the low likelihood of the structured credit and wholesale funding markets experiencing an acute fall in liquidity at the same time and for a protracted period. As a result, the perceived riskiness of financial institutions in the United Kingdom, and internationally, has increased significantly from its previously very low level.

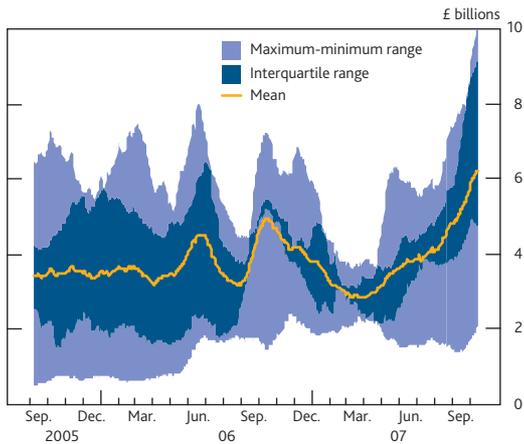
UK banks' liquidity positions came under pressure...

The disruption to structured credit markets has stalled the process by which banks have been able to distribute credit risk over recent years to other financial institutions. The resulting unanticipated expansion of banks' balance sheets represents a process of credit reintermediation, which has led to additional funding requirements for the major UK banks and banks globally. For example, banks left holding leveraged loans and mortgages intended for onward distribution have had to roll over short-term financing for these assets. This has affected most of the major UK banks, reflecting their increased use of securitisation in recent years. And banks that have committed liquidity lines to off balance sheet vehicles — such as asset-backed commercial paper (ABCP) conduits and structured investment vehicles (SIVs) — have faced an increased chance of these lines being drawn, as conditions in the ABCP market have deteriorated. These commitments are concentrated among the largest UK banks, and have a value of around £109 billion, or 2.1% of the major UK banks' total assets. Box 3 examines in further detail the implications of the reintermediation of credit for both the funding and capital positions of the major UK banks.

In principle, investor cash withdrawn from the leveraged loan, ABCP and securitisation markets could have found its way back to the banking sector. For example, other financial institutions may simply have chosen to deposit funds with banks directly or to reallocate cash to other asset classes, in turn leading to the creation of deposits elsewhere in the system. But it is clear that liquidity has not been redistributing itself effectively within the system over recent months. In large part, this is because investors have been reluctant to place term deposits as they have faced the possibility of redemptions. Banks have also sought to hoard liquidity to act as a precautionary buffer against uncertain future funding needs.

(1) Lead arrangers are the set of banks that manage the syndication process, including selling the deal to the market and offering bridging finance, a facility that may or may not be called.

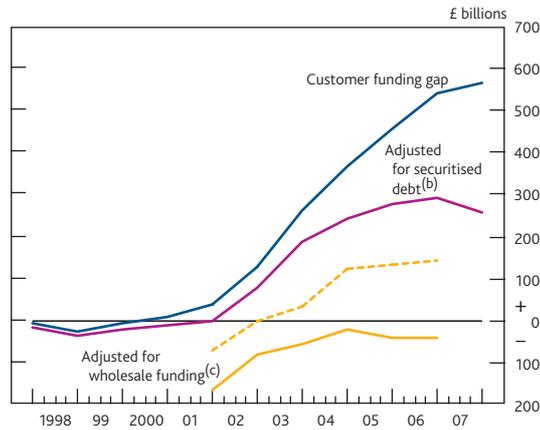
Chart 2.3 Sterling intraday liquidity buffers^{(a)(b)}



Source: Bank of England.

(a) Data are for the five major UK banks that are members of CHAPS Sterling.
(b) 30-day moving average.

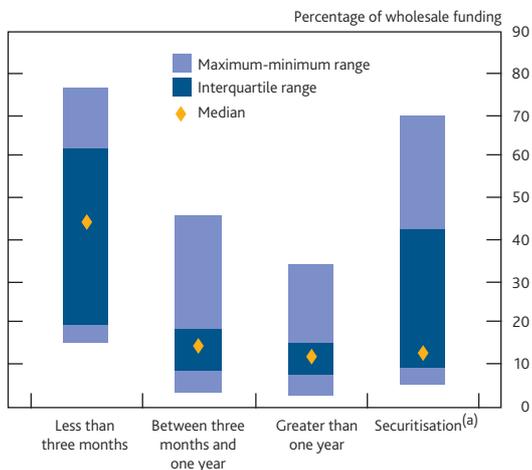
Chart 2.4 Major UK banks' customer funding gap^(a)



Sources: Dealogic, published accounts and Bank calculations.

(a) Data as at 2007 H1. Excludes Nationwide as interim data unavailable.
(b) Customer funding gap less securitised debt. Where not available, stocks of securitisations are estimated from issuance data.
(c) Customer funding gap less wholesale funding with an outstanding maturity of more than three months (solid line) or with an outstanding maturity of more than one year (dashed line).

Chart 2.5 Major UK banks' wholesale funding by maturity and securitisation end-2006



Sources: Dealogic, published accounts and Bank calculations.

(a) Where not available, stocks of securitisations are estimated from data on flows of issuance.

The five major UK banks that are members of CHAPS sterling⁽¹⁾ appear to have built up significant buffers of sterling liquid assets over the past few months. This is illustrated by the increasing amount of collateral held on account against intraday payments by those banks, relative to collateral actually used to make these payments (Chart 2.3). These banks account for the vast majority of non-bank deposits held by the major UK banks. Their deposit share has increased since July, reflecting a redistribution of deposits within the banking system towards the larger and more highly rated banks. Some of these deposits may have been recycled through interbank lending. But contacts report a willingness to do so only on a short-term basis. As a result, there has been a progressive shortening of the maturities of UK banks' interbank liabilities.

Effective liquidity recycling in interbank markets also relies on the smooth functioning of the large-value payment system and the securities settlement system. During the period of market turbulence, these core infrastructures have performed well, notwithstanding a small number of isolated operational incidents in CREST⁽²⁾ during August. Recent events have highlighted the importance of infrastructure resilience in stressed markets. With uncertainty already high, any prolonged disruption that had left trades unsettled or affected agents' risk exposures could have had serious implications.

...exposing wholesale funding vulnerabilities...

As highlighted in previous Reports, the major UK banks have increasingly used wholesale sources to fund customer lending over the past five years. This is reflected in the widening customer funding gap (Chart 2.4).⁽³⁾ At end-June 2007, this amounted to £564 billion for the major UK banks, or 22% of the stock of their customer loans. In recent years, this gap has been largely filled by securitisation. Excluding securitisation, the major UK banks' customer funding gap falls to £259 billion or 10% of their customer lending. By matching the maturity of assets to liabilities, securitisation reduces banks' exposure to rollover risk — the need to refinance long-term loans in short-term funding markets. But, as the experience of Northern Rock demonstrates, banks that are reliant on finance from planned securitisations are exposed to an unanticipated rise in rollover risk if investor demand for RMBS dries up. At end-2006, the median share of the major UK banks' wholesale funding accounted for by securitisation was just below 13%, although there was significant variation across the group (Chart 2.5).

Chart 2.5 also shows the maturity structure of the UK banks' wholesale liabilities excluding securitisation. The high

(1) CHAPS is the United Kingdom's high-value payments system. The five major UK banks that are members of CHAPS Sterling are: Barclays, HBOS, HSBC, Lloyds TSB and RBS.
(2) CREST is the United Kingdom's high-value securities settlement system.
(3) The customer funding gap is customer lending less customer funding, where customer refers to all non-bank borrowers and depositors.

Box 3

The impact of unanticipated balance sheet expansion on UK banks

Investor reappraisal of risks embedded within asset-backed securities (ABS) and leveraged loans has caused an unanticipated expansion of major UK banks' — and other international banks' — balance sheets. This process of reintermediation has operated through two channels: the crystallisation of warehousing risk and off balance sheet commitments. Both have resulted in additional funding and capital requirements for UK banks, potentially impeding their ability to extend new lending to the household and corporate sectors. And in the short term, the additional funding requirement has also contributed to major UK banks hoarding liquidity.

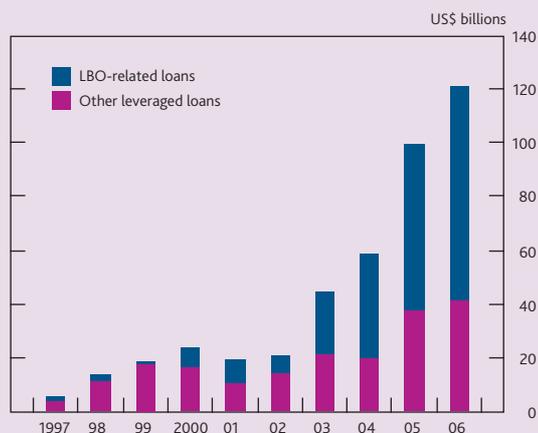
Crystallisation of warehousing risk

In common with other banks, in recent years the major UK banks have moved progressively towards an 'originate and distribute' business model. The major UK banks have syndicated more loans, securitised more of their balance sheet assets and engaged in more credit derivatives activity. But in recent months, while the major UK banks have continued to originate new loans, their capacity to distribute them has been impeded by a sharp fall in demand for leveraged loans and structured credit products from end-investors.

Previously, the participation of major UK banks as lead arrangers in leveraged lending had risen during 2006 (Chart A) and continued to rise into 2007 H1, with an increasing proportion accounted for by leveraged buyout (LBO) transactions. Major UK banks acting as lead arranger for these deals typically distribute around 70% of their exposures within 120 days of the deal being finalised.⁽¹⁾ But as discussed in previous *Reports*, banks are exposed to the 'warehousing risk' that market liquidity deteriorates, preventing them from distributing loans as intended. This risk has crystallised in recent months, as the major UK banks have retained on their balance sheets a number of 'hung' LBO loans, together with commitments to further loans in the pipeline. These unanticipated exposures then give rise to additional funding and capital requirements.

A reduction in demand for residential and commercial mortgage-backed securities (RMBS and CMBS respectively) from end-investors has also required the major UK banks to hold assets intended for securitisation on their balance sheets for longer than anticipated. In recent years, the major UK banks have become increasingly active issuers of RMBS in particular, supporting the growth in mortgage lending to UK households (Chart B). The underlying mortgages intended for securitisation will have been funded on a short-term basis only, in anticipation of their subsequent removal from the

Chart A Major UK banks' participation as lead arrangers in global leveraged lending^{(a)(b)}



Sources: Dealogic and Bank calculations.

(a) Excludes amended and unsigned loans.

(b) When the proportions provided by each syndicate member are unknown, loan amounts have been split equally among participating banks.

Chart B Major UK banks' issuance of residential mortgage-backed securities and growth in mortgage lending



Sources: Bank of England, Dealogic and FSA regulatory returns Bank calculations.

lender's balance sheet. But inability to issue RMBS and CMBS as intended will have required the major UK banks to renew this short-term funding, representing an unanticipated increase in funding requirements. Capital will also need to be allocated against these exposures for longer than anticipated.

Off balance sheet commitments

Off balance sheet vehicles established by banks — such as conduits, structured investment vehicles (SIVs) and so-called SIV-lites — have been important sources of demand for structured credit products. As discussed in Section 1, these vehicles obtain funding through the issuance of asset-backed commercial paper (ABCP). The proceeds from these short-term instruments are used to fund the purchase of assets of longer duration, such as RMBS and collateralised debt obligations. The resulting maturity mismatch leaves these vehicles vulnerable to disruption in investor demand for ABCP.⁽²⁾ That 'rollover risk' has crystallised recently, as

investors have reappraised the riskiness of assets purchased by off balance sheet vehicles. This, in turn, has reduced demand for ABCP issued by conduits, SIVs and SIV-lites.

To mitigate rollover risk, conduits typically hold committed liquidity lines provided by commercial banks — including the major UK banks — which cover 100% of the value of ABCP issued.⁽³⁾ As conduits have experienced difficulty in replacing maturing funding, the likelihood of them drawing on liquidity lines provided by sponsoring banks has increased. At end-2007 Q3, the value of such facilities established by conduits, SIVs and SIV-lites with the major UK banks was estimated to be around £109 billion, equivalent to 35% of these banks' on balance sheet lending to domestic non-financial companies.

When a bank provides liquidity support it may do so by making a loan secured against assets held by the conduit, or by purchasing assets which the conduit holds. In either case, the bank's balance sheet will expand, requiring it to obtain funding. It will also incur an additional capital charge as the (contingent) liquidity line is replaced by an on balance sheet exposure.⁽⁴⁾ Opacity in the disclosure of liquidity support facilities, and in particular the extent to which they are drawn on, makes it difficult for investors to quantify the degree of liquidity risk any one bank is exposed to.⁽⁵⁾

Funding and capital effects

Estimating the potential funding and capital consequences of these two channels can help in assessing the extent to which other lending might be crowded out as a result of recent market turmoil. It can also help in determining the length of any transition path back to banks' preferred balance sheet size and structure. **Table 1** provides a conservative estimate, based on a scenario under which banks cannot distribute any assets for the remainder of 2007 and are required to provide full liquidity support to all off balance sheet vehicles. It also assumes that additional exposures are subject to 100% risk-weighting for regulatory capital purposes.

Under this scenario, the potential funding impact on the major UK banks appears significant. In aggregate, additional funding of £170 billion would be required, representing around 12% of the major UK banks' existing wholesale funding base. To limit this additional funding requirement, banks could slow the growth of new lending. But new lending would need to slow significantly to accommodate completely the estimated additional funding, which represents approximately 14% of major UK banks' stock of lending to UK households and domestic non-financial companies. That could constrain earnings growth. It also provides an incentive for the major UK banks to hoard liquidity as a buffer to absorb any such funding pressures. There is evidence from market contacts of banks having done so in recent months. That incentive may be

Table 1 Estimated capital and funding impact on major UK banks of unanticipated balance sheet expansion^(a)

	Extra funding (per cent) ^(b)	Extra risk-weighted assets (£ billions)	Change in Tier 1 ratio (per cent)	
			Current	Prospective ^(c)
Total	12.0	147.4	8.2	7.6
Of which:				
ABCP ^(d) -funded vehicles	7.7	109.1	–	(-0.40pp)
Leveraged buyouts	1.1	15.5	–	(-0.06pp)
MBS ^(e)	3.2	22.8	–	(-0.08pp)

Sources: Bank of England, Dealogic, Fitch Ratings Ltd and Bank calculations.

- (a) Assumes a scenario under which banks cannot distribute any assets for the remainder of 2007 and are required to provide full liquidity support to all off balance sheet vehicles.
 (b) As a percentage of major UK banks' funding obtained from interbank deposits and debt securities in issue.
 (c) Assumes LBO pipeline, ABCP liquidity support lines subject to 100% risk-weighting, mortgages not securitised subject to 50% risk-weighting. Based on capital position at end-2006.
 (d) Asset-backed commercial paper.
 (e) Assumes value of mortgage-backed security (MBS) (defined as RMBS and CMBS) that cannot be issued by major UK banks is equal to average value of MBS issued by these institutions in 2006 Q3 and 2006 Q4.

offset to the extent that investors' funds withdrawn from asset-backed securities, leveraged loans and ABCP are redeposited within the UK banking system.

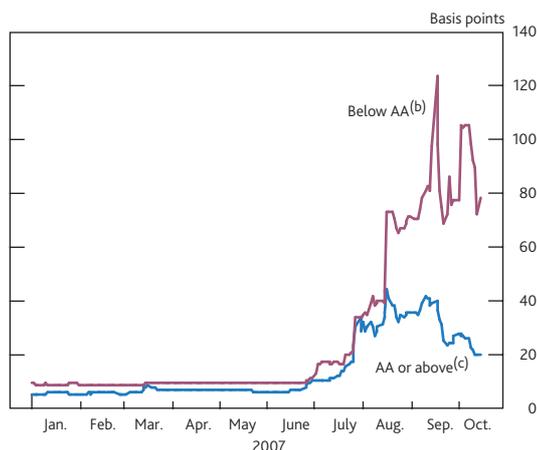
In terms of capital, the potential impact appears more limited. The aggregate Tier 1 ratio of the major UK banks is estimated to fall by only 0.5 percentage points to 7.6%. This would leave capital buffers well in excess of regulatory minima, a reflection of the current strong regulatory capital position of the major UK banks. But in practice, these banks may target a Tier 1 ratio in excess of regulatory minima, in order to maintain a target credit rating and a cost of funds associated with that credit rating.⁽⁶⁾ To maintain a target Tier 1 ratio, banks may seek to constrain the growth of risk-weighted assets in other areas of their business or issue new capital, even if regulatory minima do not appear close to being breached.

That the additional funding and capital requirements that might arise from unanticipated balance sheet expansion could further constrain new lending is consistent with the results of the Bank's 2007 Q3 Credit Conditions Survey.⁽⁷⁾ Tightening credit conditions in response to these and other factors could persist if the major UK banks adjust their business models in response to recent events. Section 3 discusses the implications of such a shift in business model.

- (1) FSA (2006), 'Private equity: a discussion of risk and regulatory engagement', Discussion Paper 06/06, November, available at www.fsa.gov.uk/pubs/discussion/dp06_06.pdf.
 (2) Further detail on ABCP-funded vehicles is provided in Bank of England (2007), 'Markets and operations', *Bank of England Quarterly Bulletin*, Vol 47, No. 1, page 348.
 (3) For SIVs and SIV-lites, committed liquidity lines typically cover less than 100% of ABCP issued.
 (4) In the United Kingdom, liquidity lines with a maturity of 364 days or less currently attract no capital charge. Following the implementation of Basel II, the capital charge will be determined by the external rating of the assets held by the conduit benefiting from liquidity support. This will likely be at a risk weighting of less than 100%.
 (5) The Capital Requirements Directive that will introduce Basel II in Europe (including the United Kingdom) will require additional disclosures, including of liquidity facilities, under Pillar 3 of the framework. Box 7 in Section 4 considers this in more detail.
 (6) See Alfon, I, Argimon, I and Bascunana-Ambros, P (2004), 'What determines how much capital is held by UK banks and building societies?', *FSA Occasional Paper Series, No. 22*, Financial Services Authority, July.
 (7) See www.bankofengland.co.uk/publications/other/monetary/creditconditionsurvey070926.pdf

proportion of wholesale liabilities maturing within three months reflects the maturity mismatch typically run by banks, with longer-term assets backed by shorter-term liabilities, exposing them to significant rollover risk. At end-2006, the median share of the major UK banks' wholesale liabilities maturing within three months was around 44%, with an interquartile range across the peer group of 19%–62%. As banks have become reluctant to lend other than at very short maturities, this rollover risk will have increased further in recent months for at least some institutions. Contacts suggest that some banks may be rolling over markedly more of their total wholesale liabilities overnight than previously. And banks employing liquidity management strategies that rely on transforming funding from one currency into another via the foreign exchange swap market have also come under pressure, as liquidity has dried up in the foreign exchange swap market for extended periods in recent months.

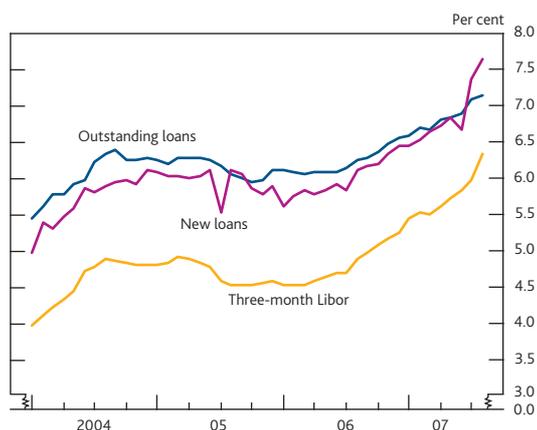
Chart 2.6 Major UK banks' credit default swap premia^(a)



Sources: Fitch Ratings Ltd, Markit Group Ltd, Thomson Datastream, published accounts and Bank calculations.

- (a) Asset-weighted average five-year premia.
 (b) Data include members of the major UK banks peer group with a Fitch Ratings long-term issuer rating below AA.
 (c) Data include members of the major UK banks peer group with a Fitch Ratings long-term issuer rating of AA or above.

Chart 2.7 UK corporate borrowing rates



Sources: Bank of England and BBA.

Costs of interbank funding rose sharply during August and September, especially for longer-maturity borrowing. Interbank lending rates increased for all borrowers, but particularly for those smaller members of the major UK banks peer group with lower credit ratings. This differentiation between banks is also reflected in market perceptions of credit risk, as proxied by credit default swap (CDS) premia (Chart 2.6). Although these market-based estimates of default have increased for all UK financial institutions, the rise has been larger and longer-lived for the lower-rated institutions.

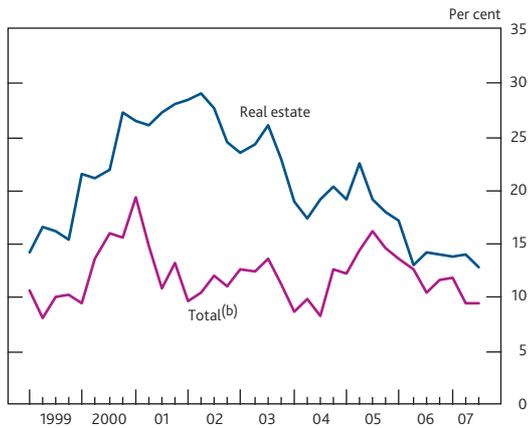
...which may affect UK lending...

Rising funding costs for banks have already begun to feed through to higher corporate borrowing rates, as many new and existing loans are indexed to three-month Libor (Chart 2.7). While borrowers may have hedged a large part of their interest rate risk, respondents to the Bank's Credit Conditions Survey in 2007 Q3 reported that demand for new loans had declined recently. Spreads over Libor on new lending have also risen slightly. This may, in part, reflect the possibility that banks are no longer able to distribute loans off their balance sheets as easily. With loans remaining on balance sheet, banks' profitability will depend more on spread than fee income. Non-price terms on corporate lending have also tightened. In the leveraged loan market, so-called 'covenant-lite' deals have largely been abandoned. Market contacts expect leveraged loan deals to become more conservative going forward, with less aggressive capital structures, lower income gearing and more covenants protecting lenders.

Lending to UK commercial property companies⁽¹⁾ accounts for 9% of the total stock of domestic lending by UK-resident

(1) This includes companies involved in the development, buying and selling of real estate. Exposures do not include banks' holdings of commercial mortgage-backed securities or loans to other companies collateralised by UK real estate.

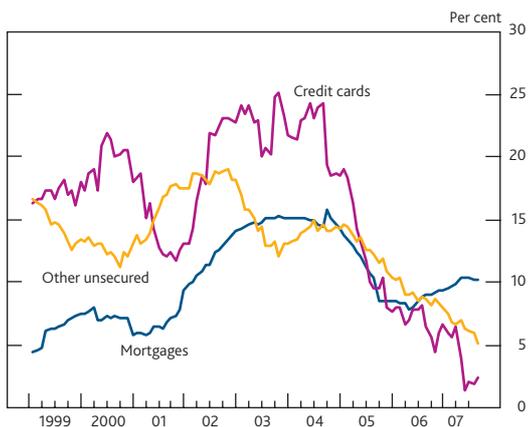
Chart 2.8 Annual growth in major UK banks' lending to UK non-financial companies^(a)



Source: Bank of England.

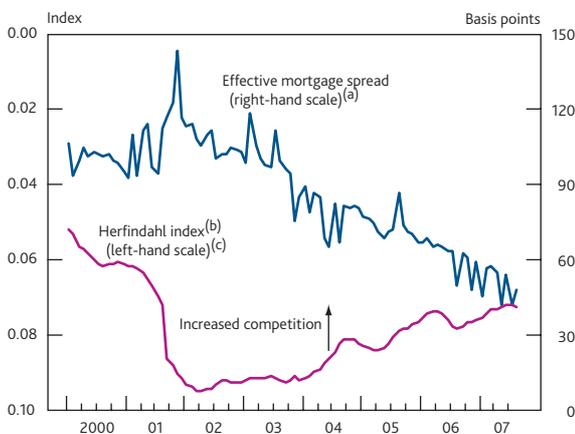
- (a) Data exclude Nationwide.
(b) Includes lending to real estate companies.

Chart 2.9 Annual growth in major UK banks' lending to UK households



Sources: Bank of England and FSA regulatory returns.

Chart 2.10 Effective mortgage spread



Sources: Bank of England and Bank calculations.

- (a) Effective interest rate on the stock of outstanding mortgages relative to an appropriate funding rate. For floating-rate mortgages, that is assumed to be Bank Rate. For fixed-rate products, swap rates of similar maturities are used (averaged over the relevant horizon and lagged one month).
(b) The Herfindahl index is a measure of concentration in an industry or sector. It is calculated as the sum of the squares of market shares for each firm.
(c) Inverted scale.

banks. This is in excess of the previous peak in 1989/90. In the first half of the year, the annual rate of lending growth by the major UK banks to the commercial property sector was relatively strong at 13% (**Chart 2.8**). However, non-bank investment has been slowing, with a doubling of redemptions from UK property funds between 2007 Q1 and 2007 Q2. As discussed in Section 1, risks to this sector have increased through this year and contacts report that lenders had already sought to tighten conditions ahead of the market turbulence. According to market contacts, this tightening is expected to continue going forward.

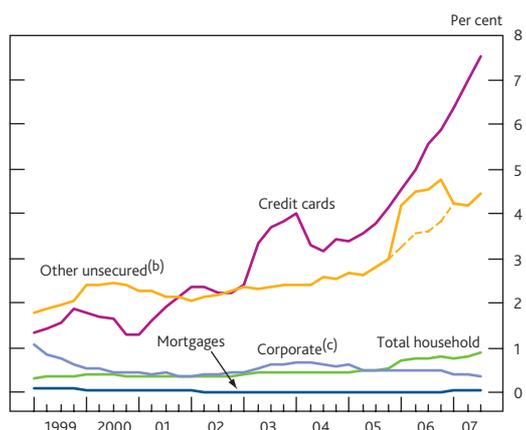
...though lending to prime household borrowers remains strong.

Growth in mortgage lending by the major UK banks to UK households has been rising over the past two years (**Chart 2.9**). This has reflected in part higher levels of competition in the UK mortgage market, which have contributed to falling spreads on mortgage lending (**Chart 2.10**). Until recently, the availability of relatively cheap funding through RMBS and covered bond issuance has allowed lenders with limited or no deposit bases, and facing relatively high costs of borrowing in unsecured wholesale funding markets, to compete for market share. The recent closure of RMBS markets may have reduced competitive pressure, providing banks less reliant on this source of funding with the opportunity to re-establish spreads. Contacts report that there is evidence of this already. The availability of owner-occupied mortgages to prime borrowers is expected to remain largely unchanged. As noted in Section 1, however, there has been a very significant tightening in credit conditions in the sub-prime sector as many specialist lenders in this market have raised rates, withdrawn products and lowered maximum loan to value (LTV) ratios.

Loans secured on residential property account for 88% of the major UK banks' stock of lending to UK households. Major UK banks' annual write-off rates on secured lending remain negligible, in large part on account of their predominantly prime customer base. Strong house price growth in recent years has also kept LTV ratios low on the existing stock of mortgages, limiting loss in the event of default. But as Section 1 notes, loan to income ratios have been increasing,⁽¹⁾ driven mainly by lending to first-time borrowers. And lending to the buy-to-let sector also increased further during 2007 H1. Both sectors are likely to be vulnerable to a tightening of credit conditions. In particular, there is evidence that some buy-to-let lenders have raised minimum rental coverage levels and increased rates and fees.

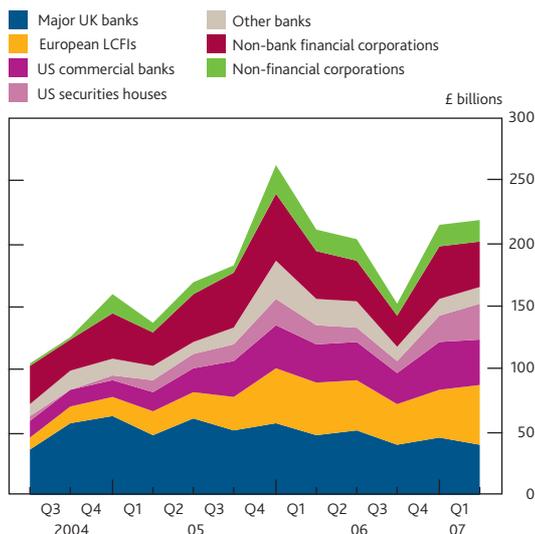
The annual growth rate of unsecured household lending continued to slow significantly during the first half of 2007 (**Chart 2.9**), consistent with a continued tightening of credit

(1) See Chart 1.21 in Section 1.

Chart 2.11 Major UK banks' annual write-off rates^(a)

Sources: Bank of England, FSA regulatory returns and Bank calculations.

- (a) Calculated quarterly as write-offs over previous year divided by average stock of lending.
 (b) Dashed line shows the rate excluding a one-off write-off of £0.7 billion in 2005 Q4, which distorted the series.
 (c) Data exclude Nationwide.

Chart 2.12 Major UK banks' 'large exposures' by type of counterparty^(a)

Sources: FSA regulatory returns and Bank calculations.

- (a) Based on exposures that exceed 10% of eligible capital at the end of the reporting period.

availability over the past two years. The annual write-off rate on unsecured lending has continued to rise (**Chart 2.11**). But this is a lagging indicator of stress. In their interim accounts, most major UK banks reasserted their confidence that unsecured impairments, which provide an indicator of future losses, have stabilised. Given the increased risks surrounding some households' finances as credit conditions tighten, however, uncertainty over the outlook for defaults in the period ahead must have increased recently.

Counterparty credit risks to LCFIs have risen...

The major UK banks maintain a large credit risk exposure to each other and to other financial institutions, including the non-UK LCFIs, through direct counterparty relationships. Regulatory large exposures data capture the most significant of these exposures.⁽¹⁾ At the end of June 2007, the major UK banks had significant exposures to all other LCFI peer groups including, increasingly, the US securities houses (**Chart 2.12**). At the end of June, large exposures to the US securities houses accounted for around a quarter of the major UK banks' total exposures to non-UK LCFIs. In total, exposures to non-UK LCFIs amounted to around £110 billion, or 62% of the major UK banks' Tier 1 capital at end-June.

According to CDS premia, the cost of insuring against counterparty credit risk has risen for the major UK banks and all the non-UK LCFI peer groups since June (**Chart 2.13**). Increases in CDS premia were particularly marked among the US securities houses, reflecting concerns about the size of their exposures to the US sub-prime market and their reliance on wholesale funding markets. Movements in CDS premia for all peer groups have also become more volatile over the past few months. This largely reflects a lack of transparency over the ultimate location and scale of credit losses.

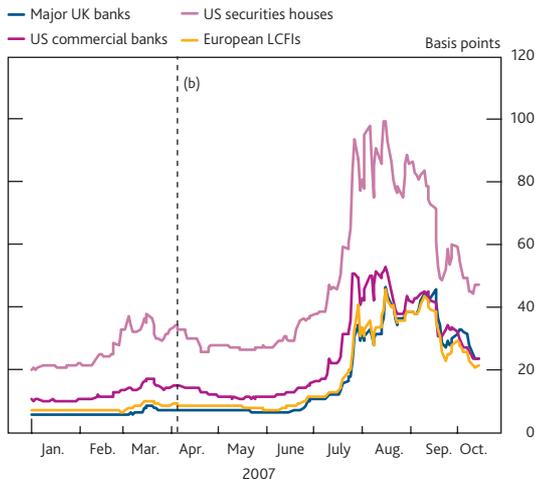
...against a background of higher risk-taking.

In recent years, banks have moved towards an 'originate and distribute' model of banking. This involves both investment and commercial banks taking on credit risk with the intention of distributing it onwards to other end-investors, including asset managers and hedge funds. Through this activity, banks are exposed to warehousing risk — the possibility that they will be left with large, potentially overvalued, credit risk exposures should investor demand fall.

During the recent period of market turbulence, this warehousing risk has been realised. For example, market estimates of the amount of 'hung' leveraged loan deals of non-UK LCFIs, both already on balance sheet and via underwriting commitments to the pipeline of deals, were in the region of \$300 billion in September. For UK LCFIs, the

(1) For regulatory purposes, 'large exposures' are defined as any exposures that exceed 10% of eligible capital (Tier 1 plus Tier 2 capital, less any regulatory deductions). Large exposures data do not capture intraday exposures or exposures that arise during the time taken to settle foreign exchange trades.

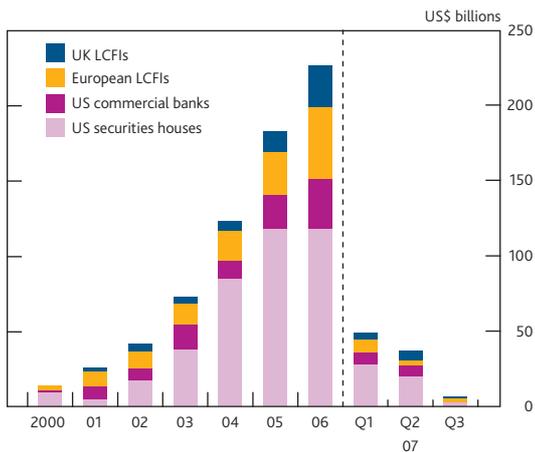
Chart 2.13 Major UK banks' and LCFIs' credit default swap premia^(a)



Sources: Published accounts, Thomson Datastream, Markit Group Limited and Bank calculations.

(a) Asset-weighted average five-year premia.
 (b) April 2007 Report.

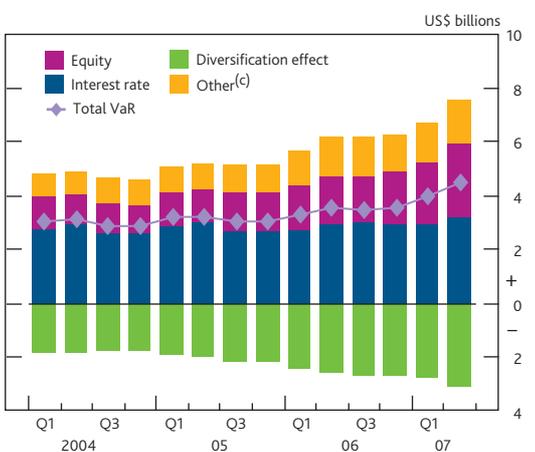
Chart 2.14 LCFIs' issuance of RMBS backed by sub-prime lending^(a)



Sources: Dealogic and Bank calculations.

(a) Data include residential mortgage-backed securities (RMBS) backed by sub-prime and non-first lien mortgages.

Chart 2.15 LCFIs' Value-at-Risk^{(a)(b)}



Sources: Bank of England, published accounts and Bank calculations.

(a) Standardised to US dollar 99% confidence interval and a ten-day holding period.
 (b) Data for selected LCFIs. Where unavailable, quarterly data are inferred from annual and semi-annual data.
 (c) Includes (among other items) commodities and foreign exchange.

equivalent estimate is around \$20 billion. As **Chart 2.14** shows, there has also been a marked fall in issuance of RMBS backed by sub-prime mortgages, suggesting that the LCFIs may have significant residual exposures on their balance sheets. Similarly to the major UK banks, the US commercial banks and European LCFIs are also potentially exposed to structured credit products through liquidity lines extended to ABCP conduits and SIVs. Market estimates of the value of these liquidity lines are in the region of \$480 billion. If these lines are drawn, this will place funding pressures on those banks and credit risk will flow back to the banking sector.

Higher levels of principal risk-taking by the LCFIs are evident in their reported trading book VaR measures, which increased during the first half of the year (**Chart 2.15**). VaR measures reported by the US securities houses for the third quarter of the year suggest that any subsequent increases are likely due to rises in the volatility of and correlation between asset prices rather than an increase in risk-taking. Volatility of some asset classes has more than doubled since the previous Report and the comovement between these volatilities has also picked up sharply. Other things being equal, this could lead to a more than doubling of reported VaR measures (see Box 4 in the April 2007 Report). Firms will have been making efforts to reduce the riskiness of their portfolios. But this will have been particularly difficult in the more illiquid markets, and could in practice have actually raised VaR levels by increasing volatility. As discussed in previous Reports, VaR measures are unlikely to incorporate such liquidity effects.

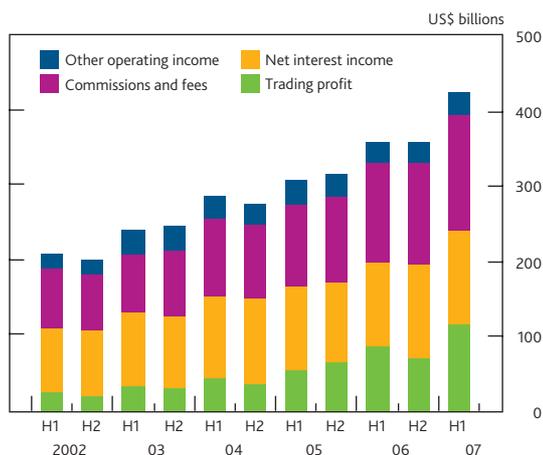
The outlook for future revenues will depend on structured credit markets...

Results released so far for the third quarter for the US securities houses and commercial banks, as well as earnings updates for several of the European LCFIs, indicate that performance has been more differentiated than usual. Some firms, particularly US commercial banks, have experienced heavy trading losses. Several firms have incurred write-downs on mortgage and leveraged loan portfolios originally intended for distribution. Some commentators have expressed concerns that several banks had not been sufficiently conservative in their revaluation of portfolios, raising the prospect of further losses in the fourth quarter.

This has occurred against the backdrop of a prolonged period of strong performance for the LCFIs, which continued during the first half of the year. In 2007 H1 aggregate net revenue for the LCFIs was \$425 billion, 19% higher than in 2006 H1 (**Chart 2.16**). Both trading profits and fees and commissions were important drivers of this growth. The average return on equity (ROE) increased, with the rise most marked for the US securities houses (**Chart 2.17**).

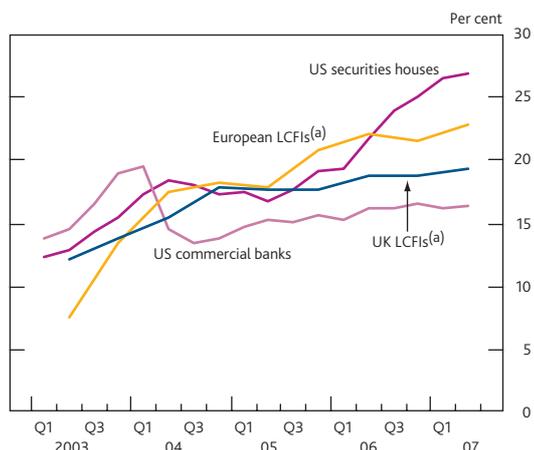
In large part, this performance is likely to have been supported by the growth in structured credit markets. The LCFIs have not

Chart 2.16 LCFIs' revenue sources



Sources: Bloomberg and Bank calculations.

Chart 2.17 LCFIs' return on common equity



Sources: Bloomberg and Bank calculations.

(a) Data for European LCFIs and UK LCFIs are half-yearly.

Table 2.A LCFIs' market shares as lead arrangers and book runners(a)

Percentage of primary market share

		0-10%	10-20%	20-25%	>25%
RMBS	Prime	23	15	21	16
	Sub-prime(b)	34	16	10	16
Syndicated lending	Non-leveraged	4	27	15	10
	Leveraged	14	27	21	8
Corporate debt	Investment grade	19	19	22	13
	High yield	17	23	29	4
ABS(d)	Excluding CDO(c)	13	29	24	11
	CDO	28	23	19	7

Sources: Dealogic and Bank calculations.

(a) For period 1 January to 30 September 2007.

(b) Data include residential mortgage-backed securities (RMBS) backed by sub-prime and non-first lien mortgages.

(c) Collateralised debt obligations (CDO).

(d) Asset-backed securities (ABS) excluding RMBS issuance.

only generated revenues through their origination and distribution activities, but demand for structured credit products has also allowed them to earn fees through the traditional investment banking activity of underwriting new debt issues. Data on lead arrangers and book runners suggest that the US securities houses have tended to focus growth on riskier products, such as sub-prime RMBS and collateralised debt obligations (CDOs) (Table 2.A), the fees for which tend to be more lucrative. In contrast, the European LCFIs and US commercial banks are dominant in more traditional markets, such as syndicated lending and corporate debt issuance. The UK LCFIs, which have been expanding their investment banking activities in recent years, appear to be most active in the RMBS market. This suggests that the outlook for future revenue growth may vary significantly across the peer group, depending in part on how long (and how far down the risk spectrum) investor appetite for structured credit products remains muted. In light of this, banks may review the future viability of their business models, in particular their increased emphasis on originate and distribute activity. The choices facing banks are discussed further in Section 3.

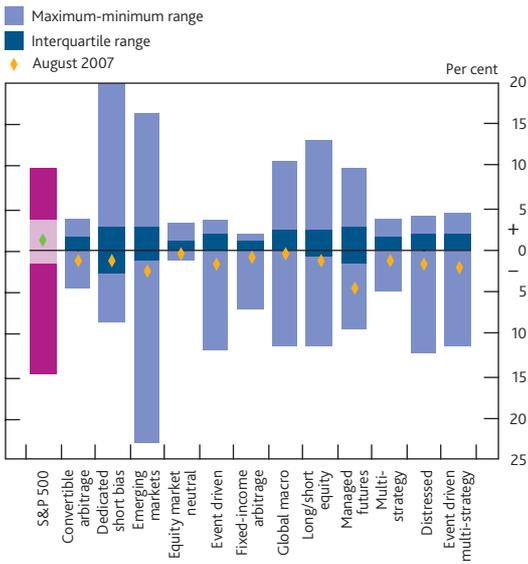
...while the impact on hedge funds has been mixed...

Hedge funds have been key investors in structured credit markets over the past few years. In a few cases during the recent period of market turbulence, deleveraging by hedge funds to meet margin calls appears to have resulted in distressed sales of assets or in the closure of funds to withdrawals to avoid distressed sales. In other cases, according to market contacts, hedge funds appear to have been a stabilising influence, buying assets in falling markets. Although hedge fund returns in August were negative, they were less weak than initial expectations, in particular after the large losses reported at the beginning of August (Chart 2.18). While there is evidence of a reallocation of assets between strategies, there does not appear to have been a net outflow of funds from the hedge fund sector as a whole. Contacts report that the most likely longer-term structural effect of the losses recorded in August will be consolidation in the sector, rather than a contraction.

...and infrastructure has coped well with increased volumes.

As financial intermediaries and investors have sought to reposition their exposure to market and credit risks, trading volumes in some of the more liquid financial markets have risen sharply, testing the processing capacity of the infrastructure. For example, the Continuous Linked Settlement system for foreign exchange saw record volumes on 19 September, settling some \$8.4 trillion in value, more than double the average daily value settled as recently as June. On the whole, the infrastructure has accommodated these increased volumes extremely well. The only evidence of capacity constraints at key infrastructures has been at the level of users.

Chart 2.18 Monthly return on hedge fund strategies^(a)



Sources: Bloomberg, CSFB/Tremont and Bank calculations.

(a) Maximum-minimum range and interquartile range calculated monthly from January 1994 to August 2007.

Capacity constraints have, however, been evident in over-the-counter derivatives markets. Contacts report that trading volumes of CDS for the major dealers increased markedly between June and mid-August. Despite the increased use of automated systems for post-trade processing of CDS (particularly the sending and matching of confirmations), the continuing reliance on manual intervention at key points in the process has put strain on dealers' back offices. As a result, having reduced backlogs over the past couple of years, several firms may now have fallen short of the targets set in conjunction with their regulators. Nevertheless, it is worth noting that, had the improvements in automation not taken place over the past two years, processing difficulties during this period could have been considerably more severe.

3 Prospects for the UK financial system

The UK and international financial systems have faced a severe test in recent months. Banks heavily reliant on the 'originate and distribute' business model have been particularly exposed to disruption in asset-backed securities and wholesale funding markets. The turmoil has also revealed significant weaknesses in the financial system, including inadequate credit and liquidity risk management and an excessive reliance on rating agencies. Banks are likely to make some changes to their business models in light of these events. Their choices will have implications for the rest of the financial system, including for the availability of credit to the household and corporate sectors.

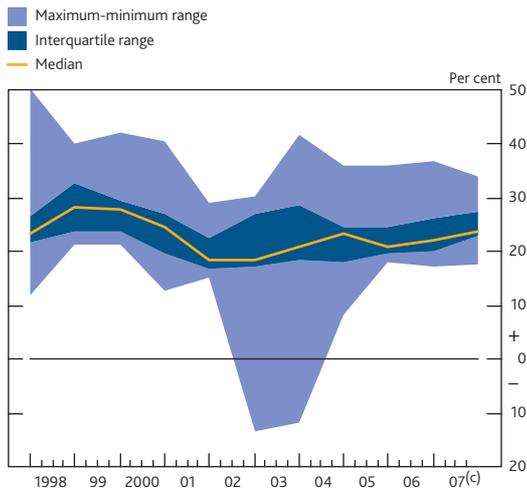
UK banks are profitable and have high capital ratios. But confidence in the robustness of the financial system, in the United Kingdom and internationally, has been dented by recent events. And as risk is repriced and balance sheets are repaired, the financial system in the United Kingdom and elsewhere is vulnerable to further shocks, whether in the credit markets that have been affected most to date or in new areas — for example, in equity or currency markets.

Chart 3.1 The phases of the crisis



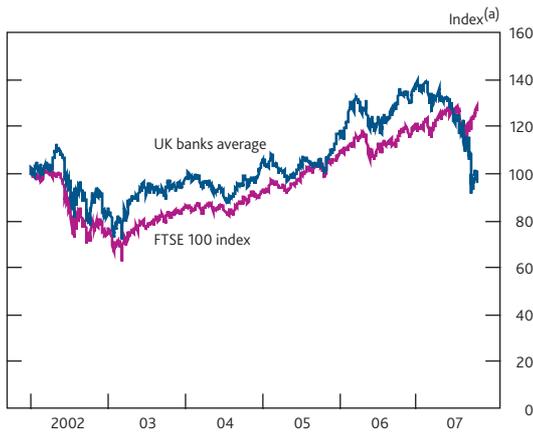
The financial market turmoil described in Section 1 and illustrated in **Chart 3.1** has proved to be the most severe challenge to the UK financial system for several decades. UK and large international financial institutions, which are at the heart of the global financial system, have been significantly affected (as discussed in Section 2). The 'originate and distribute' business model, which has facilitated rapid growth and strong profitability at major financial institutions in recent years, has been shown to have significant flaws. These include inadequate information about the true credit risk underlying financial instruments; an excessive dependency on rating agencies; opaqueness about the distribution of risks in the financial system; over-reliance on continuous liquidity in financial markets; and inadequate liquidity risk management.

The Bank and other authorities had identified previously many of these weaknesses in the financial system. But the speed, force and breadth with which these risks combined was not fully anticipated by the authorities or financial market participants. In consequence, confidence in the stability of the financial system, in the United Kingdom and internationally, has been dented. The financial system will have to adapt to these new challenges if confidence is to be fully restored. This section describes these challenges, how banks might respond to them and what implications this has for the Bank's assessment of key vulnerabilities.

Chart 3.2 Major UK banks' pre-tax return on equity^{(a)(b)}

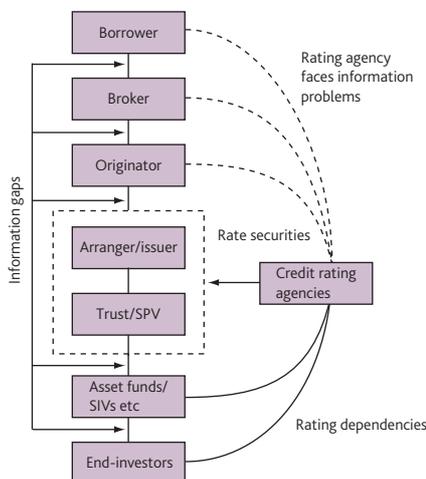
Sources: Published accounts and Bank calculations.

- (a) Data for major UK banks, excluding building societies.
 (b) Pre-tax return on equity calculated as pre-tax profit as a proportion of shareholders' funds and minority interests.
 (c) Annualised 2007 H1 data.

Chart 3.3 UK banks average equity prices

Sources: Bloomberg and Bank calculations.

- (a) Rebased to 100 on 2 January 2002.

Chart 3.4 Stylised sub-prime securitisation chain^(a)

- (a) For more detail on the roles of participants in structured finance markets see Committee on the Global Financial System (2005), *The role of ratings in structured finance: issues and implications*, January, available at www.bis.org/publ/cgfs23.htm.

3.1 The impact of recent events on the UK financial system

Profit growth in recent years has been driven by the 'originate and distribute' business model.

UK banks' and LCFIs' profitability has been high in recent years, with returns on equity often well in excess of 20% (Chart 3.2). Up until recently, the share prices of UK-owned banks have generally outperformed overall equity indices (Chart 3.3). Much of this profitability has stemmed from traditional banking activities, such as lending to prime households and companies, where these loans are retained on balance sheets. But as described in the April 2007 *Report*, competitive pressures have encouraged some banks to place an increasing emphasis on an 'originate and distribute' business model. This model has several key characteristics:

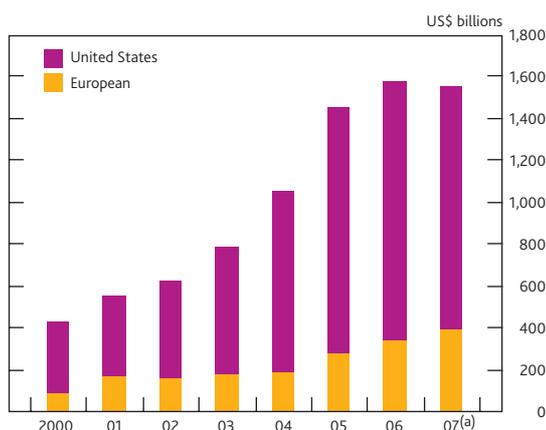
- Banks are not always at the first stage of the loan origination process. As shown in Chart 3.4, the relationship with end-borrowers is often sub-contracted to other companies, such as mortgage brokers in the case of households.
- Financial institutions pool loans and create financial securities backed by the revenue streams on these loans. Financial engineering has enabled the creation of distinct securities with readily identifiable risk characteristics — such as ratings — to match the different risk preferences of end-investors. Chart 3.5 shows how the total issuance of asset-backed securities (ABS) in the United States and Europe has more than trebled since 2000.
- Some securities are bought by other financial institutions, such as managers of collateralised debt obligations (CDOs). They in turn create new and often complex instruments with high embedded leverage, which they sell on. As Section 1 discusses, issuance of these products has been very strong in recent years.

- Banks have increasingly funded themselves using securitisation, and sometimes by creating off balance sheet vehicles backed by loans they have originated. This off balance sheet funding has been a relatively cheap source of finance.

This business model has also been encouraged by the capital treatment of different sorts of securities under Basel I. This capital treatment provides banks with incentives to securitise loans and to sell the low-risk tranches. It also encourages off balance sheet funding.

The originate and distribute business model has had significant implications for other parts of the financial system. Strong end-investor demand for yield in a generally low interest rate environment has resulted in rapid growth in structured credit

Chart 3.5 Asset-backed securities issuance



Sources: European Securitisation Forum and Securities Industry and Financial Markets Association.

(a) Annualised 2007 H1 data.

Table 3.A Collateralised loan obligation investor profile

Tranche rating	Point at which losses start to accrue ^(a) (per cent)	Typical investors
Unrated (equity)	0	Banks and equity funds (30%); CDO ^(b) managers (25%); hedge funds (20%); pension funds (20%); insurers (5%)
BB	8	Banks and insurers (50%); CDO managers (30%); hedge funds (20%)
BBB	12	Banks and insurers (55%); mezzanine structured finance CDOs (30%); hedge funds (15%)
A	15	Banks and insurers (60%); high-grade and mezzanine structured finance CDOs (30%); hedge funds (10%)
AA	21	Banks and insurers (65%); high-grade structured finance CDOs (25%); hedge funds (10%)
AAA	29	Banks and monoline insurers (85%); other insurers (5%); hedge funds (5%); SIVs ^(c) and high-grade structured finance CDOs (5%)

Sources: JPMorgan Chase & Co. and Lehman Brothers.

(a) As a fraction of notional outstanding.

(b) Collateralised debt obligation.

(c) Structured investment vehicles.

instruments. That in turn has increased banks' appetite for new lending, creating business for mortgage originators, hedge funds and private equity firms. The securitisation process has also affected the distribution of risk across the financial system (Table 3.A). For example, hedge funds have purchased first-loss exposures to loan pools from banks. Dedicated funds have purchased mezzanine tranches of these securities. And risk averse investors, such as monoline insurers, have been heavy buyers of the highly rated senior tranches.

The recent financial turmoil has been a significant test of this originate and distribute business model. In particular, several potential areas of weakness in this model have been revealed.

This model has weakened credit risk management...

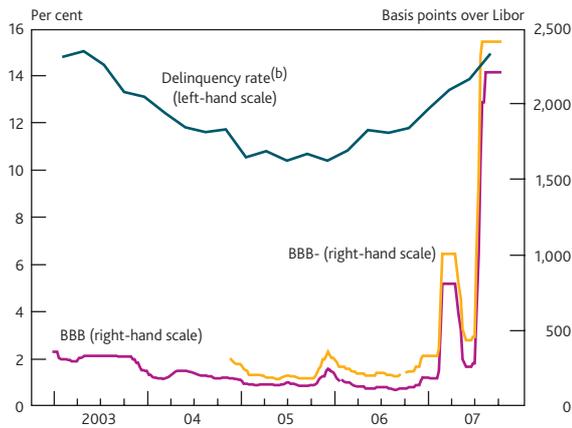
Credit risk transfer markets provide firms with the opportunity to diversify funding sources and improve credit risk management. They can also facilitate improved portfolio diversification. But as the April 2007 Report highlighted, there are features of these markets that may weaken credit risk assessment — for example, because the ultimate bearers of risk have less information on underlying credit quality than the originators and because of the reliance of some investors on risk assessments by third parties, including ratings agencies. Further increases in defaults on US sub-prime mortgages (Chart 3.6) and falls in the prices of ABS have reinforced concerns about such information asymmetries and associated adverse incentive effects.

As Chart 3.4 indicates, for a stylised sub-prime mortgage securitisation there are a number of different participants in the securitisation chain. The greater the number of links in the chain, the greater the scope for information on the underlying credit quality of the assets to be lost. These information asymmetries, in combination with the sometimes different objectives among participants, have the potential to weaken credit risk assessment standards. For example, originators and arrangers remunerated by business volumes may not have the incentives to screen risk to the same standards expected by fund managers or end-investors. While there are reputational incentives and market mechanisms to maintain credit quality, such as ensuring that originators maintain exposures to some of the potential credit loss, the reported evidence of fraudulent practices in the origination of US sub-prime mortgages suggests those mechanisms have not been fully effective. And as losses from US sub-prime markets have crystallised, investors have realised that a number of the weakspots in these markets also apply to securitised and structured credit markets more widely.

...has led to dependencies on ratings agencies...

Concerns about the loss of information on underlying credit quality may be particularly great when assets are repackaged further — for example, into CDOs. In these markets, some investors and investment managers have relied heavily on

Chart 3.6 US sub-prime mortgage delinquencies and home equity loan index spreads^(a)



Sources: Lehman Brothers, Mortgage Bankers Association and Thomson Datastream.

(a) The home equity loan asset-backed security sector is an amalgam of subsectors related to different underlying mortgage products, including first lien sub-prime mortgage loans, closed-end second mortgage loans, so-called 'high LTV (loan to value)' mortgage loans, and home equity lines of credit. This chart shows the higher-risk tranches of securities backed by such lending.

(b) US sub-prime residential mortgages 30+ days delinquency rate.

ratings as summary indicators of asset quality. Indeed, some invest in funds on the basis of a given ratings mandate. As ratings downgrades spread to even the most highly rated structured credit products, investor confidence in ratings fell. And in the absence of other readily available measures of asset quality, uncertainty about the underlying value of structured products increased markedly as a result.

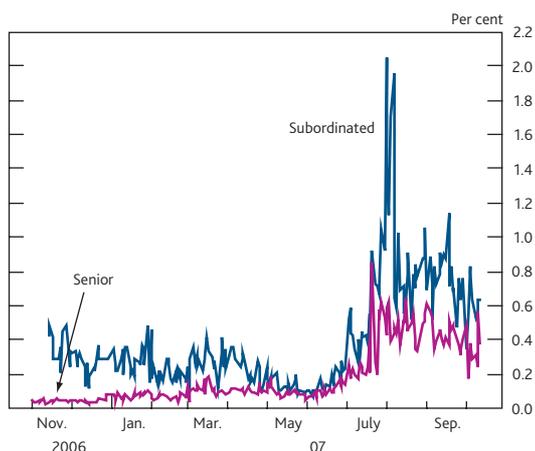
...uncertainties about the valuation of complex structured products...

The reported difficulties of the Bear Stearns Asset Management hedge funds' prime brokers in selling complex structured products returned to them as collateral, and the subsequent suspension of valuations by some funds, highlighted particular uncertainties around the valuation of complex structured credit products. These reflect the range of risks to which such products are exposed, such as correlation risks in credit quality and market risks, including market liquidity risk. Valuations are often model-dependent, reliant on a very short run of data and, in consequence, highly sensitive to the assumptions used (see Box 2 in Section 1).

Some end-investors and fund managers may have mistakenly assumed that the credit ratings of these products provided information on other risks. Many of these instruments are 'buy and hold' securities for which there is not always a readily available secondary market. A single rating does not capture adequately all of the risks inherent in these products — for example, liquidity risk — as reflected in the differential pricing of products within a similar ratings band.

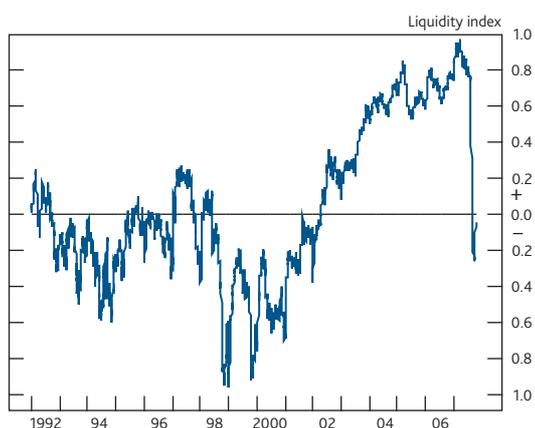
...opaqueness about the distribution of risk across the financial system...

Recent events have also shown how opacity in the distribution of risk exposures across institutions can add to perceptions of counterparty credit risk at times of financial stress. Credit risk transfer markets have allowed the distribution and dispersal of credit risk around the financial system, but at the same time have made the ultimate incidence of risk less clear, particularly given the potential for risks distributed off banks' balance sheets to return in a different form, such as liquidity risk. Uncertainty over exposures to US sub-prime lending, both through holdings of related assets and through contingent commitments to investment vehicles holding such assets, has revealed wider uncertainties about institutions' exposures to structured credit products. As Section 2 discusses, these factors have contributed to a general increase in measures of counterparty credit risk across financial institutions and a drying up of liquidity in term money and short-term paper markets. More recently, market contacts report that disclosures of exposures have been positively received by market participants, suggesting that earlier uncertainty about such exposures may have delayed a recovery in affected markets.

Chart 3.7 iTraxx LevX five-year indices bid-ask spreads^(a)

Sources: International Index Company and Bank calculations.

(a) Bid-ask spread as a percentage of mid-price.

Chart 3.8 Financial market liquidity^(a)

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

(a) The liquidity index shows the number of standard deviations from the mean. It is a simple unweighted average of nine liquidity measures, normalised on the period 1999–2004. Data shown are an exponentially weighted moving average. The indicator is more reliable after 1997 as it is based on a greater number of underlying measures. Data have been revised following methodological changes. See April 2007 Report, Box 2: Financial market liquidity, page 18.

...a reliance on continuous market liquidity...

The April Report noted how financial firms' growing use of credit risk transfer markets was increasing their dependence on continuous market liquidity to distribute risks they originate. That dependence appeared to have been encouraged by sustained high levels of liquidity over recent years. But as uncertainty about asset valuation rose, liquidity dried up rapidly across a wide range of credit markets. That has been reflected, among other ways, in higher bid-ask spreads in leveraged loan markets (Chart 3.7). Although liquidity in some other key financial markets — such as equity markets — has been little affected, summary measures of financial market liquidity have declined very sharply in recent months (Chart 3.8).

...weaknesses in the management of contingent commitments to off balance sheet vehicles...

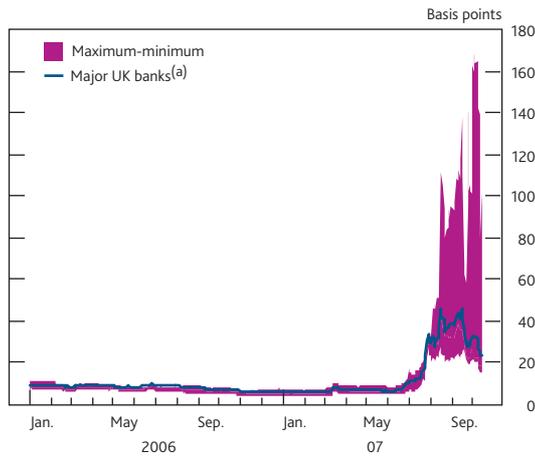
As banks' contingent liquidity lines were called, inadequacies were revealed in the extent to which contingent off balance sheet exposures were incorporated into banks' risk management. For example, two German banks had difficulties in meeting funding commitments to structured investment vehicles (SIVs) that were drawn upon. This highlights the importance of fully incorporating contingent exposures into liquidity planning and regulation (discussed further in Section 4).

...and inadequate planning for the possible closure of key wholesale funding markets.

The financial turmoil also highlighted how counterparty credit risk could transform itself into funding liquidity risk, as banks became less willing to lend to each other because of concerns about creditworthiness. Asset managers were also reported to be hoarding liquidity, in part reflecting concerns about redemption risk. The tightening of interbank funding markets in particular, as individual banks built up liquidity buffers, demonstrated the importance of firms' liquidity planning incorporating assumptions about the behaviour of others, which may affect the availability of market funding in aggregate in situations of stress.

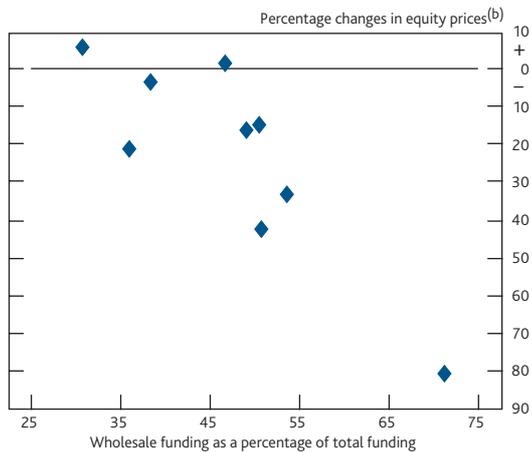
The April 2007 Report noted the growing use by major UK banks of wholesale markets for funding and how if banks were unable to securitise assets new lending would need to be financed through other wholesale sources, which may be difficult to access in times of stress.⁽¹⁾ Box A in the Overview describes how, in turbulent markets, Northern Rock experienced this particular problem. Similar difficulties have been evident, albeit more mildly, in the reported funding

(1) As the April 2007 Financial Stability Report noted, 'Issuance of residential mortgage-backed securities, in particular, matches assets to liabilities and so limits the UK banks' reliance on alternative sources of wholesale funding, such as short-term unsecured borrowing. But securitisation still leaves the UK banks exposed to a deterioration of market conditions. If they were unable to securitise existing assets, new lending would need to be financed through other wholesale sources, which may be difficult or costly to access during times of stress.'

Chart 3.9 Major UK banks' credit default swap premia

Sources: Bloomberg, Markit Group Limited, published accounts and Bank calculations.

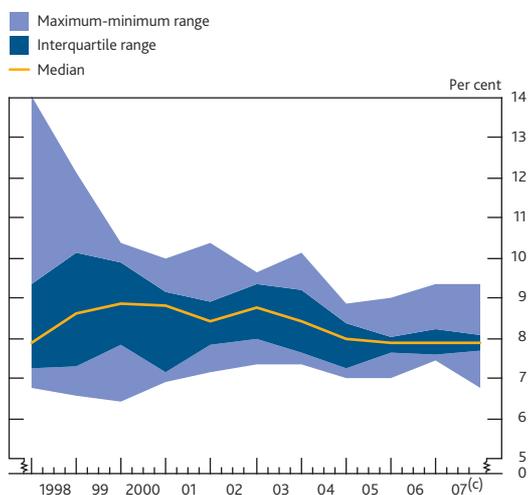
(a) Asset-weighted average five-year premia.

Chart 3.10 Wholesale funding versus equity price changes^(a)

Sources: Bloomberg, published accounts and Bank calculations.

(a) Wholesale funding is defined as interbank deposits plus debt securities in issue. Total funding is wholesale funding plus customer deposits.

(b) Since April 2007 Report.

Chart 3.11 Major UK banks' Tier 1 capital ratios^{(a)(b)}

Sources: Published accounts and Bank calculations.

(a) Tier 1 capital includes ordinary shares, associated reserves and retained earnings.

(b) All ratios reported on a Basel I basis.

(c) 2007 H1 figure.

strains experienced by some other banks. These events have highlighted the need for the more extensive stress testing of funding liquidity requirements, factoring in the possibility of prolonged and correlated closures in key financial markets. The contrasting abilities of Countrywide and Northern Rock to weather wholesale funding problems, by drawing on contingent liquidity lines, underlined the importance of ensuring that contingency funding plans are robust to such shocks.

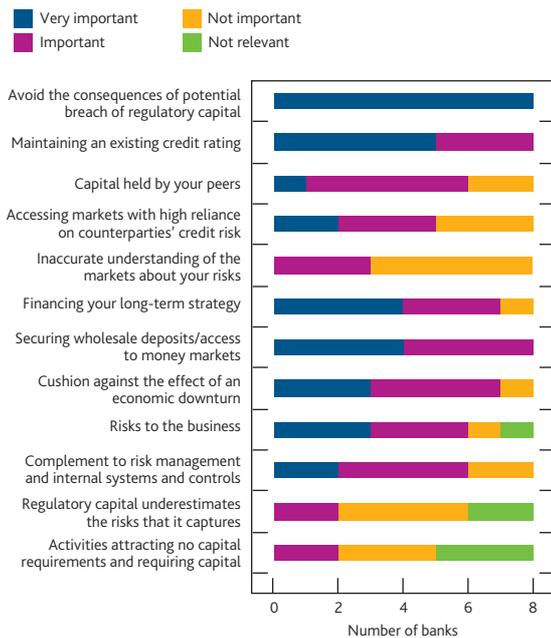
3.2 Risks to the UK financial system

Banks will have to reflect on their business models.

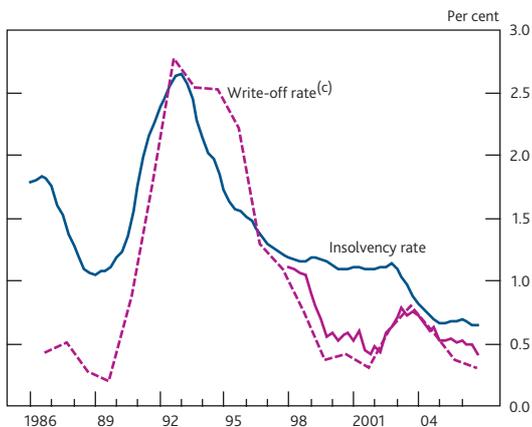
This constellation of events has severely disrupted the global banking system. Market estimates of the default premia for UK banks have gone up sharply and the distribution of default expectations across firms has also risen sharply (Chart 3.9). The UK banks that are the most reliant on wholesale funding have seen the largest falls in share prices since the April Report (Chart 3.10). UK banks are clearly vulnerable to events that could cause a further deterioration in funding conditions, despite the fact that they remain profitable and well-capitalised (Chart 3.11).

The depth and longevity of this disruption will largely depend on how banks themselves respond to recent events. They will have to reflect on the causes of the recent financial difficulties and, in particular, their reliance on the liquidity of structured credit markets to distribute loans they originate or acquire for the purpose of distribution to other investors. Three broad scenarios seem possible:

- Structured credit markets and banks' business models adapt.** The originate and distribute model exposes banks to a different set of correlated risks — for example, credit, liquidity and counterparty risk. Banks may manage these risks more effectively in the light of recent experience. For example, they may reduce liquidity risk in structured credit markets by taking measures that enhance the confidence of end-investors. And it may be possible to redesign products to be more transparent and easily monitored, so that genuine credit problems can be identified sooner, avoiding the type of market dislocation that has affected structured credit markets in recent months.
- Banks carry on business as before.** Banks' activities in structured credit markets have proved to be a valuable source of revenue in recent years. Banks and other financial market participants may conclude the financial market turmoil of recent months is a temporary set-back to what is an otherwise lucrative business. In this case, confidence and liquidity in structured credit markets may return more quickly, but at the risk of a repeat of the recent market turbulence at some future point, potentially on an even larger scale. Contacts report that there is already some

Chart 3.12 FSA survey on factors affecting capital ratios

Source: FSA.

Chart 3.13 Corporate write-offs and insolvency rates^{(a)(b)}

Sources: Bank of England and Insolvency Service.

(a) Insolvency data are for England and Wales. Data are company and creditors' voluntary liquidation rates.

(b) Annual rates, by value.

(c) Solid line shows rate for UK-owned banks, dotted line for all UK-resident banks (interpolated annual data).

evidence of credit spreads falling and new loans being distributed with apparently reduced credit standards.

- Banks bring about a sharp reintermediation of credit.** Alternatively, banks may regard the recent period as a warning signal that the originate and distribute model of banking is no longer viable on the same scale. Having held loans intended for onward distribution on their balance sheets for some time, they may take the opportunity to move back towards a more traditional model of banking. Reintermediating credit in this way has both funding and capital implications, which are described further in Box 3 in Section 2. This suggests the capital impact of additional commitments that UK banks may face are relatively modest, with capital ratios well above regulatory minima. But regulatory minima are only one component affecting banks' desired capital ratios (Chart 3.12). For precautionary reasons, banks tend to hold a buffer of capital over and above such minima to avoid the possibility of regulatory requirements binding in the wake of some future adverse shock, or an increased risk of a ratings downgrade. Either is likely to lead to banks requiring a higher risk-adjusted premium on any new lending they undertake. The cost of raising new capital has also risen in recent weeks, which is likely to be passed on through higher lending rates. A reintermediation of credit will also have revenue implications, as banks will be more reliant on spread than fee income. In this case, there are likely to be implications for the wider economy as credit conditions tighten — in particular for the higher risk segments of the markets who have benefited particularly from the originate and distribute model.

This will have implications for vulnerabilities...

Several of the key vulnerabilities identified by the Bank in the past are directly affected by these developments. (These vulnerabilities are described in Box 4.) In particular, a reduction in the availability of credit, particularly to high-risk borrowers, could increase risks to the corporate and household sectors. And greater uncertainty about financial sector business models could trigger stress among LCFIs or act as a catalyst for further falls in asset prices as off balance sheet vehicles are restructured.

...including overindebted corporates...

As discussed in Section 1, in aggregate corporates are profitable and their liquidity positions strong. Overall corporate write-off rates are low. But the experience of the early 1990s shows how sharply banks' losses on corporate lending can rise (Chart 3.13). And with credit conditions tightening — according to the Bank of England's latest Credit Conditions Survey, lenders expect a further significant tightening in lending terms to corporates over the next quarter (Chart 3.14) — some sectors may be particularly vulnerable.

Box 4

Key sources of vulnerability for the UK financial system: an update

The April 2007 *Report* identified six key vulnerabilities for the UK financial system. If some firms have underestimated and/or underprepared for the full consequences of them crystallising, they could affect the functioning of the financial system. Recent events have revealed different elements of these vulnerabilities, as well as highlighting the links between them.

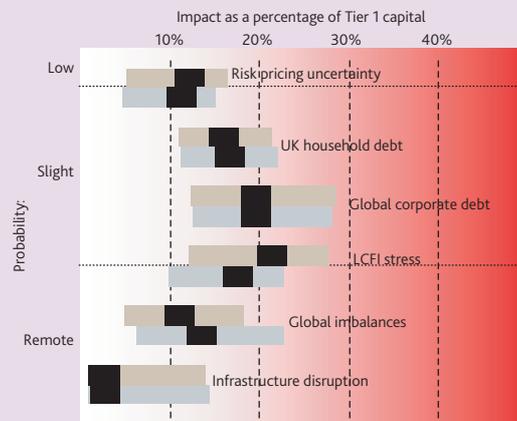
- **Risk pricing uncertainty.** Risk premia have adjusted recently, but uncertainty remains over whether both credit and liquidity risks in different markets are appropriately priced. Recent events have highlighted that uncertainty about the fundamental value of more complex, structured instruments is an important additional source of risk.
- **Possible underpricing of corporate default risk,** particularly for the commercial property sector and some highly indebted corporates. Signs of overcapacity in the commercial property sector, and the sensitivity of leveraged firms to changes in the cost of debt, make some companies particularly vulnerable to a tightening in credit conditions.
- **Rising importance of LCFIs.** Given their scale and pivotal position in many markets, distress at an LCFI could have a large, unanticipated impact on other financial market participants. Recent events have illustrated the potential for risks to flow back to the balance sheets of these institutions in situations of stress.
- **Dependence on market infrastructures and utilities.** Disruption to the core parts of the financial infrastructure could have pervasive effects on the financial system, which owners and users of these systems may not have fully prepared for or insured against. Infrastructures have proved robust to the recent high volumes of transactions, but members' ability to handle such volumes has been tested.
- **High household sector indebtedness.** Potential underpricing of, and underprovisioning for, household sector credit risk by the UK financial sector. Household wealth is strong in aggregate. But the growth in real household debt has led to a growing tail of households who would be vulnerable if credit conditions were to tighten sharply in the light of recent market events.
- **Large financial imbalances among the major economies** have been associated with significant cross-border flows of capital. Financial market participants may be

underestimating the potential speed and extent of asset price movements in the event of a sudden adjustment in these financial flows.

Gauging risks to financial stability

The potential impact of these key vulnerabilities, and the channels through which they could affect the UK banking system, can be estimated through systemic stress tests.⁽¹⁾ The latest results of these unlikely but severe stress scenarios are shown in **Chart A**. These estimates are broadly similar to the results in the April 2007 *Report*, though the probability of the risk pricing uncertainty and LCFI vulnerabilities crystallising is judged to have increased.

Chart A Impact of 'severe stress scenarios' affecting vulnerabilities^(a)

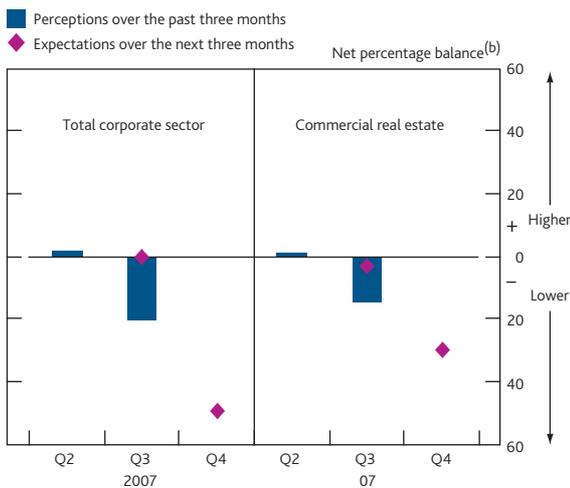


Sources: Published accounts and Bank calculations.

(a) Total impact for major UK banks of individual scenarios over a three-year horizon, expressed as a percentage of current Tier 1 capital. Central bands show estimates of the scale of loss under each scenario, wider bands calibrate some uncertainties around these estimates. The top bar presents the latest results and the bottom bar the April 2007 *Report* results.

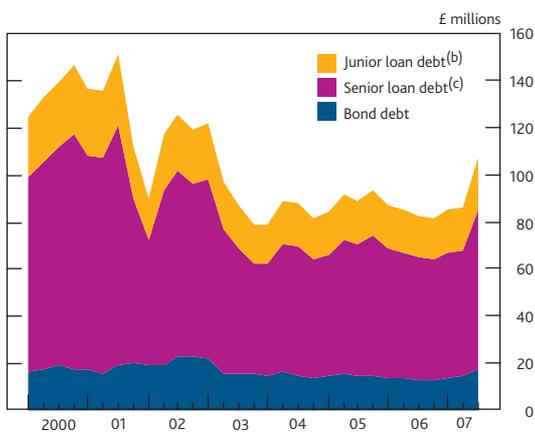
These stress tests are based on a number of simplifying modelling assumptions, which lead to considerable uncertainty around the quantitative results. Recent events have also shown the importance of certain channels which are not well quantified by the Bank's existing models, for example, the interaction between market liquidity and funding. Bank staff are developing a suite of models to allow these transmission channels to be mapped out more comprehensively. This suite will include explicitly liquidity effects and the impact of the interaction between banks on the propagation of financial stress. As such, this suite of models should be better placed to identify and quantify some of the risks evident during the recent period of market turmoil.

(1) For more information, see Haldane, A, Hall, S and Pezzini, S (2007), 'A new approach to assessing risks to financial stability', Bank of England *Financial Stability Paper No. 2*.

Chart 3.14 Corporate credit availability^(a)

Source: Bank of England Credit Conditions Survey, 2007 Q3.

- (a) A positive balance indicates more credit is available.
 (b) Net percentage balances are calculated by weighting together the responses of those lenders who answered the question. The blue bars show the responses over the previous three months. The magenta diamonds show the expectations over the next three months. Expectations balances have been moved forward one quarter so that they can be compared with the actual outturns in the following quarter. See www.bankofengland.co.uk/publications/other/monetary/creditconditionsurvey070926.pdf for further details.

Chart 3.15 Annual interest cost of a representative new £1 billion leveraged buyout deal^(a)

Sources: Bloomberg, Merrill Lynch and Bank calculations.

- (a) Assumes that the overall deal structure is 80% loan (80% senior, 20% junior) and 20% bond; that the loan is priced off three-month Libor; and that the debt is amortising.
 (b) Junior debt refers to a typical second-lien leveraged loan.
 (c) Senior debt refers to a typical first-lien leveraged loan.

Recent falls in UK commercial property prices and the more persistent falls in yields, along with the potential for overcapacity given a large pipeline of construction, make this sector particularly prone to further shocks and to rises in the cost of finance. As highlighted in Section 2, the proportion of commercial property lending in the total stock of domestic resident lending by UK banks is now in excess of the previous peak in 1989–90. The Bank's latest Credit Conditions Survey suggests that lenders have already sought to tighten terms to this sector (Chart 3.14). Firms subject to leveraged buyouts are also particularly sensitive to changes in the cost of debt. Chart 3.15 shows how sensitive a typical leveraged buyout (LBO) capital structure has been to changes in the cost of debt since 2000 and how its cost has risen in the past few months. As a result, the likelihood of a sharp rise in corporate distress is judged to have risen somewhat in recent months.

... and households.

Household wealth remains strong, but rises in household debt over the past decade have led to a growing tail of vulnerable households. These are analysed in detail in Box 5. This tail includes 'adverse credit' households, recent first-time buyers and some buy-to-let investors, all of whom are particularly exposed to a tightening in credit conditions. While write-off rates on secured lending remain low and banks report that impairment charges on unsecured borrowing have stabilised, the outlook for the UK household sector appears to be more uncertain than for some time.

There are risks along the transition path...

While there are encouraging signs of recovery in some financial markets, the structure of institutions' balance sheets and, in particular, their funding is more fragile than previously. And ongoing uncertainties about the valuation and location of exposures have increased the sensitivity of financial market participants' expectations to further shocks. Against that backdrop, there is a risk that the pressures of recent months could re-intensify.

...including from greater asset price volatility...

The global repricing of risk represents a partial crystallisation of the low risk premia vulnerability discussed in previous Reports. This underpricing of risk had previously affected credit markets in particular. Chart 3.16 provides a decomposition of the return on higher yield corporate bonds in the United Kingdom. This can be decomposed into two elements: a risk-neutral spread which compensates investors for the probability that companies will default on their debts and a credit risk premium that captures the additional return that investors demand to compensate for the uncertainty about that return. The residual reflects non-credit factors such as liquidity risk. Looking at the movements in these credit spreads since the April Report, much of the rise in risk premia appears to reflect investors demanding a higher premium for liquidity risk, rather than a substantial change in view on the

Box 5 Modelling household distress

UK household debt represents the largest single category of exposure for the major UK banks (£920 billion at end-2006 or 20% of banks' assets). Arrears on mortgage debt have increased slightly from their trough in 2004 (rising to just over 1% of all mortgages by mid-2007). But they remain well below the levels observed at the time of the 1990s recession. Even at the height of that recession, debt problems were confined to a relatively small proportion of the population, with only 6% of mortgagors having arrears of more than three months.

Estimating the number of households potentially liable to default requires an understanding of the sensitivity of the most financially vulnerable to changes in the economy. Surveys show UK households vary widely in terms of levels of debt, net assets and income gearing. This variation reflects differences in age, income, housing tenure and risk appetite. It is unsurprising, therefore, that models of household distress estimated using aggregate data are able neither to capture the dynamics of arrears nor to provide plausible forecasts in the event of large shocks.

One alternative is to use a disaggregated model of household distress. A model recently developed at the Bank separately analyses groups of households, who are differentiated by age, income and employment, debt (both secured and unsecured) and housing tenure. The proportions of each of these modelled households are calibrated to match key characteristics of the UK population using the Bank's NMG survey as a benchmark.⁽¹⁾

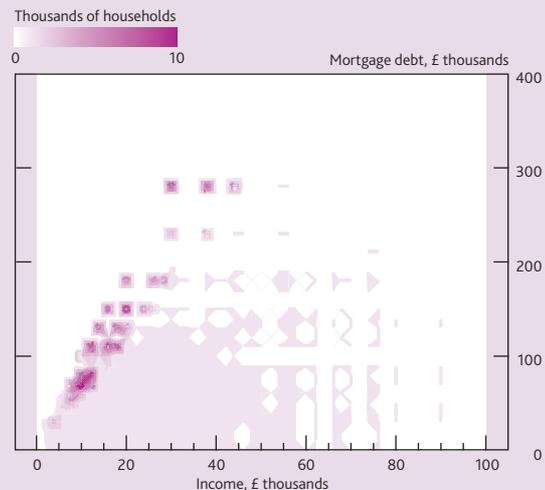
In the model, the households in each group are assumed to fall into arrears on their lending if a negative income shock (such as unemployment) or an expenditure shock causes the level of their debt payments to rise above 55% of their income and if their net worth falls below 33% of their income.⁽²⁾

The heat map in **Chart A** shows the model's profile of household mortgage arrears rates based on current economic conditions, for different levels of income and mortgage debt. Unsurprisingly, the model shows arrears concentrated among those households with relatively high debt, or low income (represented by the darker areas on the left hand side of the chart). But, as the extent of the light coloured area suggests, the number of arrears spanning the majority of the income and debt distribution is small. This is consistent with the NMG survey's findings about the clustering of debt payment problems.

The key benefit of this approach to modelling household distress is that it provides a simple framework to identify

household groups vulnerable to interest rate or income shocks. **Chart B** illustrates how arrears among these vulnerable households are estimated to rise in this model as interest rates rise. The model predicts that, from the current position, arrears would change by more in response to a 1 percentage point rise in interest rates than to a fall of similar size. This asymmetry reflects the fact that households in the model must have both high income gearing and low net worth before going into arrears, so there can be an amplified response when economic conditions worsen and a new cohort of households falls into arrears.

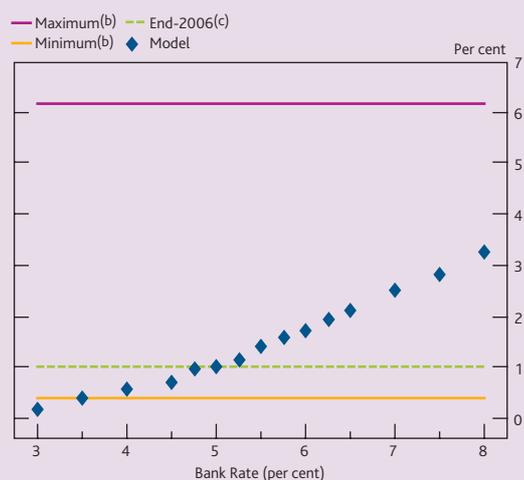
Chart A Distribution of households with secured arrears, by income and mortgage debt^{(a)(b)}



Sources: Bank of England's NMG survey and Bank calculations.

- (a) The model provides a discrete representation of the households sector population. White areas indicate no modelled households.
(b) The darker the area, the higher the number the households in arrears.

Chart B Sensitivity of estimated mortgage arrears rates to interest rates^(a)



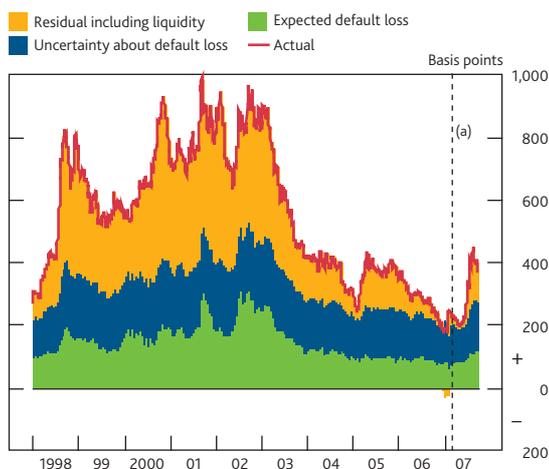
Sources: Bank of England's NMG survey and Bank calculations.

- (a) The simulation assumes house price growth and the unemployment rate are at their average 2006 level.
(b) Minimum and maximum three months mortgage arrears rate over the past 20 years.
(c) Actual arrears rates as at end-2006.

(1) See Waldron, M and Young, G (2006) 'The state of British household finances: results from the 2006 NMG Research survey', *Bank of England Quarterly Bulletin*, Q4, for details of the 2006 survey.

(2) These thresholds are calibrated to enable the model to match end-2006 secured and unsecured arrears rates.

Chart 3.16 Decomposition of UK high-yield bond spreads



Sources: Merrill Lynch and Bank calculations.

(a) April 2007 Report.

underlying risk of default in the corporate sector. Were those corporate default expectations to shift significantly — for example, because of a sharper-than-expected tightening of credit conditions — some further adjustment in corporate credit spreads might be expected.

...particularly if asset managers deleverage...

Another potential trigger for further repricing in credit markets could be deleveraging among asset managers or investment vehicles. SIVs would be particularly vulnerable to further marked-to-market falls in asset markets. As explained in Section 1, SIVs are funds which invest in highly rated ABS using short-maturity commercial paper secured against them (ABCP). Unlike bank-sponsored conduits which can be brought back on balance sheet, SIVs will be forced sellers if their liquidity lines are insufficient to cover any commercial paper not rolled over. By the end of 2007 H1, SIVs had assets of over \$350 billion, including residential and commercial mortgage-backed securities and CDOs. Tightness in US asset-backed commercial paper (ABCP) markets appears to be easing and several US banks are organising a pool of funds that are intended to support structured investment vehicles. But new problems could yet emerge, perhaps prompted by rating downgrades, leading to intensified selling pressure in markets for the illiquid instruments held by SIVs.

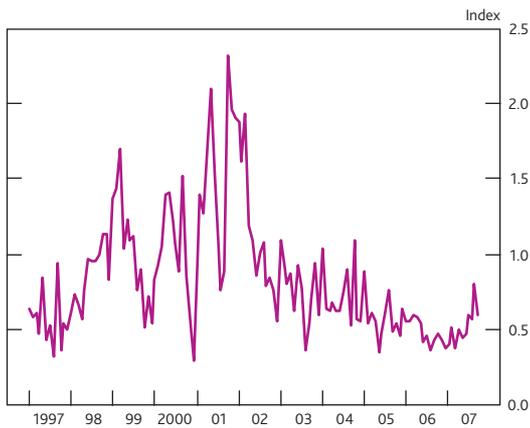
...and financial institutions are affected.

The full impact of recent events on financial institutions may not yet be fully apparent. As Section 2 discusses, profitability at LCFIs has been adversely affected by the market turmoil because they have been at the heart of the growth of the structured credit markets. The funding position of a large number of institutions is more fragile than for some time, as maturities have been shortened and lending terms tightened. Some firms have made large write-downs on mortgage and leverage loan portfolios intended for distribution. But, in general, losses from the recent episode do not appear to have been fully accounted for by disclosures to date.

The increased uncertainty about financial institutions has been reflected in rises in CDS premia, albeit from low levels, particularly for US securities houses (Chart 2.13 in Section 2), though some of these rises have moderated recently as market conditions have stabilised. A risk going forward is that sustained losses could prompt one or more LCFIs to draw back from activities in structured markets, with consequential knock on effects to other market participants. Another risk is that the emergence of large losses on credit exposures held by other institutions could further undermine confidence.

New shocks might also emerge.

There are other downside risks which have not surfaced so far that could emerge in the months ahead. An important macroeconomic risk is the possibility of a deeper downturn in the United States. Uncertainty about US growth prospects has

Chart 3.17 US GDP growth uncertainty^(a)

Sources: Consensus Economics Inc. and Bank calculations.

(a) Standard deviation of forecasts of current and next year GDP growth collected by Consensus Economics Inc. A value of one indicates average uncertainty about the macroeconomic outlook.

risen in recent months (**Chart 3.17**) and there is a pronounced downward skew to these forecasts. Prime and jumbo mortgage arrears might rise if house prices fall and refinancing conditions become more difficult. There are also some early signs of rising delinquencies in credit cards and automobile loans.

A deeper downturn in the United States and rising credit defaults could trigger a further round of asset price falls. Equity markets seem particularly vulnerable. Earnings forecasts for US companies have risen in recent months, despite the deterioration in growth prospects. Market contacts report that earnings forecasts are being sustained by expectations of growth in overseas markets as the falling US dollar stimulates faster export growth. But these expectations could be confounded if a slowdown in the United States spills over to global growth prospects.

Further falls in US asset prices could trigger a sharp decline in the US dollar. The dollar effective exchange rate index has fallen gradually by around 9% since the start of the year, causing large domestic currency losses for foreign investors. But with little sign that there has been a sustained improvement in the US net trade position, there is a risk the US dollar needs to fall further to stabilise the US external position. And the sharp turnaround in foreign purchases of dollar assets in August, if sustained, could provide further impetus.

3.3 Summary

The global repricing of risk has exposed serious fragilities within the originate and distribute business models used by many financial firms. While the vulnerability of the financial system to such a repricing has been long-recognised, and represents a partial crystallisation of the low risk premia vulnerability identified in recent *Reports*, the effects have been wider and more severe than expected. In particular, confidence in the ability to price complex financial instruments accurately has diminished. Financial system fragility has risen and financial market liquidity has fallen dramatically. Default premia for the UK banks have increased sharply alongside those for other financial institutions.

Financial markets and institutions appear to be in transition. The robust UK macroeconomic backdrop and the high profitability and capitalisation of major UK banks provide a strong anchor for the financial system during that transition. But there are risks around the transition path, at a time when expectations are fragile and balance sheets stretched. The financial system is more than usually vulnerable to further adverse shocks — sourced either in recent events or from new sources, such as the equity markets or a weakening commercial property market.

Table 3.B Key vulnerabilities in the period ahead: change in assessment since April 2007

Vulnerability	Probability ^(a)		Impact ^(b)	
	A significant increase	A slight increase	Broadly unchanged	A slight decrease
Risk pricing uncertainty	A significant increase	A slight increase	Broadly unchanged	A slight decrease
Global corporate debt	A slight increase	A slight increase	Broadly unchanged	A slight decrease
LCFI distress	A slight increase	A slight increase	Broadly unchanged	A slight decrease
Infrastructure disruption	A slight increase	A slight increase	Broadly unchanged	A slight decrease
Global imbalances	A slight increase	A slight increase	Broadly unchanged	A slight decrease
UK household debt	A slight increase	A slight increase	Broadly unchanged	A slight decrease

Source: Bank calculations.

(a) Assessed change in the probability of a vulnerability being triggered over the next three years.

(b) Assessed change in the expected impact on major UK banks' balance sheets if a vulnerability is triggered over the next three years.

Table 3.B summarises how the Bank's judgement on the key vulnerabilities affecting prospects for UK financial stability has evolved since the *April Report*. Reflecting the current fragility of financial institutions' balance sheets and financial market participants' expectations, the impact of all these vulnerabilities is judged to be greater than in previous *Reports*. The probability of the vulnerabilities crystallising is also judged to have increased for a number of them. In combination, this rise in the impact and probability of the key vulnerabilities points towards a material rise in risks to the financial system in the immediate period ahead. A recovery in confidence will depend on the risk management weaknesses that have been revealed by these events being addressed promptly. To that end, Section 4 discusses what actions might usefully be undertaken by the authorities and the private sector.

4 Mitigating risks to the UK financial system

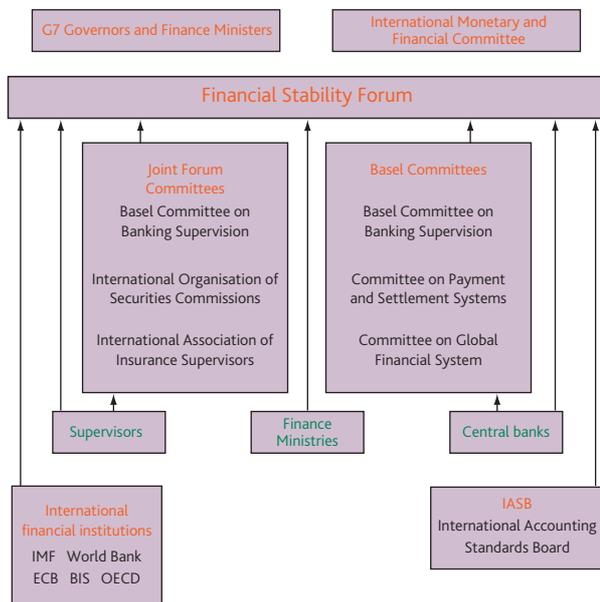
Previous sections have identified a number of conclusions which can already be drawn from recent events about the nature and source of some important vulnerabilities to the UK financial system. There is undoubtedly more to learn. This section sets out work that is currently under way by the private sector and the authorities to address these vulnerabilities, and new initiatives that may be required. Many of these require international action, others relate particularly to the United Kingdom.

The primary responsibility for managing risk lies with the individual institutions and investors taking on those risks. But the authorities may also have a role if private sector participants are unable — or have insufficient incentive — to price and manage the system-wide consequences of their behaviour.

Earlier sections have identified some key areas that have already emerged for further risk mitigation work. These include reducing risks arising from weaknesses in credit risk assessment; improving transparency about the composition of complex structured financial products and institutions' exposures to them; addressing weaknesses in commercial banks' liquidity risk management practices and limitations in regulation; the importance of stress testing and contingency planning within firms and infrastructure against extreme and correlated shocks; and the effectiveness of the tools available to the authorities for managing and resolving financial crises. These are discussed in turn.

Chart 4.1 Financial Stability Forum

Key:
 National authorities
 International bodies
 Arrows denote membership



Internationally, the Financial Stability Forum (FSF) seeks to promote financial stability, improve the functioning of markets and reduce systemic risk. It draws together representatives from the major financial sector standard setters (including the International Organisation of Securities Commissions (IOSCO), the Basel Committee on Banking Supervision (BCBS) and the International Association of Insurance Supervisors (IAIS)), policymakers from the major financial centres (central banks, supervisors and finance ministries) and representatives of international organisations such as the International Monetary Fund (IMF) and the World Bank. (See **Chart 4.1**.) In response to the recent turbulence, the FSF has been asked by the G7 to establish a shared assessment of the issues and to formulate a co-ordinated international response, drawing on the expertise of the FSF's membership.⁽¹⁾ It will report in Spring 2008, to ensure that important issues arising from

(1) FSF (2007), 'Financial Stability Forum meets in New York', Press Release 19/2007E, 26 September 2007.

recent events are not allowed to fall through gaps, and to draw out the main lessons.

4.1 Weaknesses in credit risk assessment

Some investors are over-reliant on ratings...

Recent events have exposed weaknesses in credit risk assessment. Banks increasingly distribute the credit risk that they have originated. It is unclear whether the ultimate bearers of risk have sufficient information about the underlying credit risk in the products — in particular the more complex instruments — in which they invest. Investors may have become overdependent on rating agencies' assessments of risk. They may also have misinterpreted ratings, assuming that they provide information on a range of risks — such as liquidity and market risk — in addition to credit risk.

The central role of ratings in the market for structured finance products was on the agenda of a number of regulatory bodies before the recent turmoil. The Committee of European Securities Regulators (CESR), for example, is carrying out a study of the ratings of structured finance products. This is part of its annual assessment of whether rating agencies operating in Europe adhere to a Code of Conduct designed by IOSCO.⁽¹⁾ IOSCO is considering whether the Code needs to be amended to reflect problems that might arise in rating structured finance products, such as the potential for conflicts of interest if rating agencies are involved in advising on the construction of such products as well as their eventual rating. The Committee on the Global Financial System (CGFS) is also updating its 2005 study⁽²⁾ on the use of ratings in structured finance, focusing on the information provided by rating agencies and on how investors use that information. The FSF has an important role to play in co-ordinating these closely related workstreams, as in other areas, to ensure there is no duplication of effort.

...whose information content could be improved...

There are many unanswered questions about the ratings process, which these programmes of work should help to answer. One key issue — discussed in Box 6 — is how to improve the information content and the use of ratings by investors. Rating agencies play a crucial role in the financial system, providing information that it would not be efficient for investors to collect individually. But they could make a number of methodological changes to improve the usefulness of their ratings. These could include providing an assessment not just of credit risk, but also of other important characteristics of instruments such as their liquidity and market risk, rating stability over time and the certainty with which a rating is given. This would provide a better indication

(1) IOSCO (2005), 'Code of conduct fundamentals for credit rating agencies'.

(2) CGFS (2005), 'The role of rating agencies in structured finance: issues and implications'.

of the distribution of returns an investor might expect on an asset. Some rating agencies are already considering whether it is feasible for them to provide some of this additional information.

The potential for over-reliance on ratings is not confined to end-investors. There is a risk that banks, under the changes to international banking regulations being introduced in 2008 — Basel II — may also come to rely heavily on agency ratings, particularly for structured products. Banks on the 'internal ratings based' approach will be able to use their own models — subject to supervisory approval — to determine the capital charges for standard products. But they will have to use external ratings for structured products, where such ratings exist. It is possible that this regulatory requirement could result in some banks using external ratings as their only input when assessing structured products. This potential over-reliance needs to be addressed by banks and their regulators.

...and wider lessons may be drawn for credit assessment.

The growth in the 'originate and distribute' business model also raises a wider question about whether the originators of risk have appropriate incentives to assess and monitor the performance of products in which they may have little or no retained interest. Investors need to know how the quality of securitised assets will be maintained throughout the life of the product. At a minimum, disclosures to investors should include information on the nature of any ongoing relationship between a borrower and the originator, including whether any interest retained at origination has subsequently been sold off or hedged (see Box 7). Any retained interests might usefully be a focus of greater regulatory attention in the future, given their importance and implications for risk incentives.

4.2 Inadequate transparency about complex financial instruments

There have been difficulties in valuing exposures to complex instruments...

The growth in the complexity of some financial instruments may have outstripped the reliability of the models used to value them. In the absence of reliable market prices, many exposures can be valued only by models ('marked-to-model'). But different models sometimes produce wide ranges of estimates for the values of such exposures, partly because of their sensitivity to underlying assumptions (see Box 2, Section 1) and partly because of the lack of a reasonable backrun of data. The resulting model risk should be reflected appropriately in firms' risk management decisions, such as in the setting of limits and allocation of reserves.

Institutions may also be able to adopt different approaches to the valuation of exposures to illiquid securities on their balance

Box 6

Role of rating agencies

Recent events have raised a number of questions about the role of rating agencies in the financial system, in particular in evaluating structured credit products. This box puts forward some suggestions of how rating agencies could support improvements in investors' risk assessment processes.

Role played by rating agencies

Rating agencies perform three functions for the international financial system, which it is important are not lost.

(i) They can help mitigate the fundamental information asymmetry in capital markets between investors and firms seeking external financing.

This inherent asymmetry may deter some investors from providing financing to firms because of the cost of acquiring the necessary information. A detailed analysis of credit risk would be impracticable for most investors to carry out; it might also be inefficient if the investor's stake is small relative to their overall portfolio. A rating from a neutral third party can enable small investors who could not afford to carry out their own risk assessments to enter the market. As a result, external ratings can help lower the cost of capital. When interpreting ratings, investors need to be conscious of any potential conflicts of interest — given that the issuer of an instrument pays for the rating.

(ii) Ratings can be a useful mechanism to solve some principal agent problems.

Principals (investors) can attempt to cap the amount of risk that the agent (pension funds, life insurers, money market mutual funds etc) takes on their behalf by stating a minimum rating for assets in which to invest or counterparty exposures to take. In addition, access to some financial markets or business models can be restricted to issuers with ratings above a minimum level. This applies to credit derivative product companies, who need an AAA rating to avoid posting collateral upon marked-to-market changes in their derivatives positions. Financial guarantee monoline insurers need AAA ratings to be able to provide an AAA wrap to bonds or securitisation tranches.

(iii) Ratings can be used to solve collective action problems between dispersed bond investors.

It may not be rational for individual investors to monitor and trigger a debt restructuring of a firm in difficulty. But if the firm continues trading without action being taken, this could reduce recovery values for investors. A credit rating downgrade can act as a clear signal for individual investors to

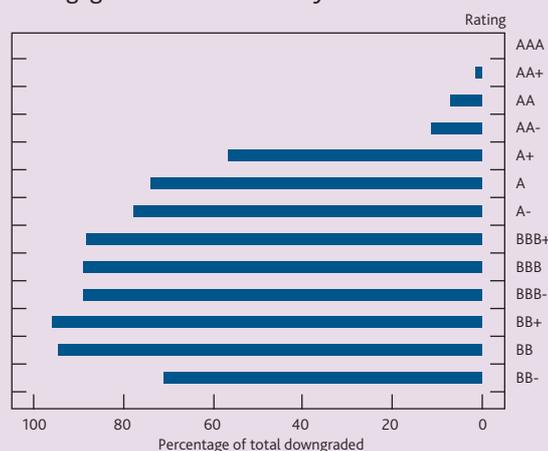
take action, triggering a debt restructuring. The winding up of several structured investment vehicles (SIVs) in recent weeks, following credit rating downgrades, are examples of this mechanism at work.

Lessons from recent events

The recent financial market turmoil has revealed that some investors appear not to have fully appreciated that rating agency assessments are currently intended to cover only credit risk. In particular, investors may have inferred characteristics other than credit quality from a given rating. Liquidity and market risk (price stability) and credit rating stability characteristics may have implicitly been ascribed to assets with the same rating. The search for yield may have encouraged these perceptions, with investors looking for assets with the highest returns within a given rating category,⁽¹⁾ and thereby failing to recognise fully that these higher returns were providing compensation for some additional risks.

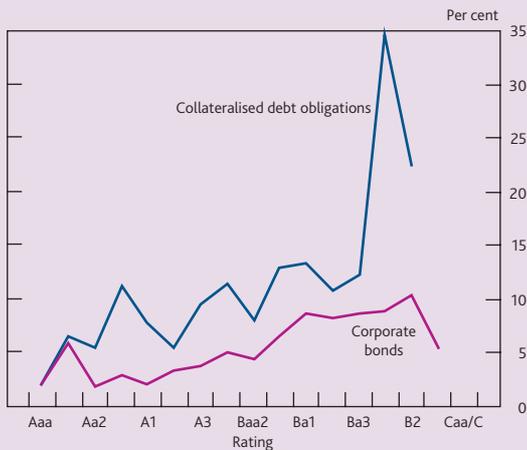
Inferring characteristics other than credit risk from ratings is particularly problematic for structured finance products. As described in Box 2 in Section 1, these instruments are complex and their prices are volatile. The secondary market liquidity of these products is low. And rating agencies' models are also often based on scarce historical data and are sensitive to assumptions about important parameters such as correlations between default rates. As a result, revisions to valuations can be large, making ratings for these products less stable than for sovereign or corporate bonds. **Chart A** shows that mezzanine tranches of 'sub-prime' structured products issued in 2006 have been subject to a particularly high number of rating downgrades — although only 8% of issuance by value has been downgraded. **Chart B** illustrates how the unconditional historical probability of sizable downgrades (of more than one notch) has also been much higher for structured products than for corporate bonds over the past few years.

Chart A Ratings downgrades of US sub-prime residential mortgage-backed securities by tranche of 2006 vintage



Source: JPMorgan Chase and Co.

Chart B Historical probability of a Moody's rating downgrade of more than one notch^(a)



Source: Moody's Investors Service.

(a) Credit migration of CDO notes, 1996–2006, for United States and European transactions, 27 February 2007.

Suggestions for improvement

It is in the rating agencies' best interest that investors have a good understanding of what ratings mean, so that they retain their important role in the financial system. To that end, the following ideas to improve the information content of ratings merit consideration:

- Agencies could publish the expected loss distributions of structured products, to illustrate the tail risks around them.⁽²⁾ Agencies have made significant efforts over the past few years to increase the transparency of their rating methodology for structured finance products, through publication of research reports describing their modelling methodology and their assumptions on correlations and recovery rates. But published distributions could provide a visual reminder of the fatter tails embedded in the loss distribution in structured products.
- Agencies could provide a summary of the information provided by originators of structured products. Information on the extent of originators' and arrangers' retained economic interest in a product's performance could also be included. Such a summary may satisfy investors that incentives are well aligned or encourage investors to perform more thorough risk assessments.

- Agencies could produce explicit probability ranges for their scores on probability of default. Probability ranges would provide a measure of the uncertainty surrounding their ratings. Although such figures are already available retrospectively as transition matrices, an explicit probability range would allow investors to monitor agencies' performance when rating different asset classes.
- Agencies could adopt the same scoring definitions. Currently, some use probability of default, some loss given default and others a combination. Converging on a single measure would reduce the risk of misinterpretation by investors.⁽³⁾
- Finally, rating agencies could score instruments on dimensions other than credit risk. Possible additional categories include market liquidity, rating stability over time or certainty with which a rating is made. Clear scores on these dimensions could encourage more sophisticated investment mandates and easier monitoring of non-credit risks in a portfolio. It would clearly take some time and money for agencies to develop the necessary expertise on these other risks, but some agencies have already proposed these additions.⁽⁴⁾

These suggestions aim to facilitate a more sophisticated use of credit ratings by investors. These measures would require further analysis and action by the rating agencies themselves. These actions might occur voluntarily in the light of recent market experience. Indeed, there is already some evidence of some of them occurring. Without this market evolution, there might be a case for public sector intervention to specify and encourage higher and common standards of assessment and disclosure. It is still critical, however, that investors carry out their own due diligence and do not become over-reliant on ratings as a summary statistic of risk.

(1) See **Table 3.C**, Section 3 of the April 2007 *Financial Stability Report*, page 46.

(2) The risk that extreme losses are more likely than what would be expected from a normal distribution.

(3) Moody's announced in 2006 that it would start disaggregating some of its long-term ratings into their two key components — loss given default and probability of default (www.moody.com/cust/content/loadcontent.aspx?source=staticcontent/free%20pages/LGD/lgdadpage.htm, 22 June 2006).

(4) Moody's is considering issuing measures of liquidity risk and market risk alongside traditional ratings for complex financial instruments (Source: *Financial Times*, 17 September 2007).

sheets, depending on whether these exposures are held to maturity or for trading purposes. It is important that there is complete clarity over the valuation approach that has been used, as required under the recently adopted international standard for disclosure of financial instruments.⁽¹⁾

Work under way in the BCBS on the reliability of valuations under stressed market conditions, and by the Joint Forum's

(1) International Financial Reporting Standard 7, 'Financial Instruments: Disclosures', which takes effect for accounting periods from the beginning of 2007.

credit risk transfer group, should allow progress to be made on these issues. Again, the FSF has a potentially important co-ordinating role to play. It is exploring whether auditors and market participants could work together to summarise sound valuation approaches consistent with accounting standards in time for 2007 year-end financial reporting.

...and inadequate transparency from individual institutions...

A key source of uncertainty and disruption in financial markets over recent months has been inadequate transparency about individual institutions' exposures, in particular to structured credit products. At present, this is being resolved by a drip-feed of disclosures. The absence of swift and clear disclosure has potentially delayed the recovery of confidence and activity in some markets, including asset-backed securities markets and term money markets.

...which the introduction of Basel II will help to mitigate.

Under Basel I, incentives existed to structure certain exposures in ways designed to exploit differences in capital charges. For example, the extension of a contingent (short-term) liquidity line to a structured investment vehicle (SIV) did not incur a capital charge in the United Kingdom.

The principles underlying the Basel II framework for securitisations aim to capture all of the risks that banks retain from their securitisation activities; to set high standards for what constitutes effective risk transfer; and to be neutral between holding risks on balance sheet and distributing them through the securitisation process. As a result, this type of regulatory arbitrage opportunity should be reduced somewhat with the adoption of the new Basel II framework in 2008. It is important that, as the new framework is implemented, due attention is paid to potential new and unintended distortions that might emerge.

Box 7 sets out how other regulatory changes as a result of the introduction of Basel II will increase the information available to the market and to supervisors on institutions' exposures. This will include details on exposures arising from securitisations, whether purchased or retained, as well as related liquidity facilities and credit enhancements. It will take time to determine if firms are adopting a common approach to their disclosures, and how useful, therefore, the new data will be in assessing the size and distribution of aggregate risks to the financial system.

But there are limits to the additional data that will become available under Basel II. For example, there are no additional disclosures on the measurement and management of liquidity or market risk. As noted in Box 7, careful thought is required to assess the costs and benefits of greater data provision. Recent events have clearly highlighted information gaps and their potentially adverse consequences for market stability. Regulatory, accounting and disclosure initiatives might usefully help to address these concerns.

4.3 Weaknesses in liquidity risk management

Work was already under way, well before recent market turbulence, to review liquidity regulation in the United Kingdom and internationally — notably through the BCBS. Recent events have provided added impetus to, and direction for, this work. They have provided a live 'stress test' for banks' liquidity risk management and for regulatory standards, which banks and supervisors are reviewing to identify areas for improvement.

Shortcomings in liquidity management within firms...

One key area for banks and supervisors to review is the assumptions that firms make when stress testing their resilience to liquidity pressures. In particular, it is now clear that firms need to give sufficient weight to the possibility that individual markets may be closed for a lengthy period, as distinct from disruption to their own access to a market. Recently, core markets for unsecured term interbank loans, foreign exchange swaps, asset-backed commercial paper (ABCP) and asset-backed securities (ABS) have all been disrupted for protracted periods. Firms also need to ensure that they have incorporated all potential demands for liquidity into their planning, including those from off balance sheet vehicles.

The recent market disruption also raises the issue of whether banks' internal models to assess liquidity risk can be relied upon by banks and supervisors. The value of internal models is much reduced when there are no or very limited data available on extreme events. The scale and duration of recent market disruption would have been difficult to predict from previous experience, but will provide data to help better calibrate these models in future.

Stress testing a bank's liquidity position should be seen as the basis for ensuring that appropriate contingency funding plans (CFP) are in place to protect the bank from unexpected liquidity shocks. To be fully operational, CFPs must be rehearsed so that banks are able to put them into operation at short notice and are alert to the circumstances in which they should do so. Supervisors need to ensure that banks are adopting good practice in this regard and are providing to the authorities appropriate and timely information on liquidity pressures before they become critical.

...combined with limitations in UK liquidity regulation...

The difficulties experienced at Northern Rock have exposed some of the limitations of the existing liquidity regime in the United Kingdom. One element is the nature and frequency of the information available on the liquidity position of firms. Another is the robustness of individual firm's stress testing and the contingency plans put in place as a result. The FSA has indicated that it aims to strengthen stress testing within

Box 7 Transparency and disclosure of banks' exposures

Role of transparency

Previous sections have argued that a lack of transparency contributed to the way the recent crisis was transmitted through global financial markets. Uncertainty about losses sustained at individual institutions appears to have contributed to a tightening of liquidity and increased spreads in wholesale funding markets. Indeed, of an estimated US\$100 billion of market losses on sub-prime RMBS,⁽¹⁾ only a relatively small fraction appears so far to have been disclosed by individual institutions, creating uncertainty about where losses may ultimately lie.

A lack of bank transparency can result in asymmetric information between a bank and its potential lenders on the risk of the loan — known as a 'lemons' problem⁽²⁾ — that can lead wholesale and interbank funding markets to dry up. Transparency can also increase discipline on banks to invest prudently and maintain sufficient buffers against the risks they take.⁽³⁾ On the other hand, transparency may not always be beneficial *ex post*, as market reactions can sometimes exacerbate an existing funding problem. Nier (2005) provides empirical evidence that banks that regularly disclose more information upfront are less at risk of a liquidity or solvency problem.⁽⁴⁾ In other words, the reduction of asymmetric information and the increase in market discipline arising from regular disclosure appears to reduce the likelihood that transparency turns out to be detrimental *ex post*.

Before asking what new initiatives are needed to encourage bank transparency and disclosure, it is worth considering how policy initiatives already in the pipeline may help.

Changes to disclosure requirements

The Capital Requirements Directive (CRD)⁽⁵⁾ that will introduce Basel II in Europe (including the United Kingdom) from 2008 will require additional disclosures under Pillar 3 of the framework. There will be new requirements on banks to disclose information across a number of dimensions, in order to facilitate an assessment of the nature and extent of the risks that banks are exposed to, as well as the capital resources set aside to cover those risks. Under the CRD, all of these disclosures will be required at least at an annual frequency and will typically be made as part of the audited accounts. Moreover, while some banks might already disclose some of the information voluntarily, the new regime is likely to achieve a greater degree of consistency and uniformity across all banks incorporated within the European Union and eventually more broadly. This may enable more meaningful comparisons across banks and strengthen market discipline. If a high degree

of uniformity can be achieved, this also holds out the possibility that authorities might be able to use these disclosures for an improved assessment of the size and distribution of risk positions across the system.

What are the specific additional disclosures under Basel II?

For banks on the internal ratings based (IRB) approaches for credit risk, mandated disclosures include both a geographic and an industry breakdown of credit risk exposures, as well as a breakdown of exposures into bands of different probability of default (PD), estimates of loss given defaults (LGD) by portfolio and average exposure at default (EAD) on any undrawn credit exposures.⁽⁶⁾

In addition, Pillar 3 will introduce requirements to disclose detail on exposures that arise from securitisations, in line with the new securitisation framework that is contained within the new Basel II rules. Disclosures on securitisation exposures include those exposures that arise from securities retained — typically, the so-called first-loss piece — or purchased, as well as those related to liquidity facilities, and credit enhancements provided to ABCP programmes and SIVs. These new disclosure requirements go beyond what currently flows from International Financial Reporting Standards (IFRS) and stock market listings requirements. The new rules will include a requirement on banks to report the aggregate amount of securitisation exposures, broken down by exposure type (for example credit cards, mortgages, auto, etc), as well as the capital requirements arising from these exposures. Liquidity facilities to SIVs and ABCP programmes will attract a regulatory capital charge under Basel II.

Basel II will also require some additional quantitative information on interest rate risk in the banking book, such as the bank's own assessment — arrived at through stress tests — of the impact on earnings of an interest rate shock. This might also help gauge a bank's vulnerability to an increase in the interest rate spread (above official rates) arising from a tightening of funding markets. By contrast, the disclosure requirements for market risk in general will provide little change from current reporting standards and practice, relying on disclosure of Value-at-Risk (VaR) calculations for marketable assets.

Where might additional initiatives be useful?

The new Basel standards hold out the potential for increased uniformity and consistency of disclosure requirements across banks and jurisdictions. Uniform and consistent disclosures are important from the point of view of enhancing market discipline. They are crucial also in enabling central banks and supervisory authorities to gain a better understanding of both the size and distribution of aggregate risks to the financial system. However, the extent to which these benefits will be

realised in practice is still an open question. Supervisors across the EU should aim to work to preserve these benefits when implementing Basel II.

Although the new requirements will go some way towards clarifying for investors the risk profile arising from a bank's securitisation activities, the Basel II framework will stop short of requiring detail on exposures to specific off balance sheet vehicles. Likewise, Basel II does not contain a requirement on banks to disclose whether or not the so-called first-loss piece on any specific securitisation has been retained, sold or hedged. The principle here is that individual exposures need not be disclosed, since such disclosures might impair the business interests of the bank. However, it may be worth exploring how and in what form more information could be provided to the market on the retained interest in a securitisation.

Under Basel II there will be no additional disclosure requirements as regards the measurement and management of liquidity risk. While some banks already provide on a voluntary basis an analysis of funding gaps as part of their annual accounts, more consistent information here may be useful to help investors understand the degree of liquidity risk any one bank is subject to. Detailed requirements on liquidity risk might invite strategic behaviour in interbank markets, if banks with ample cash use their market power to exploit banks whose liquidity position is known to be weak. So any new disclosure requirements in this area would need to be designed and applied with care.

A shortcoming in current practice is the lack of comparability in the measurement of market risk across banks. This arises as banks are free to choose the key parameters of the VaR model used, including the distributional assumptions made and the horizon at which the model is applied. A greater degree of

standardisation in the assumptions used for VaR calculations would improve the degree of comparability of market risk disclosures.

A final crucial limitation of the framework is the relatively low frequency of disclosure. While the Basel framework proposes a minimum of a semi-annual frequency, the CRD — mindful of the costs of regular reporting especially for smaller firms — has pushed this out to an annual requirement. More frequent reporting is largely at the discretion of the bank. But in modern financial markets, even six months without disclosure can give rise to considerable uncertainties about positions which could destabilise financial markets in times of stress. Gropp and Kadareja (2006)⁽⁷⁾ have shown that information provided in the annual accounts of financial institutions is 'stale' and no longer valued by investors when it becomes older than four to five months. Listing rules already require banks to disclose material changes to their earnings prospects. More frequent and regular reporting of information on banks' risk profile could help investors put any new information into context and thus encourage timely and comprehensive disclosure of losses incurred on existing positions. If undertaken on a co-ordinated basis, this could help improve market functioning and reduce system-wide risk.

(1) According to Bank calculations based on publicly available data.

(2) In 'The market for 'lemons': quality uncertainty and the market mechanism', *Quarterly Journal of Economics*, Vol. 84, pages 488–500. Akerlof (1970) first described how asymmetric information could lead to the breakdown of markets.

(3) Nier, E and Baumann, U (2006), 'Market discipline, disclosure and moral hazard in banking', *Journal of Financial Intermediation*, Vol. 15, pages 332–61.

(4) Nier, E (2005), 'Bank stability and transparency', *Journal of Financial Stability*, Vol. 1, pages 342–54.

(5) The Capital Requirements Directive, comprising Directive 2006/48/EC and 2006/49/EC, was published in the Official Journal in June 2006. The text is also available at http://ec.europa.eu/internal_market/bank/regcapital/index_en.htm.

(6) See BCBS (2004), 'International convergence of capital measurement and capital standards', June, available at www.bis.org/publ/bcbs128.htm.

(7) Gropp, R and Kadareja, A (2006), 'Stale information, shocks and volatility', *European Central Bank Working Paper no. 686*.

individual firms, as part of its comprehensive review of lessons from the Northern Rock events.⁽¹⁾

As well as requiring that banks have in place appropriate stress-testing arrangements and CFPs, and that they pursue sound practices in managing their liquidity risk, the FSA requires that the major UK banks adhere to a 'stock liquidity regime' (SLR). This requires banks to hold a pool of highly liquid assets to cover their short-term liquidity needs in a situation of stress. As noted in the April 2007 *Report* (page 52), there are well-known shortcomings with the SLR, and it was already under review. For example, it does not cover non-sterling outflows or contingent liquidity lines that have been extended to off balance sheet vehicles. It also

(1) 'Recent turbulence in global financial markets and Northern Rock's liquidity crisis', Memorandum from the FSA to the Treasury Committee, 5 October 2007.

assumes that only a relatively small proportion of customer deposits, 5%, would flow out of the institution.

The SLR was designed to provide insurance against liquidity outflows for one week — a much shorter period than the duration of the recent market disruption. It is important that consideration is given to the rationale behind and calibration of the SLR alongside other policies that affect banks' resilience to liquidity stress. As part of its review, the FSA will also be considering whether changes should be made to its liquidity regime.

...provide lessons to be taken forward internationally.

The work in train on UK liquidity regulation was taking place in the context of international discussions of liquidity, notably through the BCBS which established a working group in January this year to carry out a stock take of liquidity regulation and supervisory practices.⁽¹⁾ The Committee of European Banking Supervisors is also reviewing and extending its earlier (2000) survey of the supervision of liquidity risk management within the European Union, in response to a call for advice from the Commission in March 2007. It is important that the authorities liaise closely, given the international integration of capital markets and the development of global banking groups operating more centralised liquidity management strategies.

The BCBS will discuss the working group's findings in December and decide how to take forward future international work in this field. The Committee will also discuss the group's suggestions on practical lessons for national authorities emerging from the recent market turbulence. The work of the group will form the basis for a closer dialogue on practical policy issues in this area, improving the level of common understanding between the authorities on the role that liquidity regulation plays in different countries.

4.4 Testing the resilience of the system

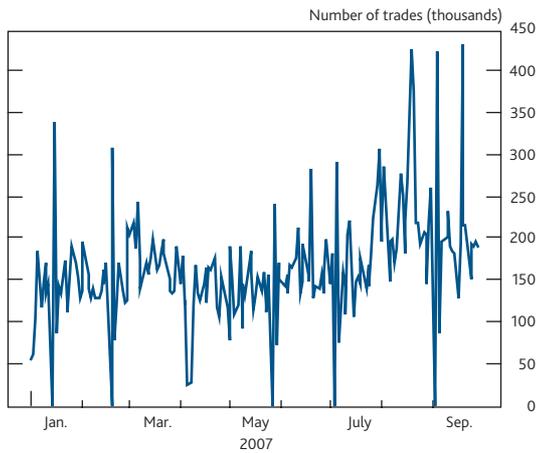
Stress testing of firms' balance sheets is crucial...

Previous Reports have noted that the relative stability of the financial system in recent years has meant that firms might not be taking sufficient account of the possibility of large shocks to the real economy or to financial markets when analysing the robustness of their balance sheets.⁽²⁾ In the light of recent events, firms need to check that the scenarios used in their stress tests are sufficiently extreme and exacting to provide a genuine test of their robustness.

Banks also need to consider the potential actions of others in situations of stress, as these may potentially invalidate the assumptions that feed into their models. The analysis in

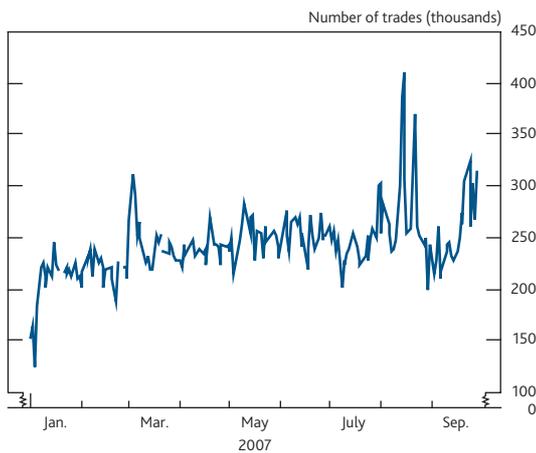
(1) The Bank of England chairs this working group.

(2) See, for example, Section 4 of the April 2007 Report, page 50.

Chart 4.2 Daily volumes in CLS^{(a)(b)}

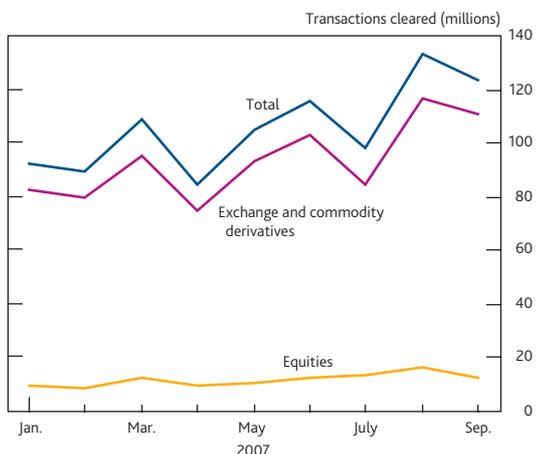
Source: CLS Bank International.

- (a) Volume figures report the number of trades submitted to Continuous Linked Settlement (CLS).
 (b) CLS does not settle currencies on local public holidays. On US\$ holidays, volumes typically fall to a few hundred transactions.

Chart 4.3 Daily volumes in CREST^(a)

Source: Euroclear.

- (a) Excluding self-collateralising repos.

Chart 4.4 Monthly volumes in London Clearing House^(a)

Source: LCH.Clearnet Ltd.

- (a) Total includes swaps and fixed income which are not shown as volumes are very small.

Sections 1 and 2 demonstrates how shocks can be amplified by the behavioural responses of other firms. For example, the hoarding of liquidity by individual banks has contributed to the drying up of liquidity in term money markets. Assessing these potential behavioural and market-wide effects presents a significant challenge for individual firms.

Banks should consider a range of shocks and employ a variety of techniques in their stress testing including: standard macroeconomic stress testing; traditional market and credit risk modelling; and stress tests carried out collectively among banks that can incorporate the type of second-round behavioural effects discussed above. The last of these is not standard practice at present and recent events have highlighted the importance of that gap. The Bank and FSA now hold regular discussions with a group of major banks operating in the United Kingdom on stress-testing techniques. These discussions provide an opportunity both to review the lessons from recent events and to consider how they can be incorporated into firms' stress-testing practices.

... as is assessing the resilience of market infrastructures.

A robust market infrastructure — the framework allowing institutions to make payments and settle transactions — is crucial to the smooth functioning of financial systems. This is particularly true at times of market stress, when any disruption to the underlying infrastructure is most likely to exacerbate market pressures.

As discussed in Section 2, the market infrastructure has generally performed well over recent months, despite record volumes of transactions being processed over a number of consecutive days (**Charts 4.2–4.4**). For example, between end-July and end-August, CLS — the dominant global foreign exchange settlement system — exceeded its previous record for daily trading volumes on 'normal' trading days⁽¹⁾ on nine occasions. There were, however, incidents in some systems during August and September, as a result both of those high volumes and of the behaviour of some individual members. These were dealt with effectively and had limited impact, but serve as a useful reminder of the importance of a smooth functioning infrastructure in situations of stress.

These incidents suggest two key areas for risk mitigation. First, it is vital that members undertake adequate capacity tests of their own systems and processes. These capacity tests must assume extreme scenarios over a sustained period. Second, changes in the timetable or in the methods of processing transactions in times of stress may require members to change their behaviour — for example, being ready to provide the resources for extensions to settlement timetables. These back-up plans must be well articulated in advance and tested.

(1) That is, excluding the peak volumes occurring the day after a US bank holiday or on the quarterly foreign exchange futures expiry dates.

Table 4.A Market Wide Exercise 2006: progress on follow-up issues

Issues for follow-up	Progress
Cash What arrangements can be made to make cash distribution more resilient to a pandemic?	The Market Wide Exercise highlighted the importance of a co-ordinated approach to planning cash distribution. The cash industry is currently working on plans to address these issues.
Retail Can improvements be made to co-ordination between high street banks to enhance the availability of branch networks and ATMs to consumers during a pandemic?	The Retail Bank Business Continuity Group (RBBCG) ^(a) has drafted a statement of principles on this issue. Once available, the statement will be scrutinised to ensure it does not breach competition laws.
Wholesale Do the various concerns raised by firms about reliance on home working undermine its potential role in a pandemic?	A Remote Working Group ^(b) has been established, with representation from the tripartite authorities and across the financial sector. This group will identify specific issues relating to remote working. It is also liaising with the telecoms industry to establish levels of resilience.
Infrastructure What are the impacts of disruption or closure of exchanges or infrastructure providers?	Possible workarounds and simplifications are being investigated by infrastructure providers (eg LSE, LCH.Clearnet, EuroclearCrest, and Euronext.Liffe) with the support of the Cross-Market Business Continuity Group (CMBCG). ^(c)
Regulatory forbearance In what areas, and when, would firms be seeking regulatory forbearance during a pandemic?	The tripartite authorities are working with the financial sector and with overseas regulators to produce a statement of principles.
Dependencies How accessible will third-party recovery space be?	The four key UK recovery site providers have agreed to prepare a statement covering invocation of services during a pandemic. Once available, the statement will be scrutinised to ensure it does not breach competition laws.

(a) The RBBCG consists of representatives of the five major retail banks, plus the British Bankers' Association and APACS. The group considers business continuity issues for the retail banking sector.

(b) The Remote Working Group was established to explore solutions to the issues raised during the exercise, identify where workable solutions are not available and establish key potential implications for the financial sector where there is no obvious solution.

(c) The CMBCG provides a forum for the authorities, infrastructure providers and key firms to pool information in the event of a major operational disruption.

There is scope for further testing of the infrastructure, in conjunction with firms, to supplement the existing programme of work in this area. A tripartite-led market-wide exercise in 2006, which covered disruption to market infrastructure following a flu pandemic, produced a programme of follow-up work, including more testing of the infrastructure 'workarounds' that might be required under stressed conditions. As outlined in Table 4.A, progress is being made on these fronts.

4.5 Financial crisis management

The evaporation of liquidity in structured credit and term money markets, and the consequent problems at Northern Rock, were an important test of the United Kingdom's tripartite crisis management arrangements. As reported in the July 2006 *Report*, the UK tripartite authorities have established domestic arrangements for exchanging information and making decisions in response to financial crises.⁽¹⁾ These arrangements delineate the responsibilities of the Bank, the FSA and HM Treasury, and seek to ensure orderly communication with market participants and overseas authorities. While the tripartite authorities have worked closely with one another throughout the recent market turbulence, they will be reviewing how to improve these arrangements, as the Chancellor has already indicated.⁽²⁾

The Bank's role in a financial crisis.

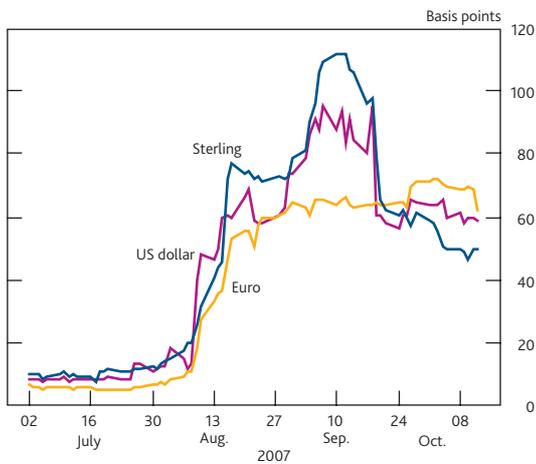
There are essentially four instruments potentially available to the Bank in addressing the causes and consequences of the recent market turmoil: interest rates; liquidity contingency measures set out within the Bank's published framework for money market operations; broader liquidity support operations; and lender of last resort facilities.

The Bank's approach to the setting of interest rates is set out in detail in its quarterly *Inflation Report*, which is next published in November. The Bank's operations in short-term money markets are aimed at delivering overnight interest rates in line with Bank Rate and the Bank's recent operations are set out in the 2007 Q3 *Quarterly Bulletin*. The Bank has also offered longer-term liquidity to the banking system against a wider range of collateral through a sequence of term auctions, the first of which took place on 26 September. These auctions were restricted in overall size and set at a minimum rate of 100 basis points above Bank Rate, to relieve liquidity problems at a price which would encourage firms to adopt more prudent approaches to liquidity management in the future. The announcement of the term auctions may itself have helped sentiment in the sterling money markets, as reflected in a

(1) See Box 8 of the July 2006 *Report*, page 58, and the Memorandum of Understanding on financial stability between HM Treasury, the FSA and the Bank, available at www.bankofengland.co.uk/financialstability/mou.pdf.

(2) See Chancellor of Exchequer's statement to the House of Commons on financial market instability, 11 October 2007.

Chart 4.5 Spreads of international three-month interbank rates to three-month expected policy rates^(a)



Source: Bloomberg.

(a) Three-month Libor spreads over comparable overnight index swap rates.

narrowing of the spread between Libor and anticipated policy rates (Chart 4.5). The Bank has provided lender of last resort facilities to Northern Rock, as set out in Box A.

This is the first time the Bank has operated its new money market regime in conditions of acute stress in financial markets. It is also the first time it has offered exceptional liquidity to the market outside of this framework and the first time for many years that it has undertaken a lender of last resort operation for a major bank. These events have illustrated the risk that, at times of stress, stigma can attach to banks that call on central bank facilities, potentially undermining their usefulness. The Bank will consider carefully the design of its lending facilities in times of stress to maximise the chances of these being effective.

Lessons need to be learnt for banking reform.

The Northern Rock episode has also provided a number of lessons about the interaction of different elements of the legislative framework during a financial crisis, and the crisis management tools that are available to the authorities. The recently announced consultation on banking reform will cover the most important of these tools.⁽¹⁾

One important tool that is currently unavailable in the United Kingdom is an insolvency process specifically adapted to banks. As described in the April 2007 Report, UK banks are subject to normal corporate insolvency procedures, which have a narrow focus on the failing firm and the interests of its creditors, whereas a number of G10 countries have special insolvency procedures for banks.⁽²⁾ The sudden closure of a bank could cause difficulties for its depositors, even if they are eventually repaid in full: they might be unable to make and receive payments for an extended period, and be unsure about the long-term security of their funds. A sudden closure could also potentially impose costs and disruption elsewhere in the financial system, particularly if the bank concerned provides key functions (such as correspondent banking services) for other banks. These problems would be compounded if the bank operates in more than one jurisdiction.

There are a number of options for reform of the United Kingdom's current approach. These include alternative methods of ensuring 'continuity of function' for a bank, such as the transfer of the assets and liabilities of the existing legal entity to a new legal entity, or the transfer of ownership of the existing entity to new owners. The 'new' bank would then continue to provide the critical functions while either a recapitalisation or a permanent transfer of business to new owners is organised. The Bank will contribute fully to tripartite consideration of the case for making special provision for

(1) HMT, FSA and Bank of England (2007), 'Banking reform — protecting depositors', discussion paper, October 2007.

(2) See Box 7 of the April 2007 Report, page 58.

Table 4.B Deposit insurance in the Group of Ten

	Coverage limits per depositor ^(a)
Belgium	€20,000
Canada	C\$100,000
France	€70,000
Germany	90% of insured deposits up to €20,000 ^(b)
Italy	€103,000 ^(c)
Japan	100% coverage of non interest bearing 'settlement deposits' and up to ¥10 million for time and demand deposits
Netherlands	€40,000 ^(d)
Sweden	SKr 250,000
Switzerland	SFr 30,000
United Kingdom	£35,000
United States	\$100,000 ^(e)

Sources: Individual country schemes.

(a) Depositor limits refer to insured deposits held at an individual institution. A number of countries have additional limits which apply to other types of financial investments.

(b) This limit applies to the statutory schemes for public and private banks. Additional protection is provided by various voluntary schemes. For further information see: www.bafin.de/bankenaufsicht/sicherungen_en.htm.

(c) To the nearest €1,000.

(d) 100% of the first €20,000 of qualifying deposits and 90% of the next €20,000. Please note that this qualification is not made in the hard copy of this publication.

(e) Certain retirement accounts are insured up to \$250,000.

preserving critical banking functions for a period, and the possible options for doing so.

The consultation also covers the nature of the United Kingdom's deposit insurance regime. The reaction of Northern Rock depositors to the announcements about its position exposed the limitations of the UK deposit insurance regime in averting a run on a bank.⁽¹⁾ The scale of deposit insurance varies widely even within the G10 (Table 4.B), demonstrating that there is a balance to be struck between providing insurance to individual investors and creating moral hazard. The degree to which depositors are asked to 'co-insure', by limiting the level of coverage, must be considered, alongside other elements, such as the method of funding the insurance, the speed of payment and the intended role of insurance within the wider framework of measures designed to protect investors and improve the resilience of the financial system. These aspects will all be considered as part of the current consultation.

Further progress is also needed internationally.

These domestic issues become even more complex in an international context. There are a number of ongoing crisis management initiatives at the international level, focusing on the operational issues that can arise during a crisis and implementing practical improvements. For example, the European Union is extending its existing Memorandum of Understanding on co-operation and information exchange between banking supervisors, central banks and finance ministries to cover a number of crisis management issues, including a common analytical framework for assessing the potential systemic implications of a crisis.⁽²⁾ Efforts are also continuing, co-ordinated by the G10 Committee of Payment and Settlement Systems, to improve the arrangements to facilitate cross-border use of collateral, particularly in stressed circumstances.

Progress is also being made on practical and operational issues in smaller groups of authorities whose financial systems are closely linked (so-called 'interest groups') on how to manage the disruption caused by a crisis. Recent turbulence has demonstrated both the likelihood that disruptions to the financial system are likely to cross international borders, and that further improvements to the existing architecture for handling cross-border financial crises are required.

The FSF is well placed to oversee and co-ordinate the work that is already being undertaken, in different forums, to improve the framework of international financial crisis

(1) Details of the scheme, the Financial Services Compensation Scheme, can be found at www.fscs.org.uk/consumer/.

(2) The extended Memorandum of Understanding will cover principles for co-operation to preserve financial stability, an analytical framework for assessing the potential systemic implications of a crisis, and practical guidelines to be followed during a cross-border crisis. (See Press Release 2822nd Council Meeting Economic and Financial Affairs, Luxembourg, 9 October 2007, 13571/07.)

management. It should also seek to ensure that the additional work being carried out in response to recent events complements and extends work already in progress, but does not duplicate it.

4.6 Key lessons from recent events

In summary, there are at least four key areas where early lessons from recent events can be learnt by market participants and the authorities.

(i) Liquidity management, including:

- underinsurance against closures of key funding markets;
- inadequate recognition of contingent liquidity obligations to off balance sheet entities; and
- scenarios used in the stress testing of funding insufficiently severe.

(ii) Valuation of complex structured products, including:

- high dependency on models in valuations;
- extent of investors' reliance on a narrow ratings metric; and
- insufficient clarity in the composition and construction of instruments.

(iii) Opacity of structured credit exposures, including:

- inadequate transparency of exposures and losses; and
- lack of transparency of off balance sheet exposures.

(iv) Crisis management arrangements, including:

- insolvency arrangements for banks;
- nature of deposit insurance regime;
- improvements in tripartite arrangements; and
- underdeveloped practical arrangements for managing stress at an international institution.

Other financial stability publications

This section provides a short summary of other financial stability related publications released by the Bank of England since the April 2007 *Report*.

Regular publications

Markets and operations article, *Bank of England Quarterly Bulletin*, 2007 Q3.

This article reviews developments in sterling financial markets since the 2007 Q2 *Quarterly Bulletin* up to the beginning of September, including a preliminary discussion of the stress in international markets. It also reviews the Bank's official operations during this period.

www.bankofengland.co.uk/publications/quarterlybulletin/qb0703.pdf

Speeches

A perspective on recent monetary and financial system developments.

Paul Tucker, Executive Director for Markets, April 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech308.pdf

In this speech, Paul Tucker considered the risks facing monetary stability and financial stability. After explaining his January vote on Bank Rate, Mr Tucker characterised monetary conditions as 'edging towards restrictive', which provided the platform needed going forward to restrain inflationary pressures. Turning to financial stability, Mr Tucker contrasts the risks presented by global current account imbalances and compressed risk premia. In a world of what he called 'vehicular finance' in which risk is transferred — if only contingently — beyond banks, he called for market practitioners to work to continue to improve *ex-ante* measures to handle periods of stress, including via documentation and insolvency regimes.

The Governor's speech at the Mansion House.

Mervyn King, Governor, June 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech313.pdf

In this speech, the Governor discussed the institutional structures in place for monetary and financial stability. The current institutional arrangements gave the Bank the responsibility for the oversight of payment systems, but gave no powers to discharge this responsibility. He offered a

solution where the Bank has narrower responsibilities in this field. Moving to financial stability more generally, the Governor noted that securitisation is transforming banking. New and ever more complex financial instruments create different risks. This suggests that lenders should be cautious, especially when they know little about the activities of the borrower. Assessing the degree of leverage in an ever-changing financial system is far from straightforward and the liquidity of the markets in complex instruments is unpredictable. The Governor noted that excessive leverage is a common theme of many financial crises.

London, money and the UK economy.

John Gieve, Deputy Governor, June 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech314.pdf

In this speech, John Gieve discussed the impact of London's growth as an international financial centre, the effect of financial innovation on the interpretation of economic data and the significance of the growth in money and credit for the economy. He argued that internationalisation, IT and the growing role of capital markets favour the clustering of financial activity. As such, we should expect London to continue to grow in the long term relative to the financial industry worldwide and to the rest of the UK economy. He noted that the growth of the City and new financial markets are making the interpretation of some of the core statistics used to monitor the economy more difficult. Challenges arise from the growing importance of bonuses, the difficulty of measuring the output of financial firms, and the impact of the growth in structured finance on monetary aggregates. After allowing for these effects, he concluded that there have been shifts in the supply of money and credit in recent years and explained that he voted for a further increase in Bank Rate in June partly because he was not convinced that current rates would be sufficient to bring credit growth and nominal demand back to their long-term sustainable path.

Promoting financial system resilience in modern global capital markets: some issues.

Nigel Jenkinson, Executive Director for Financial Stability, and Mark Manning, June 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech315.pdf

In this speech, Nigel Jenkinson and Mark Manning argued that structural change in financial intermediation and the global financial system had exposed new vulnerabilities. Market participants and policymakers alike needed to update their approach to risk assessment and take appropriate steps to identify and contain emerging threats. A well-functioning and

resilient operating environment is essential here, with the financial market infrastructure a critical component of this. In an increasingly complex and globally integrated financial system, vigilance, flexibility and international co-ordination among policymakers are likely to become ever more important.

Developing a framework for stress testing of financial stability risks.

Nigel Jenkinson, Executive Director for Financial Stability, July 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech318.pdf

In these comments at the ECB High Level Conference on Simulating Financial Instability, Nigel Jenkinson noted that developing a rigorous, coherent and robust framework to analyse the resilience of the financial system presents many formidable challenges. In particular, the global financial system is evolving at a tremendous pace, fuelled by rapid innovation and cross-border integration, and supported by lower macroeconomic volatility. He described the approach that the Bank of England utilises to assess risks to major UK banks from sources of potential vulnerability. The first stage is to define a coherent stress scenario, then to map the important propagation channels and finally to estimate banks' losses. Nigel Jenkinson then outlined a suite of models being developed in the Bank of England to allow the transmission channels for potential financial system stress to be mapped out more accurately and comprehensively.

Uncertainty, policy and financial markets.

John Gieve, Deputy Governor, July 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech321.pdf

In this speech, John Gieve discussed the range of uncertainty facing monetary policy makers, emerging lessons from the US sub-prime market and the significance of sovereign wealth funds and other influential investors. He argued that the level of uncertainty in the economic environment represented a return to normality. On financial markets, he argued that developments in the US sub-prime market had brought out vulnerabilities in the new structured credit markets. For example: the move to an 'originate and distribute' model of banking; the potential misalignment of incentives; the changing way that exposures impact on bank balance sheets; the way market liquidity can dry up in stressed conditions; and the difficulty of valuing instruments. Finally, he noted that the growth of sovereign wealth funds over time would tend to increase the price of riskier assets, like equities and corporate or emerging market bonds, compared with government bonds, and that the switch of reserve-rich countries from lenders to

owners of financial or real assets was also likely to lead to political tensions and pressures for protectionism.

The Governor's speech at the Northern Ireland Chamber of Commerce and Industry.

Mervyn King, Governor, October 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech324.pdf

In this speech, the Governor focused on the incentives facing banks, investors and depositors. In August, problems with the valuation of exposures to US sub-prime mortgage loans produced a sharp reappraisal of risk. Not only did asset prices fall, but the markets in some instruments virtually closed. Banks then faced the possibility that they would have to finance investment vehicles that securitised loans. They hoarded cash and became reluctant to lend to other banks beyond very short maturities. In the United Kingdom, Northern Rock was particularly exposed and it came to the tripartite authorities to seek financial support. It was important that this support was not provided for free to avoid moral hazard — that central bank action encourages the very risk-taking that caused the present problems. In the absence of a well-developed insurance scheme for depositors, once the queues started outside Northern Rock, other depositors faced every incentive to join them. Three lessons were identified. First, liquidity should be central to the regulation of banks. Second, there should be legislation to create powers to intervene pre-emptively in a bank in trouble, to separate the retail deposit book from the rest of the bank's balance sheet. Also, deposit insurance requires some changes. Third, central banks need to be able to lend against good collateral at a penalty rate without destabilising further any bank to which they lend. The Bank will explore ways to restore the use of discretion in central bank operations.

Working papers

Comparing the pre-settlement risk implications of alternative clearing arrangements.

John Jackson and Mark Manning, April 2007.

www.bankofengland.co.uk/publications/workingpapers/wp321.pdf

Inter-industry contagion between UK life insurers and UK banks: an event study.

Marco Stringa and Allan Monks, May 2007.

www.bankofengland.co.uk/publications/workingpapers/wp325.pdf

Cash-in-the-market pricing and optimal resolution of bank failures.

Viral Acharya and Tanju Yorulmazer, June 2007.

www.bankofengland.co.uk/publications/workingpapers/wp328.pdf

The impact of yuan revaluation on the Asian region.

Glenn Hoggarth and Hui Tong, July 2007.

www.bankofengland.co.uk/publications/workingpapers/wp329.pdf

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Glossary and other information

Glossary of selected data and instruments

ABCP – asset-backed commercial paper.

ABS – asset-backed security.

ABX.HE – a set of indices linked to credit default swaps on US sub-prime home equity loans of specific vintage and rating.

BBA – British Bankers' Association.

CDO – collateralised debt obligation.

CDS – credit default swap.

CDX index – a family of indices offering credit default protection against groups of North American and emerging market companies of various quality and over a range of maturities.

CLO – collateralised loan obligation.

CMBS – commercial mortgage-backed security.

CP – commercial paper.

GDP – gross domestic product.

iTraxx LevX index – a pair of indices comprising senior and subordinated credit agreements traded in the European leveraged loan CDS market.

Libor – London interbank offered rate.

MBS – mortgage-backed security.

RMBS – residential mortgage-backed security.

SIV – structured investment vehicles.

Abbreviations

APACS – Association for Payment Clearing Services.

BCBS – Basel Committee on Banking Supervision.

CESR – Committee of European Securities Regulators.

CFP – contingency funding plan.

CGFS – Committee on the Global Financial System.

CHAPS – Clearing House Automated Payment System.

CLS – Continuous Linked Settlement.

CMBCG – Cross-Market Business Continuity Group.

CRD – Capital Requirements Directive.

ECB – European Central Bank.

EME – emerging market economy.

ESF – European Securitisation Forum.

EU – European Union.

FICO – Fair Isaac Corporation.

FSA – Financial Services Authority.

FSF – Financial Stability Forum.

FTSE – Financial Times Stock Exchange.

G7 – Canada, France, Germany, Italy, Japan, the United Kingdom and the United States.

G10 – Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States.

GAAP – generally accepted accounting principles.

HMT – Her Majesty's Treasury.

IAIS – International Association of Insurance Supervisors.

IBES – Institutional Brokers' Estimate System.

IFRS – International Financial Reporting Standards.

IMF – International Monetary Fund.

IOSCO – International Organisation of Securities Commissions.

IVA – individual voluntary arrangement.

LBO – leveraged buyout.

LCFI – large complex financial institution.

LTV – loan to value.

MLEC – Master Liquidity Enhancement Conduit.

MoU – Memorandum of Understanding.

MSCI – Morgan Stanley Capital International Inc.

OIS – overnight index swap.

ONS – Office for National Statistics.

RBBCG – Retail Bank Business Continuity Group.

ROE – return on equity.

S&P – Standard and Poor's.

SIFMA – Securities Industry and Financial Markets Association.

SLR – sterling stock liquidity regime.

SPV – special purpose vehicle.

SWF – sovereign wealth fund.

VaR – Value-at-Risk.

WFE – World Federation of Exchanges.

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