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**Financial Stability Review**

December 2000

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## The **Financial Stability Review** aims:

- to encourage informed debate on financial stability issues, domestically and internationally
- to survey potential risks to financial stability
- to analyse ways of promoting and maintaining a stable financial system

### Essential information

The *Financial Stability Review* is available as a complete document in pdf format, together with additional information about the *Review*, on the Bank of England's website: [www.bankofengland.co.uk/fsr/](http://www.bankofengland.co.uk/fsr/). For a summary of the main financial stability issues, two sections of the *Review* are available in htm format with hyperlinks to this and earlier reviews where appropriate. The Financial stability themes and issues section is at: [www.bankofengland.co.uk/fsr/themesandissues.htm](http://www.bankofengland.co.uk/fsr/themesandissues.htm) and the *Financial stability conjuncture and outlook overview* is at: [www.bankofengland.co.uk/fsr/overview.htm](http://www.bankofengland.co.uk/fsr/overview.htm). (The Bank's website also has details of job opportunities at the Bank of England at [www.bankofengland.co.uk/jobs](http://www.bankofengland.co.uk/jobs))

The postal address is: *Financial Stability Review*, Bank of England HO-3, Threadneedle Street, London EC2R 8AH.

By e-mail, general *Financial Stability Review* enquiries should go to [tim.kidd@bankofengland.co.uk](mailto:tim.kidd@bankofengland.co.uk) and Bank of England authors can be contacted at [forename.surname@bankofengland.co.uk](mailto:forename.surname@bankofengland.co.uk)

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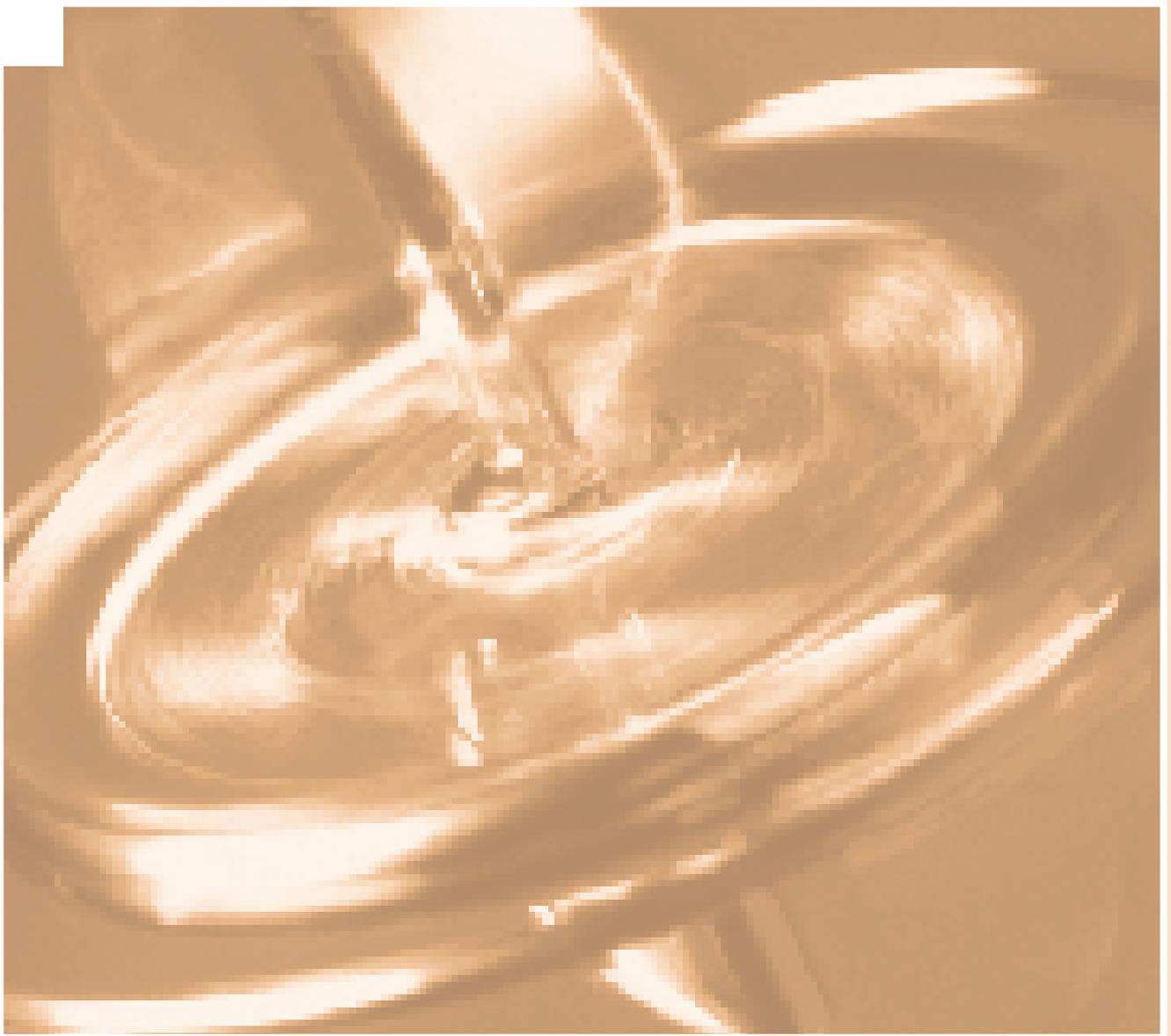
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December 2000

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# The financial stability conjuncture and outlook

## Overview: risks to financial stability

This latest half-yearly assessment suggests that, on balance, the risks to global and UK financial stability are somewhat greater than six months ago. In particular, there are signs that credit risk is perceived to have increased in several economies and markets, and the increase in stock market volatility since the summer reflects greater uncertainty about future corporate sector earnings. Nevertheless, financial systems have shown resilience so far, and banks in the industrial world have over the past decade generally built up substantial capital to cushion unexpected losses.

### Signs of fragility

Since the end of March, corporate bond spreads in most markets (measured as the difference between bond yields and swap rates) have widened markedly across most rating categories, and particularly for high-yield debt, suggesting that credit risk generally is thought to have increased. In recent months that has been most striking in the United States (Chart A), where the volume of new issues at the high-yield end has declined. There are also reports of tighter loan market conditions (for example from the Federal Reserve Board's Senior Loan Officer Survey) and suggestions of deterioration in credit quality in the US commercial banks' lending books, with the value of non-performing loans increasing. This is not just a US phenomenon. Credit spreads have been rising in the euro and sterling markets as well – again, particularly for sub-investment grade borrowers (Chart B). Emerging market sovereign spreads have risen too, but by less than US high yield spreads, and they generally remain lower than they were two years ago.

Perceptions of increased credit risk may have developed because of greater pessimism about corporate earnings and/or greater uncertainty about those earnings amid signs that US and European growth was slowing in 2000 Q3. Equity market indices, particularly those with a high 'new economy' content such as the Nasdaq, have weakened significantly since the start of September (Chart C). Volatility has also increased over the past three months or so, with investors apparently finding it particularly difficult to assess the prospects for 'new economy' stocks (Chart D). That is reflected in the at times sharp reaction of markets to individual profit warnings, as investors try to assess

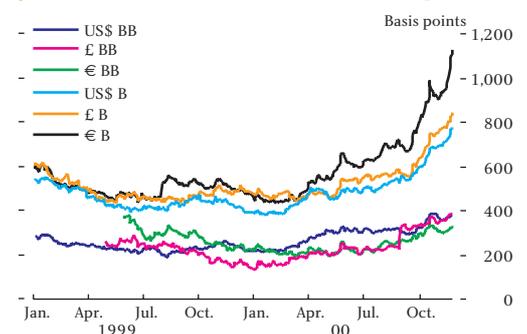
**Chart A:**  
US investment-grade spreads by rating<sup>(a)</sup>



Source: Bloomberg.

(a) Ten-year maturity fair market bond yields less ten-year swap rates. Five-day moving average.

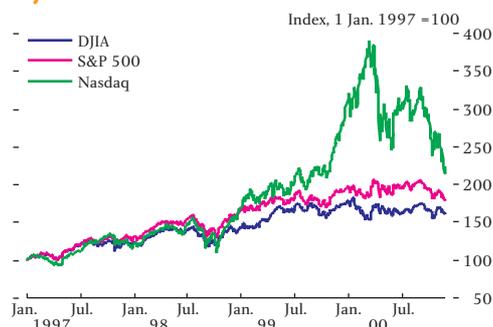
**Chart B:**  
Sub-investment-grade corporate bond spreads: US dollar, euro and sterling<sup>(a)</sup>



Sources: Bloomberg and Merrill Lynch.

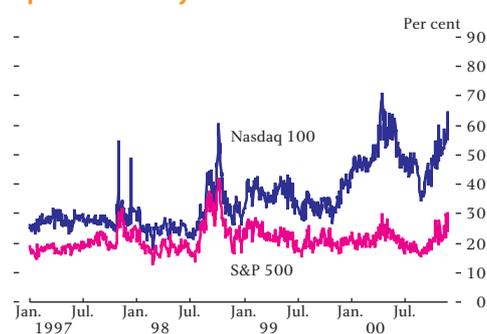
(a) High yield indices spread over maturity-matched swap rates.

**Chart C:**  
**Major US market indices**



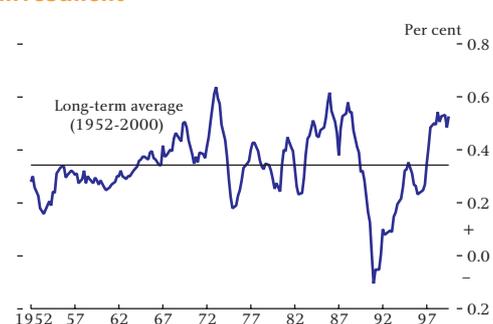
Source: Thomson Financial Datastream.

**Chart D:**  
**Implied volatility of US stock indices**



Source: Bloomberg.

**Chart E:**  
**Ratio of US gross new debt to gross investment**



Source: Board of Governors of the Federal Reserve System: 'Flow of Funds Accounts of the United States', 2000 Q2.

whether they reflect firm-specific problems or broader developments in a sector or the economy. From a bondholder's point of view, such volatility may imply an increased risk of default – and hence higher credit spreads – even if the central expectation for earnings is unaltered. In fact, the central expectation has probably deteriorated somewhat. The impact of volatility on credit risk is likely to be higher where firms have borrowed heavily to finance investment (see Box 4, Section II), which is true for example of part of the US corporate sector in recent years (Chart E).

While credit risk has increased perceptibly, and there have been sharp equity and bond price movements, some comfort can be taken from the lack of serious spillovers to other asset markets and of discontinuities in prices. These developments have not triggered a major credit event nor developed into a serious 'credit crunch', a shortage of market liquidity or a rush for assets perceived to be low-risk. Spreads on commercial paper have not widened significantly; there has not been a widespread draw-down of back-up lines; new issues, even if expensive and on a smaller scale, have nevertheless been possible; and the spread between on-the-run and off-the-run US treasuries, one indicator of liquidity preference, has not risen. There may be confidence that monetary and fiscal authorities would, if necessary, act to offset the macroeconomic consequences of any serious shock to financial stability. The cost of funds for investment-grade borrowers in the US and UK has in fact fallen, although not by as much as risk-free rates. In autumn 1998, an important factor behind general turbulence and the sharp fall in market liquidity was retrenchment by highly leveraged market participants who had not anticipated the problems triggered by the partial Russian default and the difficulties of LTCM. Now, leverage is probably lower, although not negligible when commercial and investment banks are taken into account.

US equity markets have fallen materially since the June *Review* and since the highs in the spring – in the latter case, the Nasdaq by over 40 per cent and the S&P 500 by over 10 per cent. US valuations are now perhaps more consistent with projections of persistent increases in productivity growth judged likely by some macroeconomists to be delivered in the 'new economy'. Nevertheless, rough estimates of the expected future dividend growth implied by equity prices suggest that – despite the market correction – it is still significantly higher than three years ago in the industrial world's main markets (see Chart II, Section I, and Box 3 for a discussion of the techniques used). Whether the rise in the market since the mid-1990s is explained by faster expected productivity growth or a fall in the equity risk premium, future returns would be lower after the adjustment in the market's level. If so, investors should not expect future returns to match the average of the past five years or so.

Following the recent correction, there have, however, been reports of net outflows from US mutual funds.

## Sources of increased risk

What factors lie behind the increased uncertainty in financial markets? The three most important are probably the economic outlook in the United States and its implications for other countries; some problems specific to particular emerging markets; and issues concerning particular sectors, especially telecommunications. For internationally active financial firms, compared with six months ago there is also greater risk from uncertainty about oil prices; continuing divergent credit and asset price movements across the euro area; some persisting weaknesses in the Japanese financial sector and questions about Japan's public sector indebtedness; and, for UK banks in particular, news about a continuing deterioration during 1999 in the finances of some of the financially less robust UK companies. These sources of risk are surveyed below, focusing on downside risks rather than the most likely outlook, given that the objective of this *Review* is to identify potential sources of systemic instability.

### Structural changes in the United States

The pace of structural change in the United States has quickened in recent years, as illustrated by the divergence of expected dividend growth rates for different sectors of the US economy (Chart F). The striking increase in long-term capital flows into the United States over the past three or four years (Table A) appears to have been driven by expectations of enhanced returns in the 'new economy', which has developed faster there than elsewhere and has already delivered a significant increase in productivity growth. The widening US current account deficit (Chart G) and the real and nominal appreciation of the dollar are plausibly a consequence of the impact of those capital flows on demand for the US currency in a world with imperfect substitutability of US goods and services for foreign ones (Section I).

**Table A: Net capital inflows to the US (\$ billions at an annual rate)**

Annualised rate over:	1995-96	1999-2000 H1	Change
Equities and foreign direct investment	-76.0	130.1	206.1
Bonds	263.7	241.0	-22.6
Other <sup>(1)</sup>	-51.6	-19.9	31.8
Net capital inflows	136.1	351.2	215.2
Current account <sup>(2)</sup>	-116.4	-359.4	-243.0

Source: Board of Governors of the Federal Reserve System: 'Flow of funds accounts of the United States', 2000 Q2.

(1) Mainly bank lending

(2) Not equal to net capital inflows because of errors and omissions.

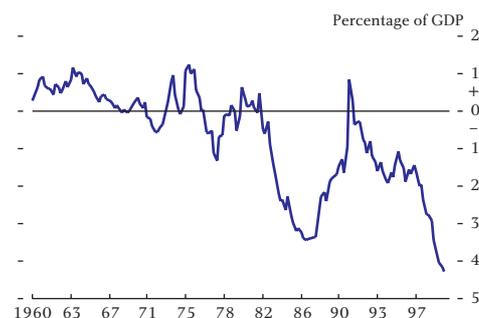
**Chart F: Cross-sectional standard deviation of implied real dividend growth rates in US<sup>(a)</sup>**



Sources: Thomson Financial Datastream and Bank calculations.

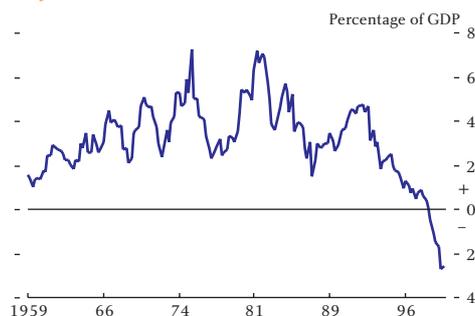
(a) 38 sectors were used in this calculation.

**Chart G: US current account**



Source: Thomson Financial Datastream.

**Chart H:**  
**US personal sector financial balance**

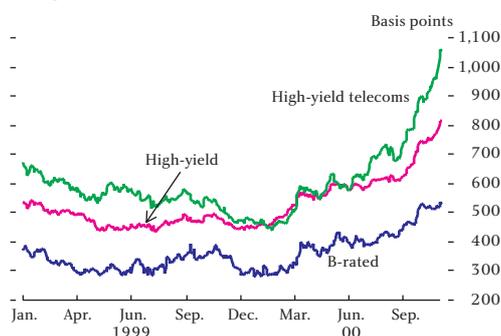


Source: Board of Governors of the Federal Reserve System: 'Flow of Funds Accounts of the United States', 2000 Q2.

Looking forward, though, there is a risk that expected returns to investment might be revised down, possibly sharply, if the improvement in productivity growth were to prove to be temporary or smaller than originally assumed. Any such revision might lead to a sudden reversal of capital flows and a sharp increase in the US personal sector's financial balance (Chart H) and saving rate. There could also be a problem if a fall in measured productivity growth, accompanying a short-run slowdown in economic growth, were to be misinterpreted as implying that the potential growth rate had not increased significantly after all. In that case, especially, there would be a risk of equity prices and credit spreads overshooting on the downside. The volatility of the TMT sector's asset prices in particular this year suggests that there is a risk of such a revision; it might also reflect the way in which investment has been increasingly financed by new debt.

The cash-flow problems of some highly publicised 'dot.com' start-up companies without retained profits on which to fall back have shown that it may be more difficult than some expected to exploit the 'new economy' for the benefit of shareholders. Start-up companies are now finding it more difficult to graduate to the equity markets via initial public offerings; some have been able to turn to venture capital instead. Some longer-established companies, too, may have been over-optimistic about revenues. Even if advances in information and communications technology increase the potential growth rate, the benefits may accrue to consumers over the medium run, not least because the very innovations raising productivity may also intensify price competition – but that is not yet evident in the United States, judging by the share of profits in national income.

**Chart I:**  
**US sub-investment-grade spreads by ratings<sup>(a)</sup>**



Sources: Bloomberg and Merrill Lynch.

(a) B-rated spreads are ten-year maturity fair market bond yields less ten-year swap rates. High-yield and high-yield telecoms are option adjusted spreads over a government benchmark.

#### *Telecoms borrowing*

Within the 'new economy', the telecoms sector presents a particular set of risks which have, on balance, increased since the June Review. Financing needs – for infrastructure investment and, in Europe, for 3G licences – have been heavy. Borrowing by European companies, for example, increased sharply in Q3. But the prospective returns are some way in the future. Credit spreads on telecoms debt, particularly in the high-yield sector, have in general increased more than spreads for other borrowers of the same credit rating (Chart I). Some large companies have had their ratings lowered and/or put on 'watch', and have had to propose restructuring or reductions in indebtedness via asset sales and scaling back expansion plans. Planned reductions in debt are still largely in the pipeline. The problem of sectoral risk concentration for banks and investment firms seems likely to remain for some time. Awareness of that risk has increased over the past six months, and contacts suggest that some – but not all – banks around the world have begun to monitor, and/or set limits on, their sectoral exposure, if they were not already doing so. Some face tough choices between risk and business

relationships. It is important that regulators of internationally active banks and securities firms, and other financial stability authorities, should actively share information in this area.

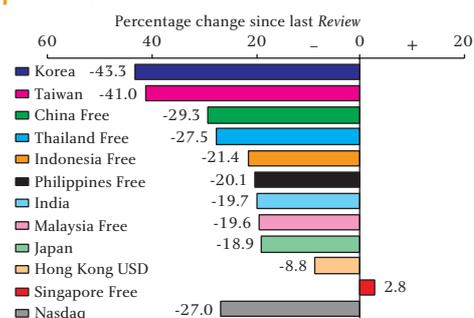
#### Emerging market economy vulnerabilities

The slight deterioration in the outlook for world growth in the short term increases the macroeconomic risks faced by emerging market economies (EMEs) at a time when many still face structural problems or have fragile balance sheets. The timing, extent, and speed of any slowdown in the United States are likely to be particularly influential, given the important role of US external demand and the dollar for many EMEs. Any effect would vary depending on the circumstances of individual EMEs. Asian equity prices in particular have already been hit hard this year (Chart J). As well as having to contend with slowing growth, some EMEs have achieved only limited corporate and financial sector reform (for example, Indonesia, Thailand, Russia and, at least until recently, Korea), and some still suffer from ongoing weaknesses in national or key sectoral balance sheets (for example, in Argentina, Brazil, Poland, and Turkey). These problems would make it more difficult for them to cope with adverse economic news, which would itself further delay their resolution.

Some economies remain vulnerable to reversals in investor sentiment. Argentina is one recent example, Turkey another. In Argentina, continuing macroeconomic weakness – industrial production is no higher than in 1997 – larger-than-expected fiscal deficits and high real interest rates have contributed to an increase in sovereign borrowing costs and reduced market access, which have further increased Argentine credit risk. Its current position as the dominant EME bond issuer in international markets suggests that there could be spillovers via financial channels if any serious ‘credit event’ developed, though so far there is little evidence of contagion in asset prices. In Turkey, a banking crisis has induced a wide-ranging re-assessment of macroeconomic prospects (Chart K). The IMF has proposed a strengthened programme to tackle their banking and macroeconomic problems. So far, spillovers from these problems to other countries and markets have been fairly muted, perhaps reflecting weaker financial linkages and more countries having adopted floating exchange rates. It could be that investors are discriminating amongst EMEs according to their circumstances to a greater degree than in the 1997–98 crisis, a prospect welcomed in the June Review. Differential movements in spreads amongst EME countries point in that direction.

In this environment, it remains very important that there should be satisfactory arrangements for resolving country problems, including for private sector involvement.

**Chart J:**  
Asian equity price movements since the previous Review



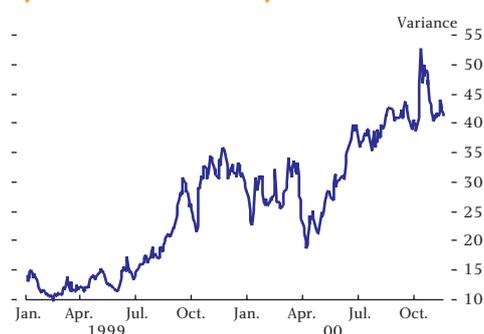
Sources: Bloomberg and MSCI.

**Chart K:**  
Turkish overnight interbank interest rates



Source: Central Bank of the Republic of Turkey.

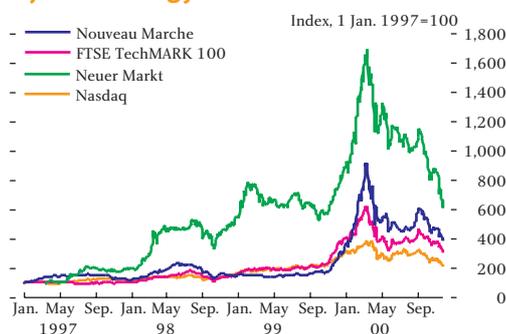
**Chart L:**  
**Implied variance of oil prices<sup>(a)</sup>**



Sources: Bank of England and Nymex.

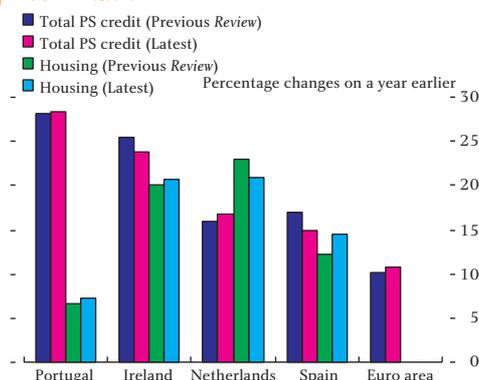
(a) Derived from option prices for West Texas Intermediate oil.

**Chart M:**  
**Major technology indices**



Source: Thomson Financial Datastream.

**Chart N:**  
**Private sector credit growth and house price inflation<sup>(a)</sup>**



Sources: National central banks, European Central Bank, statistical agencies and Irish Permanent.

(a) Euro-area data not available for housing prices.

## Oil

One of the problems faced over the past few months by oil-importing EMEs (such as South Korea, India, and China) has been the increase in the price of oil. More generally, that raises the question of whether the risk of a major supply-side shock of the sort seen in the mid 70s and early 80s has risen. Spot oil prices have very recently fallen back and derivatives markets suggest that they will drop more, but uncertainty about them has increased sharply since the spring against the background of tension in the Middle East (Chart L). The intensity of oil use in the industrial world has been reduced since the major oil price rises of the past and the real price of oil is now lower than during those episodes. If the world economy slows down, the risk from this quarter is likely to diminish.

## The euro area

As elsewhere, the main risks to financial stability arise from the international and sectoral exposures of euro-area financial institutions. For example, some euro-area banks have been actively involved in 'new economy' financing and others have increased significantly their exposures to Latin American financial systems. The euro area is affected by the same uncertainty about the 'new economy' as the United States; the rise and fall of the European technology indices have been more extreme than those of the Nasdaq (Chart M). Although the economic outlook for the euro area as a whole remains reasonably benign, one region-specific issue of note is the persistence of rapid credit and asset price rises in some euro-area economies (eg Ireland, Netherlands, Portugal) (Chart N). The consequences are likely to differ depending on whether these economies might plausibly be catching up with productivity levels in the most developed euro-area countries and adjusting to structural reform, or suffering an asset-price bubble; it is difficult to tell when one might tip over into the other.

## Japan

The issues raised in the June *Overview* remain relevant. Since then, private investment in Japan has continued to recover, although consumer spending has remained sluggish, and retail price deflation has continued. The end of the Bank of Japan's zero nominal interest rate policy on 11 August did not trigger the sell-off in the bond market that some had feared, and conveyed a useful prudential message about banks' management of their yield curve exposure. At present, a gradual economic recovery is being sustained, accompanied by further progress in financial-sector restructuring and repairing of balance sheets. But it is still heavily dependent on public spending, while private, especially consumer, spending seems to be constrained by weak confidence. Other concerns also remain: corporate bankruptcies have risen, the life insurance sector is still in some difficulty, and banks' forecasts of loan-loss provisions for the current year have been revised upwards. Given the rising public

debt, there is also a possibility that a risk premium might develop on Japanese government bonds (JGBs). There is increased foreign involvement in Japan's fixed-income, interest rate swap and derivatives markets, implying an increased (if small) risk that any sharp JGB market shock could have a significant impact on global markets. That concern – which the Bank has heard in the market – might usefully be addressed in firms' and regulators' stress tests and scenario analyses, where not already.

#### The UK household and corporate sectors

The UK household sector's financial balance has deteriorated and debt-income ratios have risen further over the past year (Chart O). It is therefore relevant that the central projection of the Bank of England's MPC forecast in November was for growth to slow, with the balance of risks to output growth judged to be slightly on the downside, reflecting the risks to world economic activity. Continued rapid growth in borrowing has increased the vulnerability of the sector to an economic downturn or market correction, although capital and income gearing measures – at both aggregate and disaggregate levels – remain relatively low.

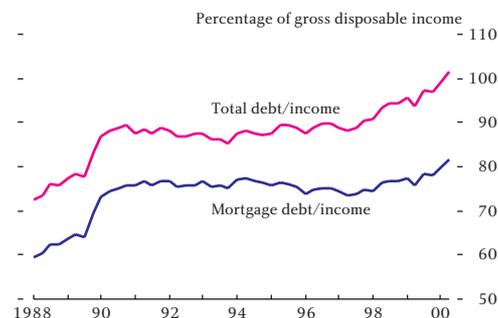
Perhaps of more concern is the UK corporate sector, where profitability (outside the oil industry) has remained modest despite stronger-than-expected growth and, relative to retained earnings, total borrowing has been close to historical peaks, despite investment spending being more subdued than expected (Chart P). Disaggregated data suggest that, at least up to last year, the relative position of the most financially fragile companies deteriorated (including on a size-weighted basis), judging by measures of liquidity, capital and income gearing and profit margins (Chart Q).

### Impact on the financial system

Overall, therefore, banks and other financial firms appear to be operating in a somewhat more risky environment than six months ago. Signs of increasing credit risk are evident in the portfolios of US commercial banks, and spreads on their bonds have risen to levels last seen in autumn 1998. But in terms of recent profitability and capitalisation – two key lines of defence against unexpected loss – their position remains generally strong. The same is true of banks in Europe. Risk asset ratios in the G10, including in the UK, have on average been increasing since the introduction of the 1988 Basel Capital Accord.

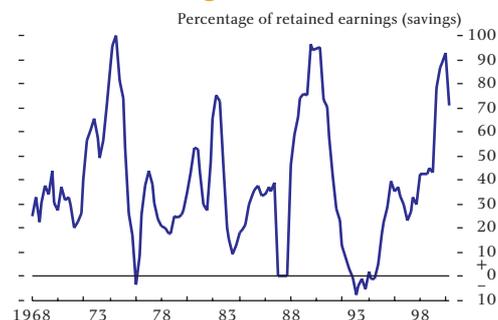
There are, perhaps, three reservations. First, for banks involved in 'bridge' financing and venture capital, planned 'exit strategies' might be frustrated by the more difficult conditions for primary issues in bond and equity markets. Second, the declines in credit quality in bank portfolios will have tended to deplete their economic capital somewhat, and that may not be fully reflected in calculations of the rather crude 1988 Basel Capital Accord ratios. Third, the impact of any current or future deterioration in

**Chart O:**  
UK Household sector debt-to-income ratios



Sources: Bank of England and ONS.

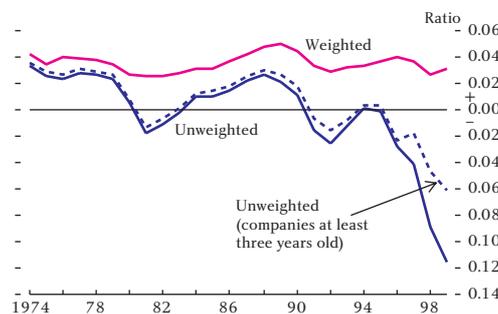
**Chart P:**  
UK PNFCs' total borrowing as a percentage of retained earnings<sup>(a)</sup>



Sources: Bank of England and ONS.

(a) Backward looking four-quarter moving average.

**Chart Q:**  
Operating profit margins at tenth percentiles for all UK companies and companies at least three years old<sup>(a)(b)(c)</sup>



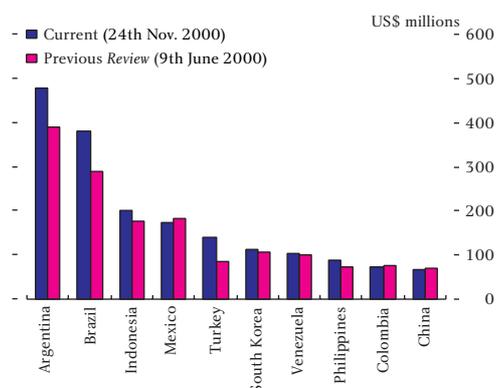
Sources: Bank of England and Thomson Financial Datastream.

(a) Weighted by company turnover.

(b) Solid lines indicate all companies.

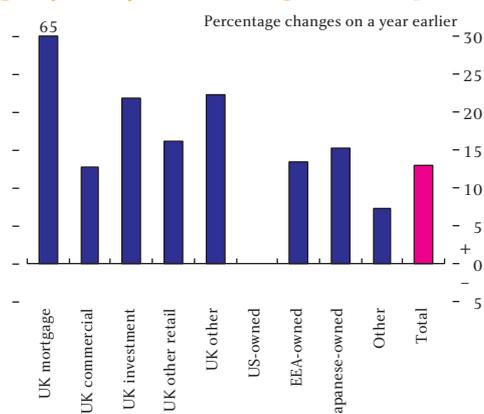
(c) The weighted operating profit margin at the tenth percentile for companies at least three years old is not shown. It shows a similar profile to the weighted profit margins at the tenth percentile for all companies.

**Chart R:**  
**UK-owned banks' estimated expected default loss on emerging economy exposures<sup>(a)</sup>**



Sources: Bank of England and JP Morgan Chase & Co.  
**(a)** Exposure multiplied by probability of default. Probability of default proxied by spreads on sovereign bonds. See Buckle, Cunningham and Davis 'A possible international ranking for UK financial stability', *Financial Stability Review* June 2000.

**Chart S:**  
**Changes in UK banking sector peer groups' corporate lending – 2000 Q3<sup>(a)</sup>**



Source: Bank of England.  
**(a)** 'Other overseas banks' are overseas banks other than US, EEA and Japanese.

credit quality depends partly on the distribution of credit exposures, which has become more difficult to assess following increased use of new mechanisms for transferring credit risk. One example is the market for credit derivatives, which unbundle credit risk from the other elements of a bond or loan. The market has been growing rapidly, involving insurance companies as well as banks, often through offshore special purpose vehicles (SPVs). Broadening the population of investors in credit risk is, of course, welcome to the extent that it helps to diversify risk, but financial stability authorities need to follow this closely. They might also usefully consider whether international banking statistics should distinguish loans and risk transfer to SPVs.

There do not seem at present to be major weaknesses in the UK financial system, although as always the experience of individual firms is not uniform. UK-owned banks' overseas exposures increased by about 10 per cent in the first six months of the year, largely to industrial economies. In terms of a proxy for the overall value of expected losses, the United States remains the biggest exposure, by virtue of the scale of its borrowing. Argentina and Brazil are the most important on this measure amongst EMEs (Chart R). As far as domestic exposures are concerned, the most rapid increases have been in corporate and unsecured consumer lending. But banks' relative exposure to the apparently most vulnerable companies may have dropped as a proportion of their total lending. The profitability of the banking sector has attracted significant new entrants, intensifying competition and so far depressing margins. Data on various 'peer groups' of banks located in the UK show that lending to firms by banks previously specialising in mortgages has risen particularly rapidly (Chart S); so has (household) lending by new entrants and by 'other UK banks' – essentially small banks. Given past episodes in which problems amongst small banks threatened to spill over into the wider banking sector, that may warrant continued monitoring (see the article by Andrew Logan in this *Review*).

Compared with the June *Review*, the overall picture, then, is one of generally robust financial systems in the industrial world against a background of somewhat greater credit and market risk, and general uncertainty about the path of the world economy; a significant 'credit event' cannot be ruled out. Focusing on downside risks, the central question – for bankers, investors, and the authorities – is probably still what the effect would be of a sharper-than-expected slowdown in the United States and in global activity more widely, given the build-up of debt and the uncertainty about returns in the 'new economy'.

# I The US and the global pattern of capital flows

Two features of the current global conjuncture stand out: first, the real and nominal value of the dollar, particularly against the euro, and, second, the size of the US current account deficit. The current account deficit entails, of course, a capital account surplus. One of the most important risks in the international environment is that the willingness of foreigners to hold an increasing stock of US assets, which underpins that surplus, might diminish. If it did so suddenly, it would probably lead to a sharp correction in US asset prices and in the dollar, with adverse effects on the world economy and global financial markets. This section considers what might lie behind the current demand for US assets, focusing on the role of expected returns to investment, particularly in the 'new economy'. It looks especially at the US corporate sector and the uncertainties it faces, including the impact of heavy borrowing in some industries, such as telecoms. The main threat is that expected returns to investment are revised down sharply, either because the improvement in productivity growth proves to be temporary, or because a short-run slowdown in economic growth is misinterpreted as implying that the potential growth rate has not increased significantly after all.

## The dollar and the US balance of payments

By July 2000, the US real effective exchange rate<sup>1</sup> had increased by 29 per cent since July 1995, its most recent trough. In contrast, the real effective exchange rate of the euro and, before January 1999, the 'synthetic' euro, had fallen about 22 per cent since peaking in November 1995. The real effective rate of the yen had fallen about 13 per cent since June 1995 (but, unlike the euro, it has been rising, after reaching a low point in August 1998). Since the June *Review*<sup>2</sup>, the dollar has appreciated by 12 per cent against the euro and 4 per cent against the yen in nominal terms. Uncertainty about the future exchange rate of the dollar against the euro and sterling has increased since June (Chart 1).

The prolonged rise in the dollar has accompanied a big increase in the US current account deficit, which is large by historical (Chart 2) and international standards (Chart 3). It continued to widen in 2000 Q2, reaching 4.3 per cent of GDP, chiefly accounted for by a widening trade deficit – which increased further in Q3.

**Chart 1:**  
US dollar exchange rate implied volatilities<sup>(a)</sup>

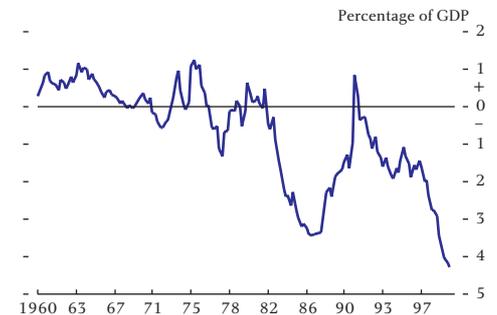


Source: RBS Financial Markets.

(a) Three-month constant horizon from at-the-money options (on spot).

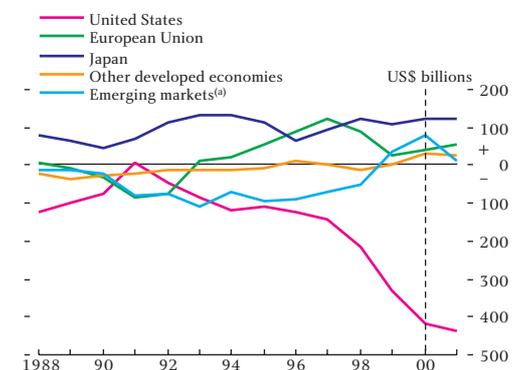
(b) Deutschemark used instead of euro before January 1999.

**Chart 2:**  
US current account



Source: Thomson Financial Datastream.

**Chart 3:**  
Current account balances



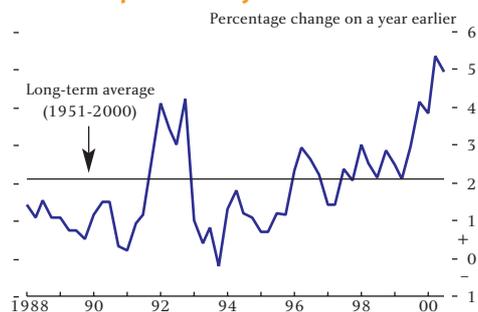
Source: IMF World Economic Outlook.

(a) Newly industrialised Asian economies plus developing countries plus countries in transition.

1: Based on the IMF's measure using relative consumer prices.

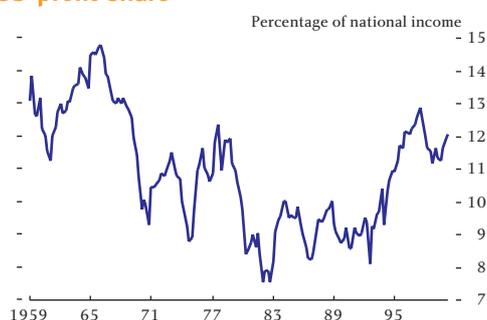
2: For which the cut-off date for data was 9 June.

**Chart 4:**  
**US labour productivity<sup>(a)</sup>**



Source: Thomson Financial Datastream.  
(a) Non-farm business sector.

**Chart 5:**  
**US profit share**



Source: Bureau of Economic Analysis.

**Chart 6:**  
**Tobin's Q in the United States<sup>(a)</sup>**



Source: Board of Governors of the Federal Reserve System: 'Flow of funds accounts of the United States', 2000 Q2.

(a) Market value of equity divided by net worth with tangible assets valued at replacement cost. No adjustment made for capital allowances or other aspects of the tax system.

*What has sustained this pattern?*

Looking backward, labour productivity growth has picked up in the United States since the beginning of 1994 (Chart 4), both absolutely and relative to other industrial countries. A recent study by the Federal Reserve Board<sup>3</sup> found that the United States was the only country in the G7 to experience an increase in labour productivity growth in the second half of the 1990s. Estimates of the potential growth rate of the US economy have increased over the past couple of years from around 2.5 per cent to around 4 per cent<sup>4</sup>. Also, the share of national income paid out in profits increased during most of the 1990s (Chart 5). Capital inflows seem to have been attracted to the United States by a rise in expected returns there relative to other countries. Looking forward, the value attached to ownership of corporate assets by US equity markets has risen well above their replacement cost (Chart 6), increasing the incentive for companies to invest. Consensus forecasts for US growth in 2001 have increased a little since the June *Review* (Chart 7). The difference between US and European growth rates is expected to diminish, but forecasters have repeatedly put back the projected date of complete convergence.

Higher capital inflows have not been the counterpart of lower US domestic saving (Chart 8). Indeed, from 1993 until the late 1990s, US domestic saving rose as a proportion of GDP, because the reduction in the government's fiscal deficit more than made up for the decline in private sector saving. Instead, the inflows have been accompanied by higher investment, which has risen relative to US GDP since the early 1990s, and by more than domestic saving. The rise in investment's share contrasts with a large fall over the same period in Japan and a small one in the euro area. Comparing the United States and Europe, the difference in the share in GDP of private investment in information and communication technologies has been particularly marked. Goldman Sachs<sup>5</sup> estimates that real investment in information, communications, and technology (ICT) in 1996-99 was over 50 per cent higher as a proportion of GDP in the US (5.3 per cent compared with 3.2 per cent in the euro area). Its annual growth rate was over 26 per cent, compared to under 20 per cent in the euro area.

An examination of gross capital inflows to the United States suggests that foreign investors have been willing to switch to riskier assets in order to share in the returns expected in the United States' rapidly growing economy, while the supply of US Treasury bonds has in any case shrunk. The increase in

<sup>3</sup>: Gust, C, and Marquez, J (2000): 'Productivity Developments Abroad', Federal Reserve Bulletin, Vol 86, No10, October.

<sup>4</sup>: Compare, for example, *OECD Economic Outlook*, November 2000 preliminary edition, p75 with *OECD Economic Outlook*, December 1997, p 35.

<sup>5</sup>: *Global Economics Weekly*, issue 00/37, Goldman Sachs, October 2000.

foreign direct investment and US equity purchases since the mid-90s has outstripped the increase in the current account deficit. Some of the gross inflow of this risk capital has been offset by outflows, as the international diversification of portfolios has continued. But, even in net terms, the rise in FDI and equity inflows has been large (Table 1).

**Table 1: Net capital inflows to the US (\$ billions at an annual rate)**

Annualised rate over:	1995-96	1999-2000 H1	Change
Equities and foreign direct investment	-76.0	130.1	206.1
Bonds	263.7	241.0	-22.6
Other <sup>(a)</sup>	-51.6	-19.9	31.8
Net capital inflows	136.1	351.2	215.2
Current account <sup>(b)</sup>	-116.4	-359.4	-243.0

Source: Board of Governors of the Federal Reserve System: 'Flows of funds accounts of the United States', 2000 Q2.

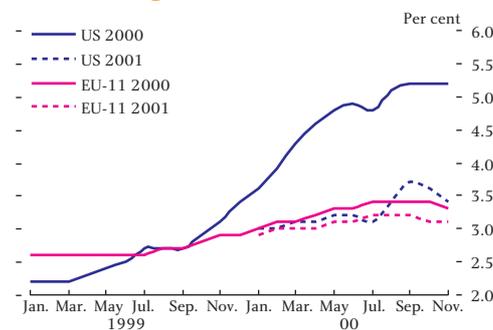
(a) Mainly bank lending

(b) Not equal to net capital inflows because of errors and omissions.

The risk of a sudden reversal in the direction of the dollar is less easy to assess. A one-off reduction in the willingness to hold US assets might simply lead to a fall in their prices, without any change in actual capital flows or exchange rates. The nature of the capital inflows may give a clue as to the reasons for the appreciation of the dollar and hence the risks of its sudden reversal. To the extent that the inflows have been driven by long-term investment opportunities rather than short-term expectations about interest rates and exchange rates, they will have had a more lasting impact on demand for the dollar. To satisfy that demand, the current account deficit has had to widen, so that there is an increased supply of dollars from Americans wanting to buy foreign goods and services. An increase in US growth prospects would by itself tend to generate increased demand for imports. The question is, to what extent has a change in the dollar exchange rate also been necessary? Here it may be helpful to distinguish between US goods and services and non-US ones. A rise in the price of US goods and services relative to imports – brought about by dollar appreciation – may have been necessary to persuade US consumers and firms to switch. There is now considerable evidence that the 'law of one price' does not hold for goods and services in international trade, because of transport costs and other impediments, so a significant relative price adjustment – via a nominal exchange rate appreciation – may have been necessary.

Another distinction, between those goods and services that are difficult to import and those that are relatively easy, may also help to explain the rise in the real exchange rate of the dollar

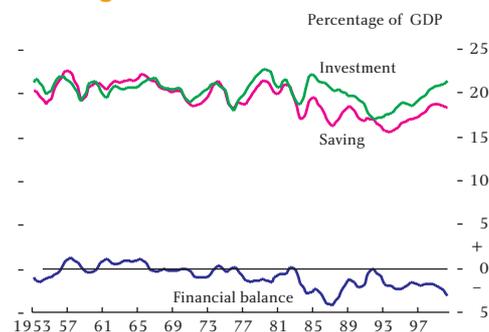
**Chart 7: Consensus<sup>(a)</sup> growth forecasts**



Source: Consensus Economics

(a) Mean of forecasts compiled by Consensus Economics.

**Chart 8: US saving and investment<sup>(a)</sup>**



Source: Board of Governors of the Federal Reserve System: 'Flow of Funds Accounts of the United States', 2000 Q2.

(a) Four-quarter moving average.

measured in terms of relative consumer price levels. The investment boom is likely to have increased the price of 'non-tradables' relative to the price of 'tradables', because with the US economy close to full employment there has been limited scope to meet demand by increasing capacity utilisation. The nominal appreciation of the dollar has probably helped to moderate the impact of this relative price change on the overall price level, by making 'tradables', particularly imports, cheaper. Hence the interaction of (i) an increase in investment, (ii) differential supply responses according to the ease of importing the relevant goods and services, and (iii) the Federal Reserve's objectives of price stability and full employment may help to account for the path of the dollar. That implies that the key risk for the dollar is a sudden fall in plans to invest.

### **The outlook: central tendency versus risks**

US growth remained much faster than in Europe and Japan in 2000 Q2. In Q3, however, US growth fell to a quarterly annualised rate of 2.4 per cent, down from 5.6 per cent in Q2. Preliminary national accounts data for the major euro-area economies suggest that there may also have been lower growth in Europe. The growth rate of US investment fell. Forecasters generally anticipate a 'soft landing' for the US economy, but initially that could be difficult to distinguish from the beginning of a 'hard landing'. The Federal Open Market Committee has not found it necessary, however, to change its target for the federal funds rate from 6½ per cent since May; forward rates suggest that the markets expect that the next move will be down.

From the point of view of financial stability, the downside risks to the outlook are of most interest. In the past six months, there have been signs that these risks have increased. It was argued above that the prospects for high investment returns in the United States might have sustained the US current account deficit, and that the outlook for the US corporate sector was therefore particularly important. To what extent have the risks facing those lending to the corporate sector increased?

For an individual firm, various factors affect the risks it faces. On the one hand, the higher are expected future earnings, other things being equal, the lower is the probability of default (or ratings downgrade). On the other hand, the higher are gearing or the volatility of the value of the firm's assets, the higher is that probability. These relationships, reflected in Merton's option pricing model of equity valuation, have in recent years become widely used to derive estimates of the likelihood of individual firm default; this is explored further in Box 1. The model also seems helpful in thinking about the risks facing the corporate sector as whole. Another factor at the aggregate level is the changing structure of US industry, with the growing importance of investment in information and communications technology. Such structural change has been increasing the degree of

## Box 1: Pricing corporate securities

Merton (1974)<sup>1</sup> set out a framework for pricing corporate securities as if they were options contracts. Consider a firm owning risky assets and bearing liabilities (zero-coupon corporate bonds) that fall due on a particular future date (denoted date T). The value of the firm's equity is analogous to a European call option on the firm's assets which is exercised when the liabilities are due to be repaid, with a strike price equal to the firm's debt: both instruments offer the same payoffs under every possible future outcome. If the value of the firm's assets is greater than that of the liabilities on their due date, the equity holders will receive the value of the assets net of the amount paid to bondholders. Conversely, if the value of the firm's assets is less than that owed to bondholders (ie the firm is insolvent), then the assets must be sold to repay them and the payoff to equity holders will be zero. The payoffs received by equity holders at the future date, T, are shown in Chart A. The *present value* of equity or debt is simply the discounted expected value of the future payoffs to these securities, which are determined by the expected future value of the firm's assets. These expectations can be summarised by a probability distribution (Chart B) which, under certain assumptions, will be determined by three key parameters:

- The current leverage of the firm (shown in Chart B, as the ratio of the initial value of assets and liabilities on the vertical axis);
- The expected rate of growth of the value of the assets; and
- The variance, or volatility, of the value of the assets.

The present value of equity in the firm is equal to the probability-weighted sum of net assets (assets less liabilities) for all future outcomes where assets exceed liabilities. The present value of corporate bonds is inversely proportional to the probability that the firm's assets are insufficient to repay the liabilities, which can be measured by the area under the lower tail of the probability distribution that is bounded on the upper side by the value of outstanding liabilities. Given this framework, the impact of changes in market participants' expectations on corporate security prices can be analysed.

Chart C depicts the probability distribution associated with higher leverage, expected growth and uncertainty than in Chart B. Higher leverage and uncertainty produce a higher probability of default and an increase in corporate bond spreads, the size of the effect increasing nonlinearly as leverage rises. The effect on the value of equity is ambiguous, because, although the likelihood of receiving no payoff would increase, the faster expected growth of assets implies that the largest possible payoffs would be larger than before.

Chart A

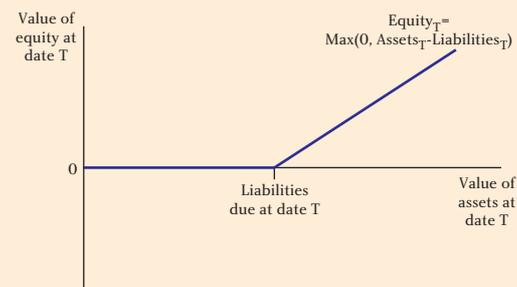


Chart B

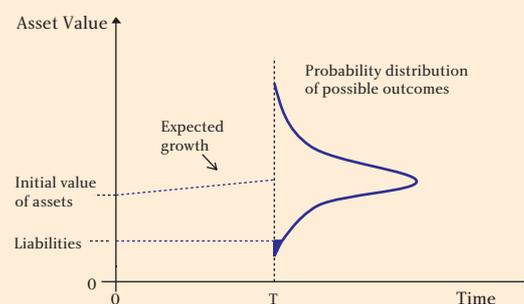
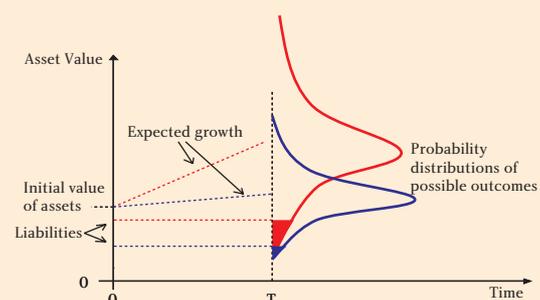


Chart C



<sup>1</sup> Merton, RC (1974) 'On the pricing of corporate debt: the risk structure of interest rates' *Journal of Finance*, May, pp 449-470.

**Chart 9:**  
**S&P 500 earnings per share**



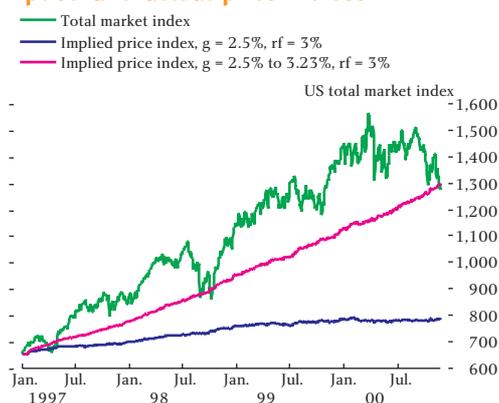
Source: Institutional Brokers Estimate System.

**Chart 10:**  
**Major US market indices**



Source: Thomson Financial Datastream.

**Chart 11:**  
**Implied and actual price indices<sup>(a)</sup>**



Sources: Thomson Financial Datastream and Bank calculations.

(a) In annotation, 'g' is the real dividend growth rate and 'rf' is the real risk-free rate.

uncertainty about returns in particular sectors. For given expectations of aggregate growth, a greater rate of structural change in the economy may raise default rates, if more firms in 'sunset' industries and young companies in novel sectors fail. And structural change may also make it more difficult to assess the likely rate of aggregate growth. An assessment of the risks to the US corporate sector should therefore consider expected returns, uncertainty about those returns, leverage, and more generally the extent of structural change.

#### Expected returns

So far, the negative impact of the expected moderate slowdown of the US economy on company analysts' projections of corporate earnings has been limited. Taken together, estimates for S&P500 index companies point to only a mild fall in the growth of earnings per share expected over the next twelve months, to 14.5 per cent – although analysts' estimates have persistently over-predicted profits (Chart 9). There was a sharper upturn in the corporate profit warnings monitored by First Call between Q1 and Q3 than in earlier years, but that reflected the particularly low level in Q1. The number of reporting companies has been increasing in recent years, so the proportion of firms issuing warnings in Q3 was not exceptional. Some specific pieces of news from firms in the ICT sector seem, however, to have had a disproportionate impact on the equity market (eg the announcement of Nortel Networks' Q3 sales figures on 24 October). Consensus surveys of macro-economists' profit forecasts suggest aggregate profit growth will be just 4.5 per cent in 2001, down from 12.4 per cent in 2000, and post-tax corporate profits did slow sharply in Q3, growing 1.2 per cent from Q2 (compared with 3.3 per cent the previous quarter).

The performance of equity markets may also give some indication of changes in expected returns in the corporate sector. Between June and August, the major US equity markets were fairly stable. But they have weakened significantly since the start of September, led by the Nasdaq 'new economy' stocks (Chart 10). The P/E ratio for the S&P 500 is currently 27, down from a peak of 36 in mid-1999. That may reflect lower expectations of the long-run growth rate of dividends and/or an increase in the risk premium demanded for holding equities, perhaps due to the increased volatility of their prices (see below).

Price-earnings ratios are, nevertheless, still high by historical standards; Box 2 illustrates how exceptional recent equity price behaviour has been in historical perspective. Calculations using a simple dividend discount model<sup>6</sup> suggest that there may have been an upward revision in expectations of dividend growth over the past three years, and that is still the case despite recent falls

<sup>6</sup> See Box 3 for an explanation of the dividend discount model.

## Box 2: Empirical patterns in US equity prices (1871-2000)

The recent increase in US equity prices is well known, and its causes and likely durability much debated. What is not so often noted, however, is just how unusual the recent behaviour of equity prices is. Chart A sets out 130 years of US equity price data, so as to put the recent period in a long-run context. The chart shows equity prices in money terms and real terms (ie deflated by the CPI)<sup>1</sup>. For such a long period, covering episodes of both inflation and deflation, the real index is more revealing.

A sequence of consistently large positive annual returns as observed in the past five years is very rare. The only periods coming close to matching it are the late 1870s and the late 1920s. These were very special periods. The US civil war finished in 1865, and the 1920s stock market boom also followed the return of peace. The current period is therefore still more unusual than it looks at first glance, unless the so-called 'peace dividend' following the end of the 'Cold War' and its impact on US government spending has played a part in the equity price rise. (Persistent negative returns are rare too, seen only in the aftermath of the 1929 crash.)

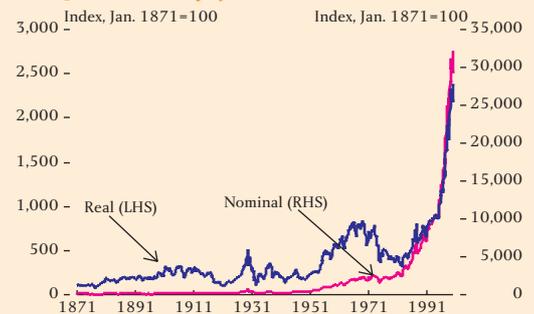
Price-earnings ratios (Chart B) have been rising steadily since the early 1980s, after falling throughout much of the 1960s and 1970s. The extent of the present increase is unprecedented, not even matched by the steep rise in the 1920s, a period of rapid technological progress as well as one following a major war. The historical dividend yield (Chart B) shows a clear downward trend during the post-war period, briefly interrupted in the 1970s. The dividend yield and the price-earnings ratio are currently near to an all-time low and all-time high, respectively. These results are of particular interest in view of substantial evidence that low dividend yields have in the past predicted lower future stock returns<sup>2</sup>.

Volatility of monthly returns (annualised) was at a historical low in the early 1990s, and the rise in volatility in the past five years has only brought it back to its long-term mean (Chart C). Apart from the enormous peak in the 1930s, there were no more peaks in volatility before the Second World War than afterwards, and mean volatility seems to have been similar. It remains to be seen whether the high volatility of 'new economy' stocks, reflected in the Nasdaq, will lead to a significant rise in mean volatility.

<sup>1</sup>: The data consist of monthly series for the S&P500. Prices are computed as monthly averages of daily closing prices. Earnings and dividend series are interpolated from quarterly or annual data, and are for the earlier decades of the sample available for a selection of stocks only. Real values are obtained using CPI-U data. These limitations are described in greater detail in Shiller, RJ (2000) 'Irrational Exuberance', Princeton University Press.

<sup>2</sup>: See, for example, Campbell, JY, Lo, AW and McKinlay, AC (1997) 'The Econometrics of Financial Markets', Princeton University Press.

**Chart A:**  
**S&P 500 monthly price index**



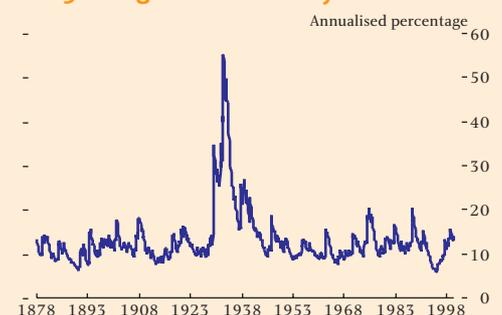
Source: Shiller (2000).

**Chart B:**  
**Price to earnings ratio and real dividend yield**



Source: Shiller (2000).

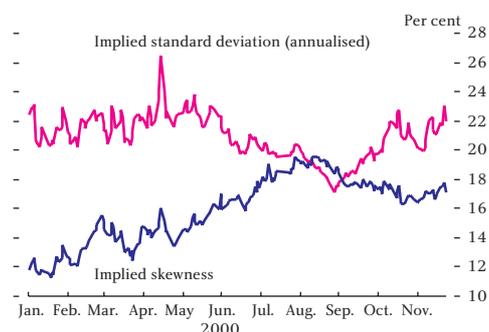
**Chart C:**  
**S&P 500 log-return volatility<sup>(a)</sup>**



Sources: Shiller (2000) and Bank calculations.

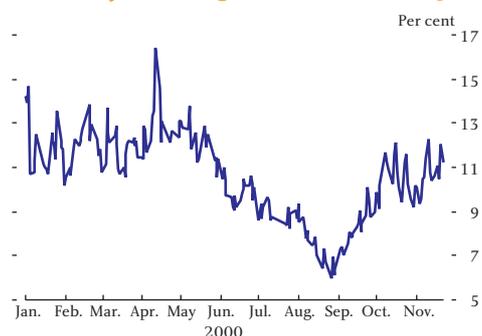
(a) Volatility defined as a rolling 84-month exponentially weighted moving average of squared log returns.

**Chart 12:**  
**S&P 500 implied standard deviations and skewness<sup>(a)</sup>**



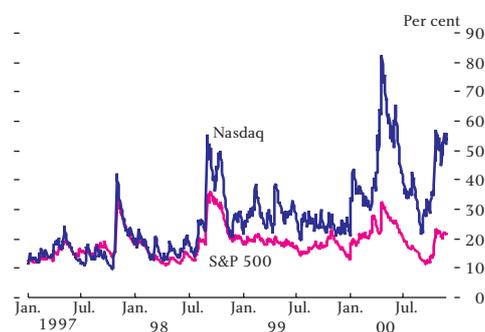
Sources: Bank of England and Chicago Mercantile Exchange.  
**(a)** Both measures are from three-month constant maturity contracts.

**Chart 13:**  
**Probability of a large fall in the S&P 500<sup>(a)</sup>**



Sources: Bank of England, LIFFE and Chicago Mercantile Exchange.  
**(a)** Implied risk-neutral probability of a greater than 20 per cent fall in the next six months.

**Chart 14:**  
**Historical volatility of share indices<sup>(a)</sup>**



Sources: Bank of England and Thomson Financial Datastream.  
**(a)** Volatility calculated as annualised 252-day rolling square-root of exponentially weighted moving average of squared daily log returns.

in equity markets. Chart 11 compares a broad US equity index with two hypothetical indices. The first is derived from the historical path of the dividend yield, assuming a real risk-free interest rate of 3 per cent, a constant expected annual dividend growth rate of 2.5 per cent, and an equity risk premium chosen to make the hypothetical and actual indices coincide at the beginning of 1997. The actual index increases much faster than the constructed one. That could be because the equity risk premium has fallen (unlikely given the greater volatility of equity returns), the real risk-free interest rate has fallen (not obvious from the US TIPS market), or the expected dividend growth rate has increased. Could the performance of the equity market plausibly be explained just by the latter? The second hypothetical index was drawn on the assumption that the expected dividend growth rate is revised up smoothly from 2.5 per cent at the beginning of 1997 to just over 3.2 per cent; that is just sufficient to bring the equity index to its current level, holding the risk-free rate and the equity risk premium constant at the assumed levels. An increase to 3.3 per cent would account for the rise in the actual index to its most recent peak. If the real risk-free rate of interest rose over the period, as suggested by the prices of index-linked US Treasuries, the increase in expected growth would have had to have been somewhat more (about 1½ percentage points). In other words, the performance of the US equity markets as a whole over the past three years is not obviously inconsistent with the upward revisions to forecasts of the United States' potential growth rate.

When expectations of the future dividend growth rate are steady, equity price indices would be expected to rise at around the same rate. An upward revision of expectations would be expected to raise the level of the indices (a one-off effect) as well as their subsequent rate of change, thereby temporarily pushing up the total returns on the indices even further. So part of the increase in US equity price indices over the past three or four years may have reflected a gradual adjustment to a higher expected rate of economic growth, in which case equity prices can be expected to increase less rapidly in the future even if the expected growth rate of the economy does not fall (equity price increases will slow even more to the extent that past increases reflected a step decline in the equity risk premium). Hence a fall in the total returns to holding equities is not necessarily evidence of declining economic prospects; if it were treated as such, that could exacerbate any equity market correction, as could mistaking a cyclical slowdown in productivity for a permanent one.

#### *Uncertainty about returns*

Market participants do not seem to think a further sharp market decline is highly likely. Implied probability distributions (PDFs) for the S&P 500 index looking forward, derived from option prices and calculated so as to have constant maturities of three

to six months, present a similar picture to those at the time of the June Review (Chart 12)<sup>7</sup>. The probability assigned to a 20 per cent or greater fall in the next six months is close to its level in June – although it has been increasing since late August, following an earlier decline (Chart 13).

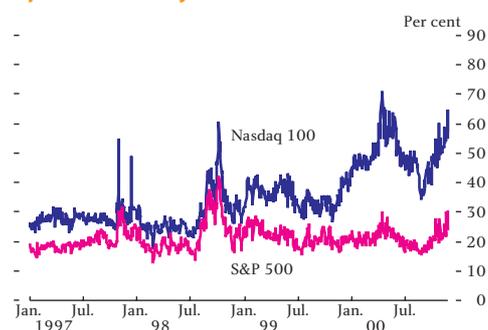
The volatility of equity prices provides another measure of the uncertainty about prospective returns and the equity risk premium. Between June and August, both historical volatility measures (based on past movements in equity indices) and implied volatilities (derived from option prices) in the United States fell from the highs reached during the first half of 2000, to levels last seen before the boom in TMT shares in 1999 Q3 (Charts 14 and Chart 15). But, since the summer, volatility measures have risen again. For broad market indices and the Nasdaq, equity price volatility this year has been above the average over the past five years (for the Nasdaq, by a factor of two). The volatility of the Nasdaq has been exceptional, with daily price movements of more than +/- 2 per cent the norm rather than the exception (Chart 16). Investors seem very uncertain about the value to be placed on the benefits of structural change and the emergence of the 'new economy.'

Following renewed political tensions in the Middle East, oil prices have contributed to increased uncertainty. Oil futures suggest oil prices will decline from around \$32 pb now to around \$28 pb by May 2001. But there is greater uncertainty around that central forecast, illustrated for example by the rise in the implied volatility of oil prices (derived from option prices: (Chart 17). An adverse supply side shock due to oil prices might raise the risk that projections of sustainable growth rates would be revised downwards sharply.

#### Corporate sector leverage

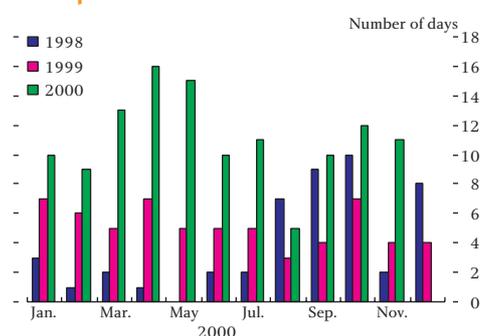
Like higher volatility, higher leverage would tend to increase risk, other things being equal. In fact, capital gearing, if measured by the ratio of the market value of equity to the stock of debt outstanding, has been at historically very low levels, thanks to the strong performance of equity markets. So has the ratio of interest payments to profits. But capital gearing measured in terms of capital at replacement cost, instead of market value, has continued to increase (Chart 18), partly reflecting the trend since the early 1990s for the corporate sector to retire equity and issue debt. The ratio of new debt to gross investment rose sharply during the 1990s (Chart 19), increasing the vulnerability of bondholders to any downward revisions in expected returns and hence asset prices. Moreover (as demonstrated for the United Kingdom in the June Review), improvements in aggregate balance-sheet ratios may mask adverse changes in their

**Chart 15:**  
Implied volatility of US stock indices



Source: Bloomberg.

**Chart 16:**  
Frequency of large daily changes in the Nasdaq<sup>(a)</sup>



Source: Thomson Financial Datastream.

(a) Number of days during the month on which the Nasdaq moved by more than two per cent.

**Chart 17:**  
Implied variance of oil prices<sup>(a)</sup>

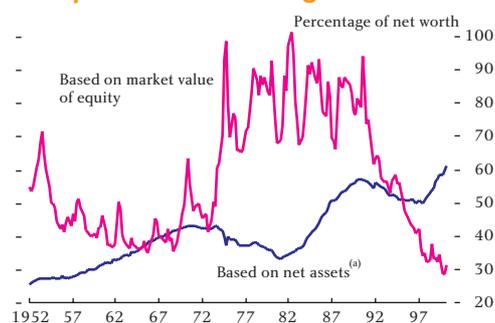


Sources: Bank of England and Nymex.

(a) Derived from option prices for West Texas Intermediate oil.

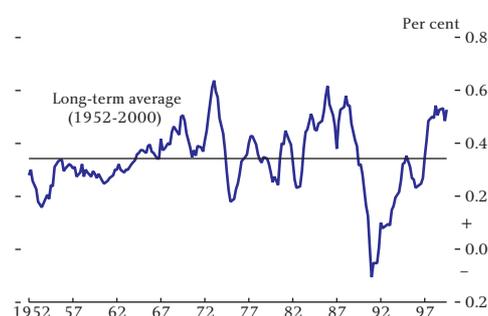
<sup>7</sup> For more details on the simplifying assumptions behind the calculation of these statistics, and their possible implications, see Box 3, *Financial Stability Review*, June 2000, pp 44-45.

**Chart 18:**  
**US corporate sector leverage**



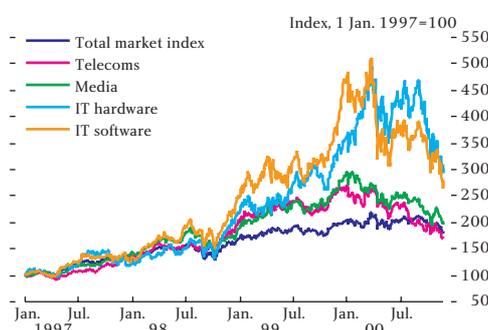
Source: Board of Governors of the Federal Reserve System: 'Flow of Funds Accounts of the United States', 2000 Q2.  
(a) Net financial assets plus tangible assets at replacement cost.

**Chart 19:**  
**Ratio of gross new debt to gross investment**



Source: Board of Governors of the Federal Reserve System: 'Flow of Funds Accounts of the United States', 2000 Q2.

**Chart 20:**  
**US TMT indices**



Source: Thomson Financial Datastream.

distribution. According to research by the New York Federal Reserve<sup>8</sup>, the leverage of small firms rose during the late 1990s, and is now high by historical standards.

#### Structural change and the 'new economy'

'New economy' stocks have in general been affected most in the recent stock market falls, suggesting that the correction reflects a re-assessment of the likely returns to investment in the technology, media, and telecommunications (TMT) sector (Chart 20). The impact of the recent oil price rises, if they persist, is also likely to differ across industrial sectors. But recent developments still leave the software and computer sectors with much higher expected dividend growth rates than the rest of the economy. Box 3 shows estimates for selected industry sectors and outlines the method used to derive them. The dispersion across industries of expected growth rates has increased this year (Chart B in Box 3). Structural change is expected to continue. The volatility of 'new economy' stocks shows how difficult investors find assessing its impact on future dividends. Chart C in Box 3 confirms how the two broad sectors of US industry with the highest implied dividend growth rates have also seen the greatest volatility in returns recently.

#### Credit risk

Since the end of March, US corporate bond spreads (measured as the difference between bond yields and swap rates) have widened markedly across all rating categories (Chart 21). Spreads on high-yield bonds have risen most, especially since September (Chart 22). The differential between investment-grade and sub-investment-grade yields has increased, and the dispersion of the latter has risen too.

Despite a fall in swap rates over the period, the interest rate charged on new bond finance for less highly rated companies – but not investment-grade firms – has risen. Downward revisions in earnings expectations (consistent with expectations of an economic slowdown) were probably a major factor behind the increase in spreads. Until mid-August, implied equity market volatility tended to fall, so, up to that point, uncertainty about aggregate returns does not appear to have been the explanation. Since then, increased volatility and a probable increase in capital gearing measured at market prices are also likely to have played a part.

Within rating categories, credit risk has increased by varying amounts across industries (Chart 23), with telecoms seeing a particularly large rise. Also, high-yield debt issuance increased rapidly up to the middle of 1998, and default rates tend to peak

<sup>8</sup> Osler, C, and Hong, G (2000): 'Rapidly Rising Corporate Debt: Are Firms Now Vulnerable to an Economic Slowdown?', *Current Issues in Economics and Finance*, Federal Reserve Bank of New York, June 2000 Vol 6 No 7.

## Credit risk: selected charts

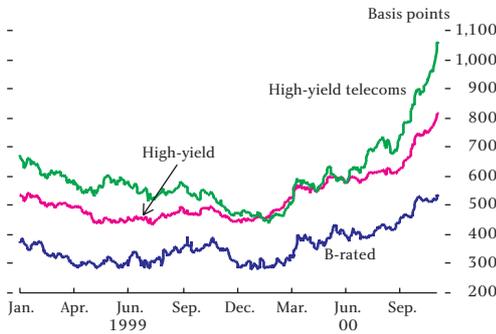
**Chart 21:**  
US investment-grade spreads by rating<sup>(a)</sup>



Source: Bloomberg.

(a) Ten-year maturity fair market bond yields less ten-year swap rates. Five-day moving average.

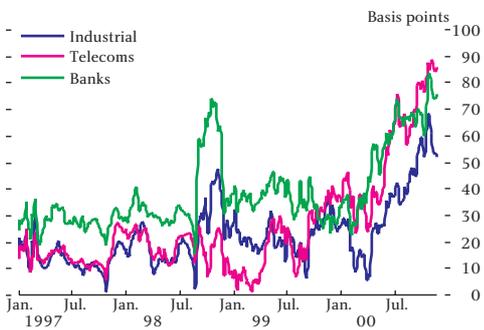
**Chart 22:**  
US sub-investment-grade spreads by ratings<sup>(a)</sup>



Sources: Bloomberg and Merrill Lynch.

(a) B-rated spreads are ten-year maturity fair market bond yields less ten-year swap rates. High-yield and high-yield telecoms are option adjusted spreads over a government benchmark.

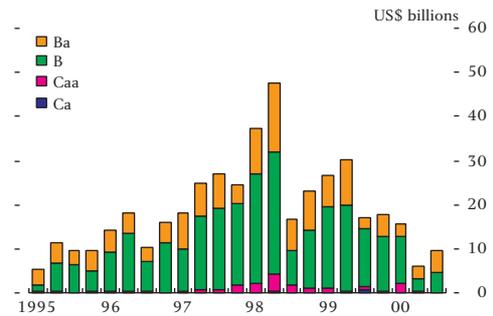
**Chart 23:**  
US A-rated spread over swap rates<sup>(a)</sup>



Source: Bloomberg.

(a) Ten-year fair value curves over ten-year swap rates. Five-day moving average.

**Chart 24:**  
US domestic sub-investment grade bond issuance<sup>(a)(b)</sup>

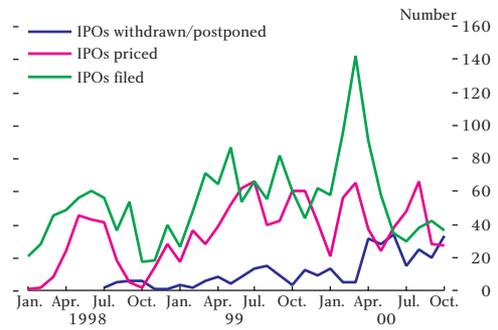


Source: Thomson Financial Securities Data.

(a) Convertible and non-convertible bonds, including rule 144a bonds.

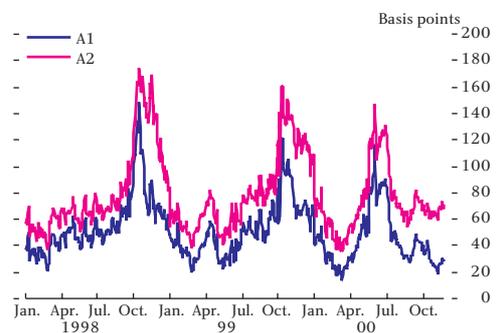
(b) Non-financial corporates.

**Chart 25:**  
US Initial public offerings



Source: ipo.com.

**Chart 26:**  
Commercial paper spreads to US Treasury Bills

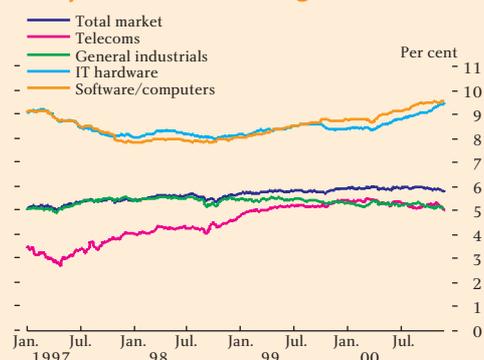


Source: Bloomberg.

## Box 3: Estimating implied real dividend growth rates for equity market sectors using the Dividend Discount Model

**Chart A:**

### US implied real dividend growth rates<sup>(a)</sup>



Sources: Thomson Financial Datastream and Bank calculations.

(a) Estimates based on two-year rolling sectoral betas, four per cent risk premium and three per cent fixed real interest rates.

**Chart B:**

### Cross sectional standard deviation of implied real dividend growth rates in US<sup>(a)</sup>

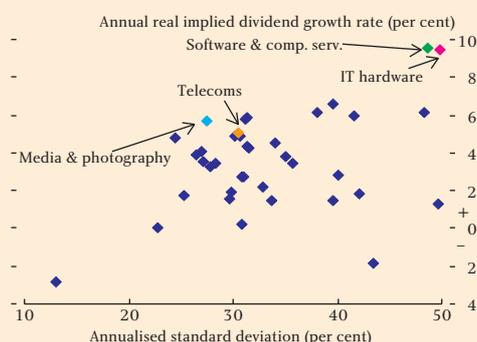


Sources: Thomson Financial Datastream and Bank calculations.

(a) 38 sectors were used in this calculation.

**Chart C:**

### Sectoral variation in expected US real dividend growth and volatility of returns<sup>(a)</sup>



Sources: Thomson Financial Datastream and Bank calculations.

(a) Datastream US sectoral indices as on 24 November 2000.

The Dividend Discount Model (DDM) relates the current price of an index (or individual stock) to the risk-free interest rate and three key features of that index: its current dividend, its associated risk premium and the expected growth rate of its dividends. With knowledge of the current dividend yield and an estimate of the risk premium, it is possible to derive estimates of the implied expected growth rate of dividends.

The current dividend yield on individual sectors can be observed easily, but sectoral risk premia cannot. They can, however, be estimated by making use of the Capital Asset Pricing Model, in which the risk premium for a sector (or individual stock) is a function of the risk premium for the market and the so-called 'beta' coefficient of the index, where beta is given by the covariance between the excess return on the index and the excess return on the market, divided by the variance of the excess return on the market. Sectoral betas can be estimated by using ordinary least squares on a recursive basis. Time-varying estimates of sectoral risk premia can be obtained by multiplying the recursive beta coefficients by the market risk premium (assumed here to be 4 per cent). Combining the time series of risk premia estimates and dividend yields for any particular sector makes it possible to obtain estimates of implied expected dividend growth rates. The estimates presented here assume that the risk-free real interest rate is constant at 3 per cent.

Time series of implied dividend growth rates for selected US industry sectors are presented in Chart A. Chart B plots the standard deviation of the implied rates for 38 industry sectors, showing the increase in the expected pace of structural change. The same framework is used to derive Chart C, which shows how the relationship between implied real dividend growth rates and risk (proxied by the standard deviation of daily returns) differs across sectors in the United States.

This approach is subject to a number of caveats. For example, it assumes that the expected dividend growth rates are constant, which in practice is unlikely to be the case. Second, it is not suitable for firms which currently are not paying out any dividends. Third, the sectoral risk premia are derived from backward-looking data, whereas it is the *expected* correlation between a sector and the overall market that matters. Fourth, the market risk premium and the real risk-free rate are difficult to estimate, but are unlikely to be constant.

two or three years after issuance; given the lower issuance since, that has probably reduced aggregate credit quality.

Increased risk of default may be reflected in credit rationing as well as increases in spreads. The high-yield market is still open, but issuance has been unusually low in the past two quarters (Chart 24), and has had to rely to a greater extent on the private placement market (see Box 4). There is some evidence of tightening credit standards (see page 34). 'New economy' firms have found it more difficult to raise new risk capital via Initial Public Offerings (IPOs) of equity and are having to rely more on venture capital. Postponed and withdrawn IPOs, although fewer than in Q2, remain more frequent than they were before the sharp fall in equity prices in March this year (Chart 25). Filings have recovered somewhat, but are running well below the average over the past two years. However, these developments do not amount to a 'credit crunch'. There is little sign of concern about whether firms can meet their short-term liabilities; Chart 26 shows that spreads on commercial paper have not widened significantly. And, in contrast to autumn 1998, drawings on back-up lines seem to have been related to firm-specific problems rather than to a general closure of capital markets.

### The personal sector

Aggregate personal sector net wealth in the United States remains high, at over six times annual disposable income, even after recent stock-market declines. Households have continued to make net purchases of equity mutual funds, but net inflows, at \$59 billion in Q3, were well down on their Q1 peak of \$134 billion (Chart 27) and anecdote suggests that they may now have turned negative. Margin debt fell in October but remained at a historically high level. Meanwhile, the personal sector financial deficit widened to a historically unprecedented 2.6 per cent of GDP in the first half of 2000 as the saving rate fell (Chart 28). Households financed this deficit by continuing to borrow heavily, pushing up the stock of outstanding debt to 96 per cent of disposable income in 2000 Q2. Household income gearing has risen for the past five years and, though it remains below its 1990 peak, is high given the relatively low nominal interest rates at the moment. Consumer confidence remains well above its long-run average, despite a sharp fall through October and November, which may have been related to equity market developments: the total twelve-month returns of the S&P 500 fell sharply in October and turned negative in mid-November, making the end-of-month figure negative for the first time since December 1990.

### The resilience of the US commercial banking sector

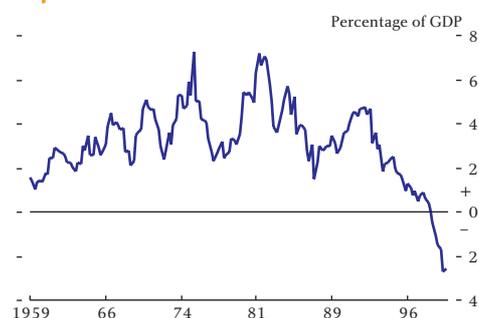
US commercial banking profitability has remained strong, although earnings growth has tended to slow. Federal Deposit Insurance Corporation (FDIC) figures show that the return on assets rose for the year to June at a majority of banks, although

**Chart 27:**  
Net inflows into US equity mutual funds



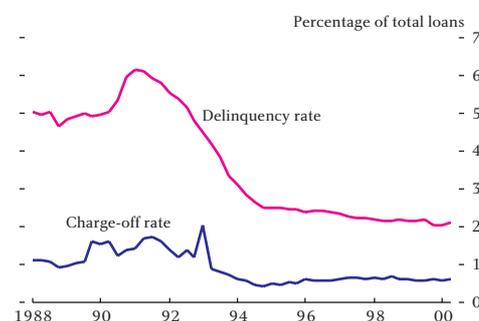
Source: Investment Company Institute.

**Chart 28:**  
US personal sector financial balance



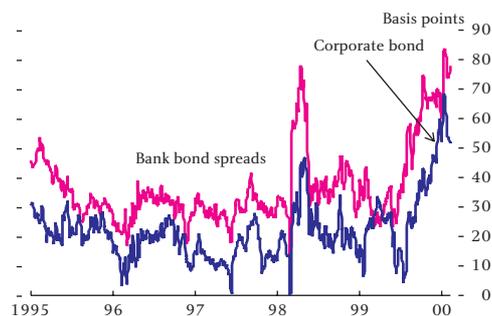
Source: Board of Governors of the Federal Reserve System: 'Flow of Funds Accounts of the United States', 2000 Q2.

**Chart 29:**  
Non-performing loans of US commercial banks



Source: Federal Reserve Board.

**Chart 30:**  
**US bank and corporate non-financial bond spreads<sup>(a)(b)</sup>**



Source: Bloomberg.

(a) Ten-year A2-rated bond spreads against ten-year swap rate.

(b) Five-day moving average.

the aggregate return on equity for the sector fell to 13.9 per cent as a result of restructuring and increased loan provisions at a few large institutions. Q3 commercial banking results showed continuing high profitability, despite increasing loss reserves and some banks' weaker performance. Banks now depend heavily on trading profits and capital market activity-related fees. Further US bank consolidation has occurred since the June Review with the acquisition of J.P.Morgan by Chase (see also Section II), Associates First Capital by Citigroup, Summit Bancorp by FleetBoston Financial, and U.S. Bancorp by Firststar.

The value of commercial banks' non-performing loans is increasing, although it remains at a low level (Chart 29). That is reflected in figures for syndicated loans from the Shared National Credit Program: 3.3 per cent of loans and loan commitments were adversely classified, a rate which has more than doubled since 1998, but which remains low relative to its 10 per cent peak in 1991. The annual survey by the Office of the Comptroller of the Currency (OCC), covering the year to March 2000, expressed disquiet about the credit risk embedded in bank portfolios, which had increased for the fifth consecutive year. OCC examiners also expressed concern about structured finance at 60 per cent of the largest institutions (assets over \$50 billion); real estate commercial lending was cited as the primary risk for other institutions. They expected credit quality to decline into next year. The increase in delinquency rates for commercial loans to date has been greater than expected for most of the largest domestic banks (assets over \$20 billion). Concerns about banking sector risk are suggested by widening spreads on bank bonds (Chart 30), which are now around the levels seen during the financial market disturbances of autumn 1998.

The increase in credit risk comes despite the modest tightening of lending standards since 1998 noted by the OCC, and is partly a reflection of past easier credit standards working through banks' portfolios. The OCC also associated increased credit risk with greater involvement of banks in higher-risk activities such as leveraged finance and sub-investment grade lending, and with the higher level of outstanding debt in the personal and corporate sectors. Inadequate analysis and risk management at some banks may, they said, have compounded these effects. The regulators' surveys now show that lending conditions have tightened for commercial loans but have changed little for retail borrowers recently. Tightening has been due primarily to changes in the economic outlook, lower risk appetite and worse industry-specific problems. The Federal Reserve's Senior Loan Officer November survey suggested that, over the past year, domestic banks tightened standards most on loans for mergers and acquisitions and for new customers. Meanwhile, the OCC is concerned by the lack of tightening in the middle market, syndicated/national loans and real estate markets.

## II International financial markets

A number of the issues affecting the United States carry over, to a greater or lesser degree, to international financial markets more generally – valuations, the financing of structural change in the economy, and developments in the types of risk being taken by financial institutions. This chapter considers these links between US, European and other international markets. Japanese markets are analysed separately in Section III.

### Equity markets

#### Key market developments

European equity market indices have moved lower since the June Review, particularly since September (Chart 31). The FTSE 100, CAC 40 and DAX 30 have fallen by 7 per cent, 10 per cent and 8 per cent respectively since the start of September, and are 7 per cent, 11 per cent and 20 per cent respectively below record highs at various times during 2000. The falls have been concentrated in technology, media and telecommunications (TMT) stocks, continuing the welcome correction in prices discussed in the June Review. The rise and fall of the European technology indices has been more extreme than that of the Nasdaq (Chart 32). Again, a degree of comfort can be taken from the orderliness of market movements and the absence of any material spillovers.

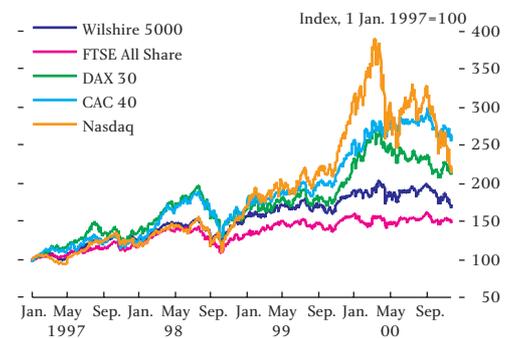
Cross-border correlations between stock indices give some idea of the degree to which changes in US markets might affect markets elsewhere. They also show the extent of (cross-country) diversification benefits in equity portfolios, which is important for risk management. Taking the third quarter as a whole, correlations between the European technology indices and the Nasdaq fell from the high levels in Q2 (Chart 33).

Both historical and implied equity market volatilities fell sharply between July and August, when prices were increasing (Chart 34). The implied volatility of the FTSE 100 fell to its lowest level since September 1997, before the Asian crises. Since September, however, volatility has returned to close to the levels at the time of the June Review. This suggests increased uncertainty about future earnings, particularly of TMT companies.

#### Longer-term rises in euro-area equity markets

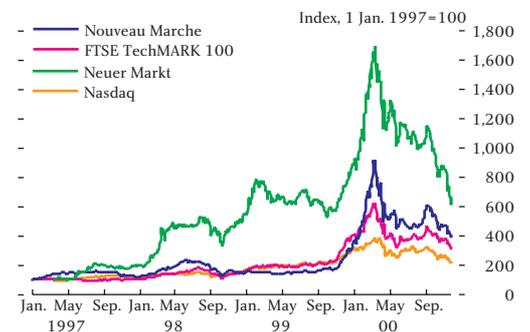
The increases in the US equity market in recent years are frequently ascribed to the strength of the US economy (see Section I). But the major French and German equity indices have risen by more than the wider US market, at least in local currency terms, since the start of 1997 (Wilshire 5000: +72 per cent, DAX 30: +116 per cent, CAC 40: +165 per cent; Chart 31). The performance of European equities relative to the US is on the face of it surprising, given the perceived differences in growth prospects.

Chart 31:  
Major market indices



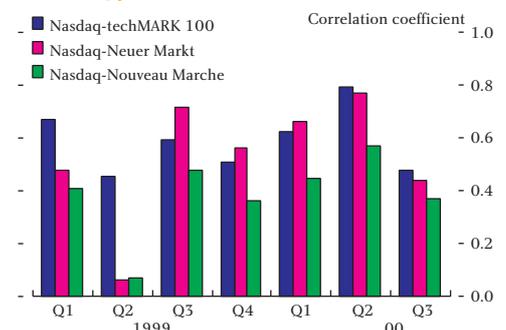
Source: Thomson Financial Datastream.

Chart 32:  
Major technology indices



Source: Thomson Financial Datastream.

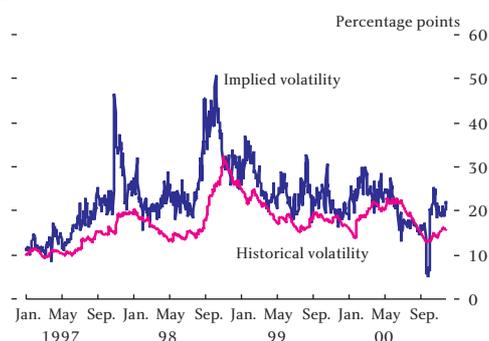
Chart 33:  
Correlation between Nasdaq and European technology stock indices<sup>(a)</sup>



Sources: Thomson Financial Datastream and Bank calculations.

(a) Correlations of weekly price changes over three-month periods.

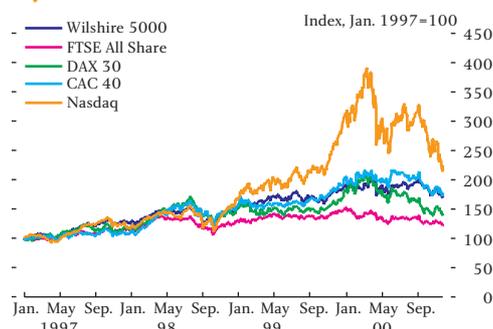
**Chart 34:**  
**Historical and implied volatility of FTSE 100<sup>(a)</sup>**



Sources: Bank of England, Thomson Financial Datastream and Bloomberg.

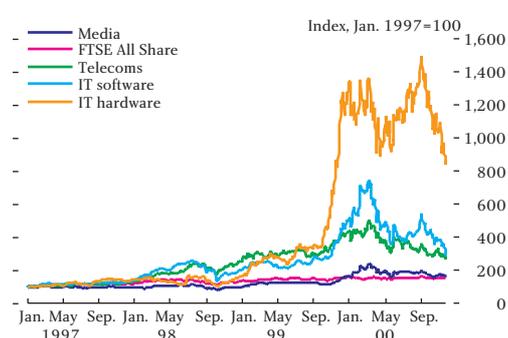
(a) Volatility calculated as annualised 252-day rolling exponentially-weighted moving average of squared log returns.

**Chart 35:**  
**Major market indices in US dollars**



Source: Thomson Financial Datastream.

**Chart 36:**  
**FTSE all-share and TMT sector indices**



Source: Thomson Financial Datastream.

One possible explanation may be that European equity markets include many multi-nationals that derive substantial profits worldwide and particularly in the USA (eg DaimlerChrysler, Siemens, Royal Dutch/Shell, Nokia, Unilever etc). To the extent that these companies have dollar earnings, their euro share prices should have increased as the dollar appreciated against the euro. In dollar terms, the French CAC 40 has increased only a little more than the wider US market since 1997 while the German DAX 30 has increased less (Chart 35). If the share price performance of European companies is to some extent an offset to the depreciation of the euro, then any future decline in the US dollar might have a corresponding, negative impact on European markets. A recent study by the BIS indeed finds that, over the period January 1983 to May 2000, the German market tended to decrease (increase) relative to the US market in months when the Deutschemark/euro rose (fell) against the dollar<sup>9</sup>.

A second possible explanation is that investors' expectations of future corporate earnings in Europe have increased as EU-11 GDP growth has picked up (see Section III). Development of the market for corporate control in Europe – hostile takeovers have recently occurred for the first time in France, Italy and Germany eg TotalFina/Elf, Olivetti/Telecom Italia, and Vodafone/Mannesmann – may have persuaded investors that companies will be better managed and added premia for control to prices. Also there are some reasons for thinking that required returns on capital may have decreased. For example, in Germany, the government is reforming the capital gains tax rules. If such Europe-specific factors lie behind the performance of markets, they may be less vulnerable than otherwise to any correction in the United States.

#### *Structural change in Europe*

European markets will be more closely linked to US markets if the structural changes in the US economy are also occurring in Europe. One sign is that the heterogeneity in performance of sectors that make up the main indices, underlined in the previous Review (p 42), remains a feature of European, as well as US, equity markets (see Chart 36 for the UK). The pattern of structural change is most evident in divergences between implied dividend growth rates<sup>10</sup> for different sectors (Chart 37). Since mid-1998, implied growth rates for telecoms have increased strongly in the UK, and to a lesser extent in the USA (see Chart A in Box 3); the increase for software/computers is large in both countries. So both UK and US markets are discounting strong

<sup>9</sup>: 'The co-movement of the US stock markets and the dollar', *BIS Quarterly Review*, August 2000, pp 31–34. The study finds a statistically significant correlation of –0.25 between returns on the Dow Jones industrial average relative to the DAX 30, and returns on the DM/US\$ exchange rate over monthly periods between January 1983 and May 2000. Daily, weekly and quarterly returns are similarly correlated.

<sup>10</sup>: See Section I, Box 3.

growth in TMT industries; any revisions to these expectations in US markets could also affect European markets. In the UK market, TMT sectors have both the highest implied future returns and the highest daily share price volatility, suggesting greater uncertainty about those returns (Chart 38).

### Market valuations

In the same way as Section I considered the US market, the Dividend Discount Model can be used to decompose increases in European markets into that part explained by changes in actual dividend payments, and a residual associated with revisions to expected future annual dividend growth rates. It is assumed that markets were fairly-valued at the beginning of 1997 and that the implied equity risk premium at that date has remained constant<sup>11</sup>. With the risk-free rate also fixed at 3 per cent, changes in equity prices over this period are consistent with upward revisions to expected future annual dividend growth rates of around 0.4 percentage points in Germany, 0.8 percentage points in the United Kingdom and 1.0 percentage point in France. This compares with an implied upward revision of 0.7 per cent in the United States over the same period (section I). These estimates are only as good as their assumptions and should be treated with care<sup>12</sup>. They do suggest, though, that investor optimism about future growth in European corporate earnings has increased by a similar amount as expectations about US growth. As in the United States, European markets remain vulnerable to news which does not corroborate these higher growth expectations.

One measure of market participants' views of the prospects for future price movements is the implied probability distribution derived from option prices for the FTSE 100 future. Calculated so as to have a constant maturity of three and six months, this presents a similar picture to that at the time of the previous *Review*. The probability assigned to a possible 20 per cent fall in the next six months is about the same as in June, having increased since September 2000 (Chart 39)<sup>13</sup>.

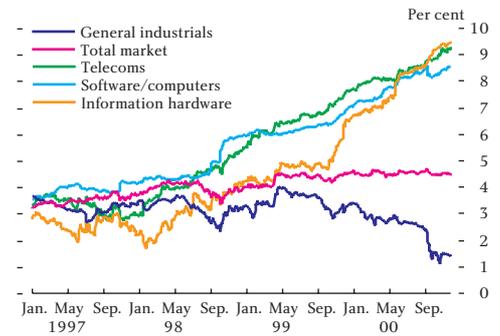
The negative skewness of the probability distribution has also risen recently. These changes in the implied probability distribution suggest that market participants may interpret the fall in the market since September as an indication that further falls are more likely.

<sup>11</sup>: The equity risk premium is likely to change over time but is unobservable directly. This is an important qualification in drawing conclusions about expectations for dividend growth.

<sup>12</sup>: In particular, estimates of risk-free real interest rates derived from index-linked government bond markets suggest that UK rates may have declined and US rates increased over this period. If true, these estimates of revisions to expected future dividend growth rates are too high for the UK and too low for the US markets. But estimates of risk-free real interest rates from index-linked markets may be distorted by liquidity premia and supply/demand influences on yields.

<sup>13</sup>: For a more detailed description of the assumptions behind, and caveats applying to, the calculation of these statistics, and their possible implications, see: Box 3, June *Review*, pp 44-45.

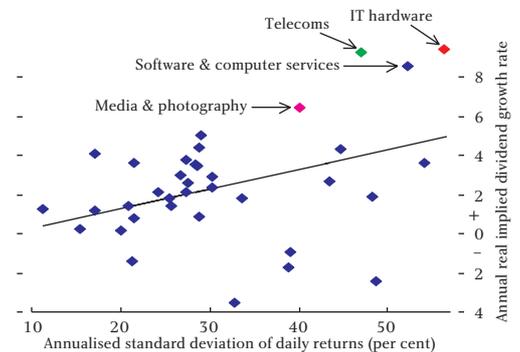
**Chart 37:**  
DDM implied real dividend growth rates for UK Datastream total market index and selected sectors<sup>(a)</sup>



Sources: Thomson Financial Datastream and Bank calculations.

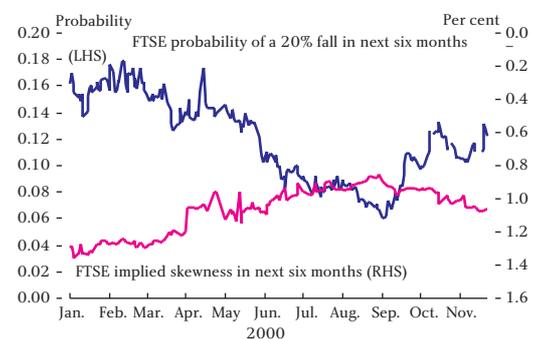
(a) Estimates based on two-year rolling sectoral betas, four per cent risk premium and three per cent fixed real interest rates.

**Chart 38:**  
Datastream UK sectoral indices as on 24/11/00



Sources: Thomson Financial Datastream and Bank calculations.

**Chart 39:**  
Implied risk-neutral probability of a greater than 20 per cent fall<sup>(a)</sup> and implied skewness<sup>(b)</sup> in the FTSE 100 in the next six months



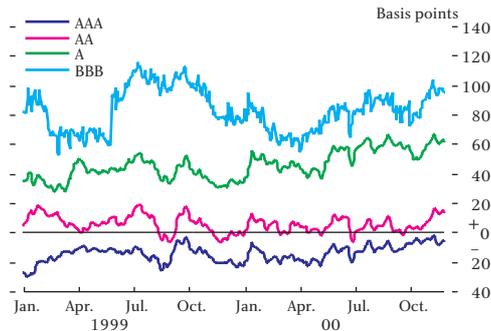
Sources: Bank of England, LIFFE and Chicago Mercantile Exchange.

(a) Calculated as a twenty per cent fall relative to the indices' value on the date the PDFs are derived.

(b) A measure of the balance of risks between large upward and downward movements in prices.

## Selected data on interest rate spreads

**Chart 40:**  
Sterling corporate bond spreads over swap rates<sup>(a)</sup>



Source: Bloomberg.

(a) Ten-year maturity fair market bond yields less ten-year swap rates. Five-day moving average.

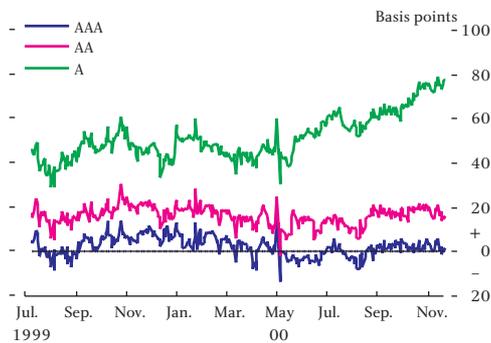
**Chart 43:**  
Spread between on and off-the-run US Treasury bonds<sup>(a)</sup>



Sources: Bloomberg and Merrill Lynch.

(a) Off-the-run minus on-the-run 30-year Treasury bond yields.

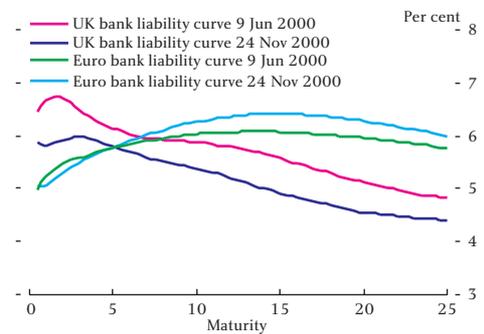
**Chart 41:**  
Euro corporate bond spreads over swap rates<sup>(a)</sup>



Source: Bloomberg.

(a) Ten-year maturity fair market bond yields less ten-year swap rates. Five-day moving average.

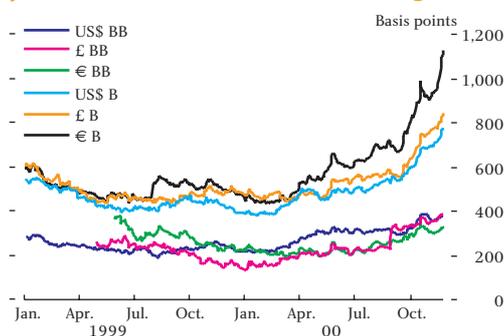
**Chart 44:**  
UK and Euro bank liability curves<sup>(a)</sup>



Source: Bank of England.

(a) Equivalent to interbank rates (eg, London Interbank Offer Rate) at short maturities and the swap yield curve at longer maturities.

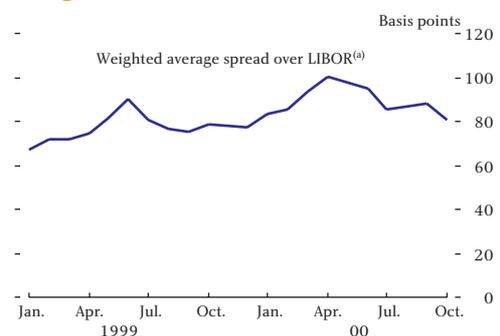
**Chart 42:**  
Sub-investment grade corporate bond spreads: US dollar, euro and sterling<sup>(a)</sup>



Sources: Bloomberg and Merrill Lynch.

(a) High yield indices spread over maturity-matched swap rates.

**Chart 45:**  
International syndicated loan spreads from arrangements



Source: Capital Data.

(a) Weighted by size of loan.

## Credit markets

The autumn decline in European equity markets was, as in the United States, accompanied by rising credit spreads, particularly for sub-investment grade borrowers. This suggests investors in European markets also believe credit risks are increasing. Developments in domestic and international credit markets are increasingly interlinked. For example, borrowers may be in the same sector (eg telecoms) and are often themselves increasingly international; a declining number of banks and securities firms tend to dominate capital market intermediation globally; and increasing cross-border portfolio investment makes markets more integrated, although home country bias remains important.

### *Credit spreads*

As in the domestic US market, a greater tiering of credit spreads between issuers of different ratings has developed in the international euro and sterling bond markets since the *June Review* (Charts 40, 41 and 42). Spreads on issues rated above AA have remained within a stable range; spreads on A-rated issues increased in Q3, more markedly for euro issues; and spreads on sub-investment grade bonds have risen sharply since Q2. B-rated issuers have seen a greater increase than in the US market, although the much smaller number of outstanding issues makes comparisons difficult. The increase in credit spreads has not been accompanied by an increase in the spread between on and off-the-run government bonds (Chart 43). Unlike 1998, therefore, recent developments seem to reflect a reassessment of credit risk rather than a flight to liquidity; and the least creditworthy borrowers are most affected. That would accord with the analysis in the *June Review* suggesting a historically high dispersion of corporate health among UK companies, with some companies both highly-g geared and unprofitable (see Section V).

Widening credit spreads over swap rates have translated into a higher cost of borrowing for all issuers in euro because, unlike the US dollar swap yield curve, the euro curve has moved slightly higher since the *June Review* at maturities beyond five years. The sterling swap curve has, however, fallen at all maturities, so that the absolute cost of borrowing has increased only for sub-investment grade companies (Chart 44).

The average spread charged on new syndicated loans decreased in Q3, having reached a five-year high in Q2 (Chart 45). This might suggest that banks have not identified any general increase in credit risk since the *June Review*, although the particular mix of borrowers in any quarter clearly affects the average spread.

### *Telecoms*

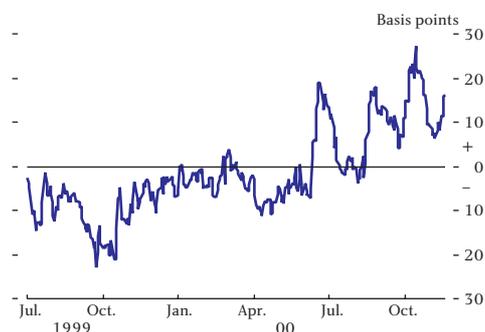
The *June Review* drew attention to the heavy issuance of debt by the telecoms sector, on both sides of the Atlantic, and the

**Chart 46:**  
**US sub-investment grade bond spreads over swap rates**



Sources: Bloomberg and Merrill Lynch.

**Chart 47:**  
**Spread of Deutsche Telekom<sup>(a)</sup> over A-rated euro-denominated bond index**



Source: Bloomberg.

(a) Deutsche Telekom 5.25 per cent 2008 bond less Bloomberg seven-year maturity, A-rated euro-denominated fair market bond index.

**Table 2: Telecom rating downgrades in 2000**

Company	Moody's action	S&P action
Deutsche Telekom	Aa2 to A2	AA- to A-
BT	Aa1 to A2	AA+ to A
France	Aa2 to A1	AA- to A
KPN	Aa2 to A3	AA to A-
AT&T	A1 to A2	AA to A-

Source: Bloomberg

consequent risk of banks accumulating a concentrated sectoral exposure. Box 4 considers the telecoms industry, its current indebtedness and prospective demand for finance.

On balance, risks in this sector appear to have increased since the previous Review. Credit spreads over swaps on US telecom bonds have risen – in the case of sub-investment grade telecoms, by more than for other borrowers of the same credit rating (Chart 46). In the international market, yields on bonds issued by many of the large diversified European telecoms have increased relative to bonds issued by industrials of the same credit rating (Chart 47 gives the example of Deutsche Telekom, downgraded from Aa2/AA- to A2/A- in Q1).

Associated with these changes have been a number of other developments, some positive, some negative:

- a growing awareness of the risk of sectoral concentration among banks and regulators internationally. Contacts suggest that some – but not all – banks have begun to monitor and/or set limits on, their sectoral exposure, if they were not doing so already.
- an announcement of plans by some large telecoms to restructure and/or reduce their indebtedness through asset sales and scaling back of expansion plans.
- lower-than-expected proceeds from recent auctions of 3G licences in Europe, reducing telecoms financing needs. The expected cost of developing 3G networks (so-called 'build out' costs) remains high, however.
- a sharp increase in borrowing by European telecoms in Q3.
- delays in some planned reductions in debt. A number of companies have reportedly delayed IPOs of subsidiaries, in most cases their mobile 'phone operations. Recent equity offerings by KPN, Telefonica Moviles and Telekom Austria seem to have raised less than the companies initially expected.
- a concentration of borrowing in Q3 in the syndicated loan market (Box 4). More than 70 per cent of these facilities are due to mature in 2001, adding to telecoms' financing needs next year.
- a downgrading of a number of companies by the major rating agencies since Q2 (Table 2). Rating agency comments suggest further downgrades will follow unless certain telecoms reduce debt.

## Box 4: Telecom debt

Telecoms are at the heart of the structural changes associated with the new economy:

- new telecommunications technology is making possible an increase in bandwidth for both wired and wireless transmission; and message volumes are growing, in particular of data.
- markets are becoming more competitive, facilitated by new technology and the actions of competition authorities.
- the industry is consolidating through international mergers and acquisitions; and new companies have entered markets.

These changes have created opportunities and the expected earnings growth of the US and UK telecom sectors, as implied by share prices, has increased<sup>1</sup> (Chart A).

But telecoms' business risk has also increased. Building new networks requires a high initial investment. Future customer demand for bandwidth and new products such as mobile data services are, inevitably, uncertain. And competition is increasing, both between providers of similar products (eg duplication of long distance fibre optic networks) and between different modes of delivery (eg wireless, wired, cable and satellite). The use of debt to finance investment adds financial risk to business risk.

The structure of the telecoms industry has also altered. The number of rated companies in Europe and North America increased by more than 50 per cent between 1995 and 1997, with the increase mainly in sub-investment grade US start-ups (Table A). Companies can be divided into three broad categories: equipment suppliers (mainly A rated), new alternative operators (mainly B rated) and incumbent diversified operators (mainly A rated).

### Alternative operators

Companies in this group include alternative network providers ('altnets'), which are building high speed fibre optic networks for long distance or corporate business, and competitive local exchange carriers

**Table A: North America and European telecoms by credit rating and region**

S&P long-term local currency credit rating						
	AA	A	BBB	BB	B	Total
Canada		2	0	1	2	5
EU-11		9	1	0	0	10
UK		3		1	3	7
US	2	8	8	9	30	57

Source: Standard & Poor's

('CLECs'), which are seeking to enter deregulated local markets, mainly in the United States. UK company accounts data shows a group of small, quoted UK telecoms that in 1999 were both in the highest quintile of companies for capital gearing and the lowest for profitability.

Alternative operators are typically loss-making and highly geared, but have high cash holdings. Questions are asked in the market about whether they will have sufficient cash, or access to new financing, to survive until they reach profitability. Some bankers say that they expect a number of alternative operators to fail. B-rated telecoms were able to raise funds in the US bond market until 2000 Q1 but to a lesser degree recently, with most transactions confined to the private placement (so-called 'I44a') market (Chart B). Another source of finance is equipment suppliers ('vendor finance'). Some of these, such as Lucent Technologies, Northern Telecom and Alcatel, securitise receivables. For example, Alcatel's SPV *SVF 1999-A Trust* is authorised to purchase up to \$US1.2 billion. So some of this risk may find its way back to the bond market.

### Incumbent diversified operators

This group includes the large European and US telecoms: BT, Deutsche Telekom, France Telecom, Telefonica, Telecom Italia, Verizon, Worldcom and AT&T. Until 1999, their debt was steady in relation to capital at book value and declining at market value (Chart C). In 2000, however, some have borrowed very heavily, mostly through the syndicated loan market (Charts D and E). Telecoms comprised 20 per cent of total syndicated borrowing in 2000 compared with an average of around 6 per cent for 1995-99. In Q3,

<sup>1</sup>: See Section I, Box 3.

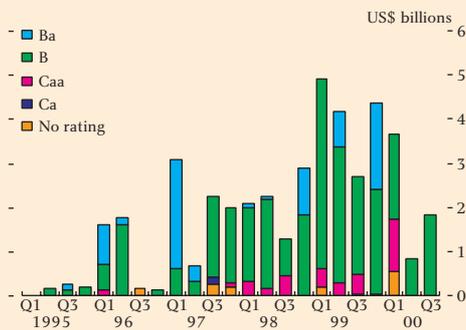
**Chart A:**  
DDM implied real dividend growth rates  
for UK and US Telecom sectors<sup>(a)</sup>



Sources: Thomson Financial Datastream and Bank calculations.

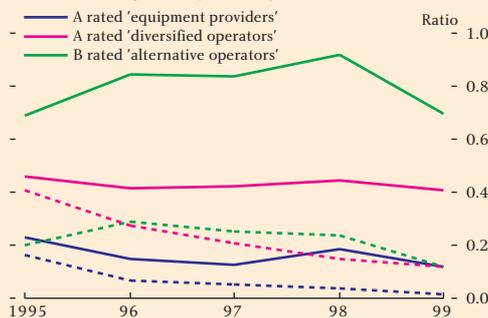
(a) Estimates based on two-year rolling sectoral betas, four per cent risk premium and three per cent fixed real interest rates.

**Chart B:**  
US domestic sub-investment grade telecom  
bonds issuance (convertible,  
non-convertible and 144a bonds)



Source: Securities Data Company.

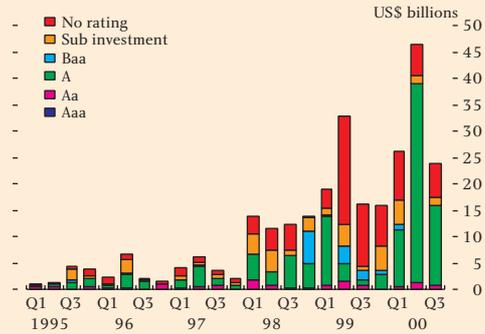
**Chart C:**  
Telecoms capital gearing<sup>(a)</sup>



Sources: Bank of England, Bloomberg and Thomson Financial Datastream.

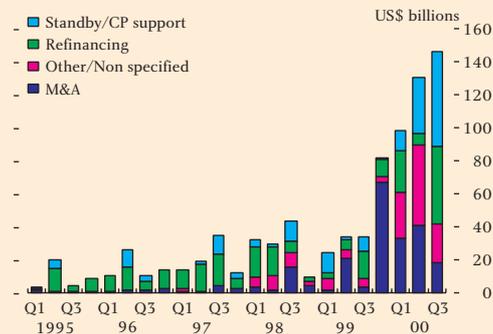
(a) Net debt weighted by capital. Full lines show ratios at book value. Dotted lines show ratios at market value.

**Chart D:**  
Telecom company bond issuance by  
Moody's credit rating



Source: Capital Data.

**Chart E:**  
Syndicated lending to telecom companies  
by use of funds



Source: Capital Data.

**Chart F:**  
Telecom loan redemptions



Source: Capital Data.

especially, a number of large syndicated revolving credit facilities were agreed (Table B).

The increased borrowing has financed mergers and acquisitions, purchases of 3G licences in Europe and capital expenditure (Chart E). 3G licence costs currently amount to around €105 billion and the cost of building 3G networks is estimated to be about the same. Telecoms appear to have used the syndicated loan market partly because of the uncertain cost of licences and the need for committed finance to participate in some auctions; and partly as a bridge in the expectation that capital market conditions will improve.

Based on their recent borrowing, the capital gearing of a number of European telecoms could increase substantially unless they take action to reduce debt. Around US\$250 billion of telecom loans fall due in 2001 (Chart F). The question is how this debt will be refinanced. Broadly, companies have three options:

- **Equity markets:** for example, issuing additional shares, whole or partial IPOs of subsidiaries such as mobile 'phone operations, or trade sales. This would reduce debt and is the preferred strategy for a number of telecoms.
- **Bond markets.** This might extend the maturity of debt but would not reduce it. With gearing remaining high, rating agencies might downgrade companies from A to BBB, which would increase their financing costs. Companies may issue debt that is convertible into equity or has a preferential claim on certain future cashflows in order to reduce these costs ('structured finance'). Under investor pressure, some telecoms have included automatic interest rate step-ups if ratings fall. This gives investors some protection against deteriorating credit quality but further increases the cost to telecoms of a downgrade. Bonds are often swapped and it is said that some interest rate swap agreements include similar provisions requiring companies to collateralise a higher proportion of any exposure on the swap if they are downgraded.

**Table B: Revolving credits to European telecoms in Q3 2000**

	Borrower	Maturity	Amount (billion)		
23 August	BT	1 year	£16.5		
2 October	Deutsche Telekom	1 year	€5		
		3 years	€2		
		5 years	€2		
		7 years	€2		
		31 July	France Telecom	1 year	€20
		3 years	€10		
30 October	KPN	1 year	€3		
		3 years	€2		
2 October	One-2-One <sup>(a)</sup>	1 year	£0.75		
		5 years	£1.75		
		7 years	£1		
25 September	Telefonica	1 year	€6		
		3 years	€4		
22 September	Vodafone	1 year	US\$14.5		

Source: Capital Data.

(a) a subsidiary of Deutsche Telekom.

- **Rolling over of loans.** Telecoms and bankers will try to avoid this option as far as possible. But the scale of the maturing debt makes it likely that some will need to be extended unless capital market conditions in 2001 are favourable.

Bank lenders may be in a stronger position than bondholders if they have covenants or collateral (although some bankers have questioned the value of some telecom assets). Loans to operating companies may also be higher quality than loans to holding companies if they give a prior claim on more valuable assets, especially as telecoms make whole or partial sales of profitable subsidiaries. Banks generally should be reviewing their credit pricing and underwriting standards; and be in a position to monitor their sectoral exposure. Regulators internationally should be giving particular attention to any banks with clustering of large exposures to companies in this sector<sup>2</sup>.

<sup>2</sup>: See the press release issued by the UK Financial Services Authority on 7 December 2000.

- effective closure of the international and US domestic high yield bond markets to most sub-investment grade telecoms, with new issuance falling in Q2 and Q3. This is desirable to the extent that it reflects more rigorous scrutiny of business plans. But it limits the options for companies seeking to refinance existing debt.

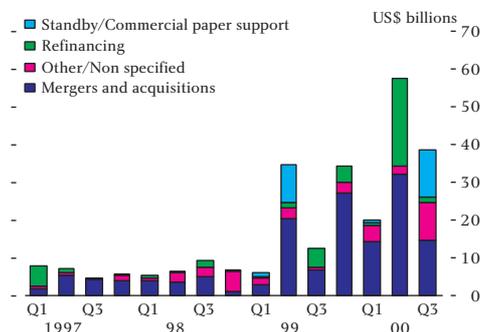
Looking forward, failures amongst some ‘alternative operators’ cannot be ruled out if they continue to have negative cashflow and find themselves unable to refinance. The large diversified operators have remained profitable and have valuable assets. But there is a risk that refinancing of their debt could potentially lead to some instability in credit markets next year, especially if debt reduction plans were to be further delayed. It is unclear whether the appetite of banks and investment funds for further telecom debt will have been affected by recent developments. Many bond funds already have large holdings. Even if banks are not constrained by sector limits, internal capital allocation models will require them to hold more capital if companies experience further rating downgrades<sup>14</sup>. The issue of sectoral risk concentration for banks and investment firms seems likely to remain for some time.

#### Bridge finance

Investment banking revenues from telecom issuers have been very high in recent years. For these and other companies, commercial banks have entered the IPO and bond underwriting markets in competition with securities dealers, offering bridge facilities to meet financing needs until a bond issue or IPO could be arranged. Securities dealers have responded by offering bridge facilities themselves. This practice is long standing in the sub-investment grade sector but has spread to the investment grade sector. One issue is whether banks might be underpricing these facilities in anticipation of high fees when equity or bond transactions are completed. If market conditions change, banks might be left with exposures for longer than anticipated, although the inclusion of pricing step-ups if loans are rolled over provides some compensation for this risk. Anecdote suggests that some large bridge loans do remain outstanding.

Market contacts say that banks have begun to syndicate bridge finance to a greater extent (corroborated by the increase in standby bridge finance shown in Chart 48). However, it also moves risk to smaller banks, which might be less able to assess and manage it. For example, it is said that a large number of banks in the London market – including, from continental Europe, Japan, Canada and emerging markets – participated in the large revolving and bridging facilities to European telecoms companies this year.

**Chart 48:**  
Bridge facility arrangements by use of funds



Source: Capital Data.

<sup>14</sup>: For example, a downgrade from AA to A would increase capital requirements from 1.6 per cent to 8 per cent under the standardised approach set out in the proposed changes to the Basel Accord published by the Basel Committee on Banking Supervision in June 1999.

### New issuance

The main exit routes for banks providing bridge finance are the IPO and bond markets. Outside the telecom sector, the increase in credit spreads does not appear to have reduced access to the international bond market. New international bond issuance by investment grade borrowers remained at a high level in Q2 and Q3 (Chart 49). Although issuance of sub-investment grade bonds was lower in Q2 and Q3 than in Q1, this market also remains open for certain types of borrower (eg industrials) and new issues continued in Q3.

### Commercial paper and back-up lines

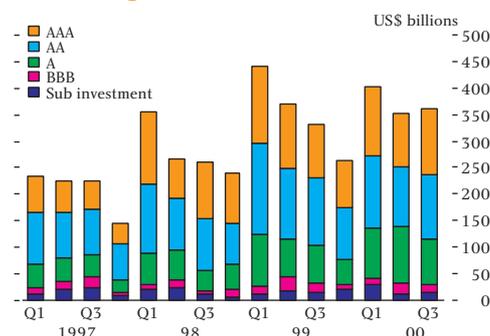
The June Review described how the back-up lines provided to commercial paper programmes are a form of liquidity insurance provided by banks and some investment banks, which can be drawn down either when the particular issuer is experiencing market access difficulties or in case of widespread market stress<sup>15</sup>. Chart 50 shows the growth in outstanding syndicated commercial paper back-up lines. This gives a sense of the scale of this liquidity insurance, although it is probably only the tip of the iceberg as most lines are not syndicated. Contacts suggest that such lines are often still under-priced and are disproportionately structured with a maturity of 364 days in order to attract a zero capital requirement – a serious weakness in the 1988 Basel Accord. The Basel Committee on Banking Supervision's proposal to apply a weighting of 20 per cent as part of the revisions to the Accord is welcome.

## Credit derivatives

The impact of any deterioration in credit quality depends partly on the distribution of credit exposures. Mechanisms for transferring credit risk have existed for many years: for example, secondary markets in bonds, guarantees, sub-participation of loans and, more recently, loan trading and securitisation of loan portfolios. US investment funds have used these methods to take on loan exposures and anecdote suggests some European funds are beginning to do likewise.

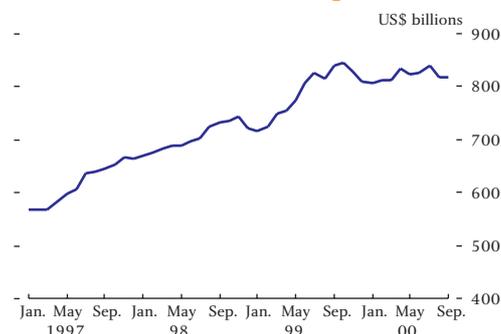
Credit derivatives are an alternative means of unbundling credit risk from the other elements of a bond or loan. Based on a survey of its members, the British Bankers Association recently estimated the size of the global credit derivatives market (excluding asset swaps) at nearly US\$600 billion (notional principal outstanding) and expects it to grow to around US\$1.6 trillion by 2002 – a nine-fold increase from 1997<sup>16</sup>. The biggest instruments by notional value outstanding are credit default swaps on individual entities and portfolio swaps/credit-linked obligations (CLOs), which typically unbundle

**Chart 49:**  
International bond issuance by Moody's credit rating



Source: Capital Data.

**Chart 50:**  
International syndicated lending for standby/commercial paper back-up facilities – stocks outstanding



Source: Capital Data.

<sup>15</sup>: See the article by Ian Michael, Alison Emblow and Graeme Chaplin in this Review.

<sup>16</sup>: BBA Credit Derivatives Report 1999/2000, BBA July 2000

credit risk on a portfolio of loans into junior (first loss), mezzanine and senior tranches. Bulge bracket investment banks are said to be the main intermediaries and also take proprietary positions. Large banks are the biggest buyers of protection. Smaller banks are often sellers as a way of diversifying their credit portfolios.

**Table 3: Credit derivatives: market participants in 2000**

	Sellers of Protection	Buyers of Protection
Banks	47%	63%
Securities Houses	16%	18%
Insurance companies	23%	7%
Others	14%	12%

Source: BBA survey 1999/2000

Other than banks, insurance companies are the biggest seller of credit protection according to the BBA survey, increasing their market share since 1997 (Table 3). In many countries, including the United Kingdom, legislation or regulation prevents insurance companies writing credit derivatives. But insurers can take on risk by reinsuring vehicles (so-called ‘transformers’) in offshore centres such as Bermuda, which are authorised to write derivatives. Some transformers are owned by insurance companies and some by investment banks. Mainstream insurance companies are said typically to buy investment grade exposures, such as the super-senior tranches of CLOs. ‘Transformers’, though, are among the buyers of higher risk junior tranches.

The increasing involvement of insurance companies is desirable to the extent that it diversifies exposures to credit risk and deepens the credit transfer market. However, it is unclear whether insurance companies are pricing the credit risk (for expected loss) as efficiently as capital markets. Moreover, if capital charges (for unexpected loss) are based on premium income received rather than exposure, this might potentially give rise to an undesirable combination of under-priced risk and insufficient capital.

The involvement of insurance companies raises other issues for banks. One is that insurance contracts – unlike financial guarantees – are not a commitment to timely payment. Delays in settling insurance claims could be a potential source of liquidity risk. Standard definitions developed by ISDA in 1999 have reduced legal uncertainty about, in particular, the exact definition of a credit event<sup>17</sup>. But areas of doubt are thought to remain: for example to which entity does a contract relate following a corporate demerger?

Another issue is lack of transparency, which could potentially give rise to concentration and counterparty risks. Many transactions are privately placed and supported by financially interdependent, and sometimes opaque, reinsurance contracts, leaving uncertainty about the ultimate location of credit risk within the financial system.

Even where transactions remain within the banking system, credit derivatives have the potential to reallocate credit risk exposure in unpredictable ways; and total gross credit derivatives

<sup>17</sup>: See November 1999 *Review* p 90

exposure related to a particular bond can exceed the size of the issue. Trading in credit derivatives related to some emerging market bond issues (eg by Argentina) has been particularly active recently. Many of these contracts have a generalised trigger, so that a default on any of the relevant entity's bonds would trigger all derivatives contracts.

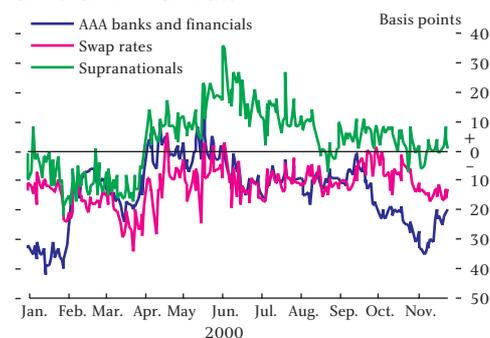
## Fixed Income markets

### US Federal Agencies

The agencies have continued to grow. For example, Freddie Mac has implemented a €20 billion annual debt programme in Europe, to be issued in quarterly instalments of €5 billion. The first issue made in September is trading at a small positive spread to European Investment Bank bonds. Turnover in the first Freddie Mac instalment is already said to be greater than some euro-area government paper. More generally, the agencies market continues to be highly liquid, both because of continued high issuance and increasing turnover. Daily turnover rose from US\$55 billion in H1 1999 to US\$72 billion in H1 2000. This could suggest that market participants are making more use of agency bonds for trading strategies which were once executed with US Treasury bonds. Agency spreads relative to bonds issued by supranationals have now reverted to close to their levels prior to US Treasury Under-Secretary Gensler's testimony to Congress on 22 March (Chart 51).

After discussions initiated by Congressman Baker, Chairman of the House of Representatives Subcommittee on Capital Markets, Securities and Government Sponsored Enterprises, the agencies on 19 October agreed new arrangements, under which they will augment their capital base and expand their periodic public disclosures. They agreed to issue publicly-traded, externally-rated subordinated debt; to maintain more than three months' worth of liquidity assuming no access to debt markets; to implement an interim risk-based capital stress test; to disclose results of interest-rate risk sensitivity analyses; and to obtain and disclose a rating from a rating organisation. The sum of core capital and outstanding subordinated debt for each of the agencies will equal or exceed four per cent of on-balance-sheet assets following a three year phasing-in period. The agencies' share prices increased on news of the agreement (Chart 52). The US Treasury commented that, "The measures announced today by Fannie Mae and Freddie Mac, if fully implemented, are useful ones that have the potential to promote market discipline and increase transparency. Of course, there remains a range of issues with respect to the agencies that warrant continuing attention from financial authorities, the Congress and their regulators"<sup>18</sup>. The Bank continues to follow the debate with interest given the scale of the agencies' involvement in capital markets.

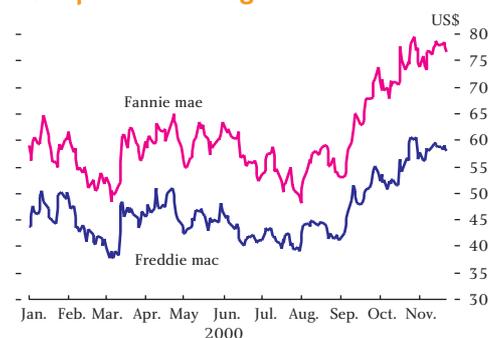
**Chart 51:**  
Spread of US Agency securities to supranationals, swaps and AAA-rated banks and financials<sup>(a)</sup>



Source: Bloomberg.

(a) Except for swap rates, all curves are fair market curves of ten-year maturity.

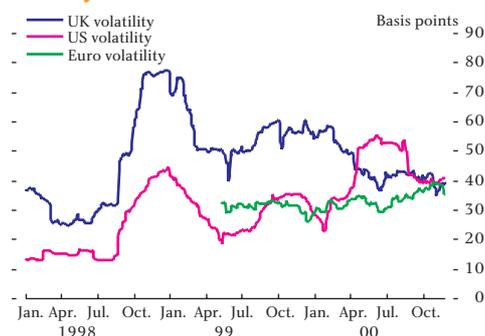
**Chart 52:**  
Share prices of US agencies in 2000



Source: Bloomberg.

<sup>18</sup>: Statement by Treasury Assistant Secretary Smith, available at: [www.ustreas.gov/press/releases/ps963.htm](http://www.ustreas.gov/press/releases/ps963.htm).

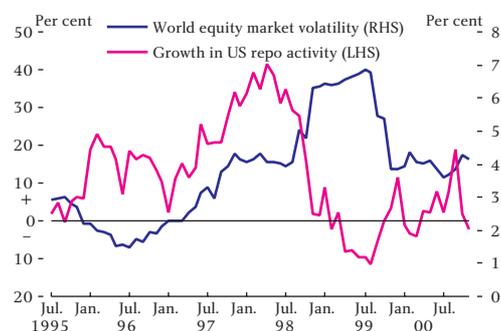
**Chart 53:**  
**US dollar, sterling and euro swap spread volatility<sup>(a)</sup>**



Sources: Bloomberg and Bank calculations.

(a) Volatility calculated as 91-day annualised standard deviation of daily swap spread changes.

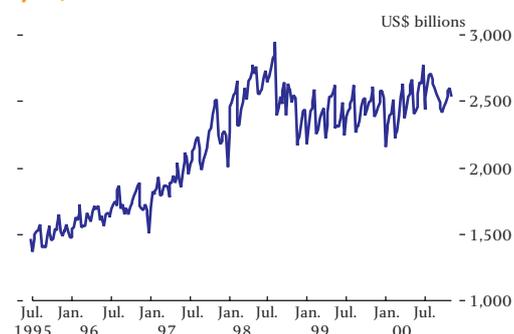
**Chart 54:**  
**Leverage and volatility in world financial markets**



Sources: Bloomberg and Federal Reserve Bank of New York.

(a) World equity market volatility defined as twelve-month rolling standard deviation of returns on FTSE World Equity Index. US repo activity defined as annual growth in the sum of dealer repos and reverse repos in US Treasuries, agency debt and mortgage backed securities.

**Chart 55:**  
**Financing by primary US government securities dealers (repos plus reverse repos)**



Source: Federal Reserve Bank of New York.

### Volatility in government bond markets

The June Review examined the effect of the reduced supply of US and UK government bonds on credit spreads and volatility in bond markets, and the potential implications for risk management. Volatility in US dollar and sterling swap spreads has declined a little since then, but remains at high levels (Chart 53). Volatility in the spread between five and 30 year government bonds has been lower in the UK market in 2000 than in H2 1999; in the US market it has been variable in 2000, spiking upwards in February when the yield curve inverted and in September when it disinverted<sup>19</sup>.

### Leverage and hedge funds

Greater asset price volatility may have prompted the reduction in leverage in the financial system since the LTCM and Asian crises in 1998. One of the main ways to obtain leverage is through sale and repurchase (repo) of securities. Chart 54 shows a broad inverse correlation between rates of growth in the US bond repo market and volatility in world equity markets. Growth in the US repo market has stalled since 1998; and growth in lending by UK banks through reverse repo to non-residents has followed a similar pattern (Charts 55 and 56). As most hedge funds are off-shore, the latter might suggest that they are less leveraged. Another indirect indicator of hedge fund leverage is the stock of cross-border lending by BIS-area banks to the Cayman Islands – one of the most significant legal domiciles for hedge funds. This continues to grow strongly (Chart 56). One possible reason is that lending to the Caymans also includes exposures to special purpose vehicles (SPVs) and use of such SPVs is said to have been increasing rapidly. International bodies should perhaps consider whether lending to SPVs needs to be shown separately, by country, in the BIS banking statistics.

The net value of hedge fund assets has increased since the June Review (Chart 57). Investors have continued to move from macro and directional funds to equity/convertible arbitrage and market-neutral strategies. Also, the number of funds is increasing. Several investment managers and investment banks have set up funds themselves. In some cases, there are questions, which may warrant review by regulators, about the extent to which these (regulated) institutions stand behind – or are presumed by market participants to stand behind – the funds.

In contrast to earlier periods, all hedge fund closures this year, including Tiger in Q2 and, since the previous Review, Dennis Trading Group and Vinik Asset Management, have proceeded without unduly influencing market dynamics or posing any threat to financial stability. This appears to corroborate market comment that hedge funds are leveraged to a lesser extent than before the LTCM crisis.

<sup>19</sup>: See Bank of England Quarterly Bulletin, November 2000, p 323, chart 6.

There have been suggestions that some larger funds have been trying to negotiate better terms with their prime brokers. Some already had zero initial margin requirements. They have now sought to add longer grace periods should they fail to meet a margin call ('close-out extensions'). Bankers need to be careful when considering granting such concessions: close-out extensions, in particular, could have the effect of turning secured into unsecured credit at just the point when the creditworthiness of the counterparty is called into question.

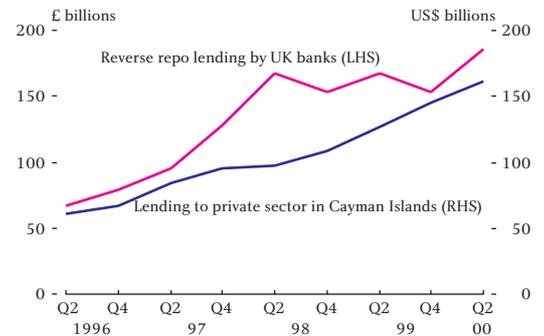
## Investment banking

Most of the issues raised in Sections I and II of this *Review* affect the bulge bracket investment banks, given their dominant position in international capital markets. Further consolidation since the June *Review* (eg Credit Suisse First Boston acquired Donaldson, Lufkin and Jenrette and, among commercial banks, Chase Manhattan and J P Morgan agreed to merge) has potentially increased market concentration.

The June *Review* observed that investment bank earnings could fall in the event of reduced primary and secondary market activity, in particular by TMT companies. Underwriting income of US securities firms was, in fact, 37 per cent lower in Q2 than Q1<sup>20</sup>. Share prices of US securities firms fell in Q3 in response to declining capital markets activity and market concerns about turbulence in the high yield sector (Chart 58). However, the US investment bank/brokerage sub-index has still increased by around 30 per cent since the beginning of the year. Yield spreads on bonds issued by leading US investment banks over other corporates of the same credit rating increased in H1 but have declined since the previous *Review*, suggesting little change in perceived relative credit risk.

**Chart 56:**

**Lending to the non-bank private sector in the Cayman Islands<sup>(a)</sup> and reverse repo lending to non-residents by UK banks**

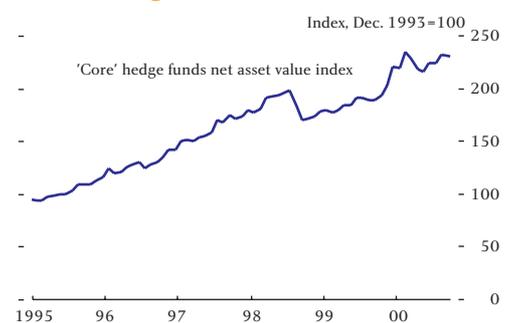


Sources: Bank of England and BIS.

(a) Cross-border lending by BIS reporting banks. Total lending to the Cayman Islands during H1 was US\$231 billion. Adjusting for risk transfer to the country of ultimate risk, lending to the Cayman Islands was US\$186 billion. Adjustments for risk transfer are not available for individual economic sectors.

**Chart 57:**

**Index of hedge fund net asset value<sup>(a)</sup>**



Source: CSFB/Tremont.

(a) Funds reporting to the CSFB/Tremont index.

**Chart 58:**

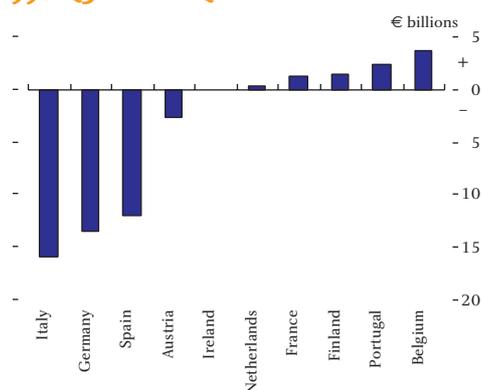
**US investment bank/brokerage sub index**



Source: Bloomberg.

<sup>20</sup> Source: Securities Industry Association.

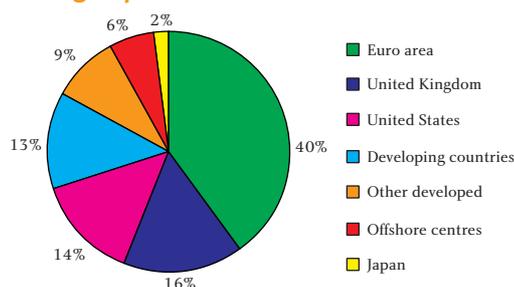
**Chart 59:**  
Turn around in euro-area trade balances,  
1998 Q3 – 2000 Q2<sup>(a)(b)(c)</sup>



Source: Thomson Financial Datastream.

- (a) Calculated as balance for 1999 Q3 – 2000 Q2 minus balance for 1998 Q3 – 1999 Q2.
- (b) Balance for Ireland estimated for 2000 Q2.
- (c) Data for Luxembourg not available.

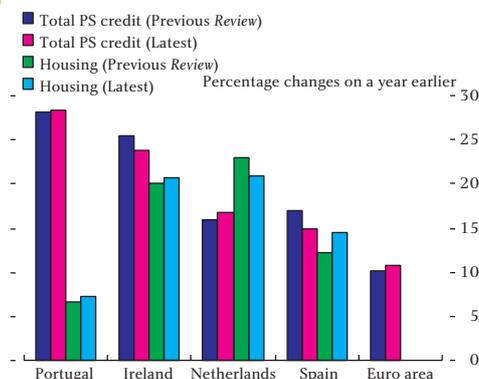
**Chart 60:**  
Consolidated euro-area cross-border  
banking exposure<sup>(a)(b)</sup>



Source: BIS.

- (a) Exposure is locational, not risk-transfer adjusted.
- (b) Euro-area data include exposures to Luxembourg but not Luxembourg's exposures to other countries.

**Chart 61:**  
Private sector credit growth and house  
price inflation<sup>(a)</sup>



Sources: National central banks, European Central Bank, statistical agencies and Irish Permanent.

- (a) Euro-area data not available for housing prices.

## III Other major industrial economies

### The euro area

Many of the risks to financial stability in the euro area stem from the broader international environment and markets discussed in Sections I, II and IV. This Section focuses on more local developments and issues.

Data released since the June *Review* show that euro-area GDP growth remained strong in the year to Q2, at 3.7 per cent. Slower Q3 growth in Germany, France and Italy, perhaps partly caused by higher oil prices, and a range of indicators point now to a moderate slowdown. In November, the mean forecasts<sup>21</sup> for 2000 and 2001 (3.3 per cent and 3.1 per cent, respectively) were unchanged from June, suggesting that the overall pace of growth was broadly as expected at the time of the previous *Review*. Meanwhile, rising oil prices together with a weaker euro pushed up year-on-year headline inflation to 2.7 per cent in October, from 2.4 per cent in June and 1.9 per cent in January. Official interest rates have risen from 4.25 per cent on 9 June to 4.75 per cent currently, broadly in line with expectations in June. Market expectations are for rates to remain at about their current levels. Year-on-year private sector credit growth at the euro-area level remained high at 10.8 per cent in October (compared with 11.4 per cent in April).

The current account recorded a deficit of 0.4 per cent of GDP in Q2, broadly unchanged on two quarters previously. It has moved from surplus to deficit since 1998, despite the depreciation of the euro, largely because of increases in the extra-euro-area trade deficits of Italy, Germany and Spain (Chart 59). That reflects the reduced saving by the private sector. Accumulation of US financial assets may be slowing, but banking exposure to the United States remains significant (Chart 60).

### Economic divergences

The economic performance of members of the euro-area continues to diverge significantly. Private sector credit growth and house price inflation in some countries remain a concern (Chart 61). With a single euro-area monetary policy unable to address country-specific problems, the emphasis is on fiscal restraint and structural reform.

In Portugal, private sector credit growth, at around 28 per cent in the year to September, was much higher than the euro-area average, although the gradual deceleration in mortgage credit, already evident in June, appears to be continuing.

In Ireland, domestic credit grew by about 24 per cent in the year to September, slightly less than growth rates in the first

<sup>21</sup> As calculated by Consensus Economics.

two quarters of the year. The Central Bank of Ireland has described the impact of rapid credit growth on housing demand as a 'cause for concern'. House prices in the year to September rose about 21 per cent (broadly the same rate as over the previous six months). Annual inflation (on the Harmonised Index of Consumer Prices) was 6.0 per cent in October (compared with 5.0 per cent in March), still the highest in the euro area.

In the Netherlands, private sector credit growth picked up again to around 17 per cent in the year to September. House prices rose by about 20 per cent in the year to Q3, a rate similar to those in Q1 and Q2. In real terms they are now higher than at their previous peak in the late 1970s. Recent data indicate, however, that house sales are declining, perhaps suggesting that house price inflation will moderate. The Dutch central bank has warned that a fall in house prices could have 'relatively major macro-economic consequences'.

Banks in the euro area face a risk of losses in the event of a sharp correction in house prices in some of the faster-growing economies. If such a correction were to occur, it would be likely to reduce household wealth, demand and employment, and so might impair households' capacity to service their mortgages.

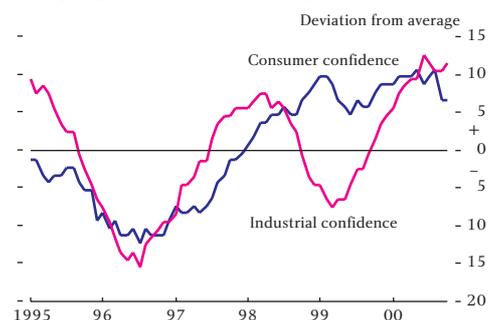
#### Corporate and household sectors

The exposures of banks and other monetary and financial institutions to the non-financial private sector increased by just under 5 per cent in the six months to September. Although business confidence in the euro area dipped in July and August, the overall level is still higher than in June. On the other hand, household expectations of financial health over the next twelve months have deteriorated, as reflected in a fall in the overall consumer confidence index relative to June (Chart 62). There is little sign of the private sector as a whole trying to strengthen its balance sheet; the private-sector saving ratio may have turned negative (Chart 63). That could change if the economic outlook were to deteriorate. Another factor which might at some stage change saving behaviour is any concern about the funding of future pension liabilities within the euro-area.

#### Banking sector

Interim results (Q3 or H1) for most of the larger banks indicated continued strong earnings per share. A weighted index of share prices of the major banks in each of the five largest euro-area economies shows that prices have risen by between 2 per cent (in Germany) and 19 per cent (in the Netherlands) since the June Review. Surveys of earnings expectations tell a similar story. Share prices of major European banks involved with telecoms financing fell in September and October, but most have since recovered, at least partially, relative to June.

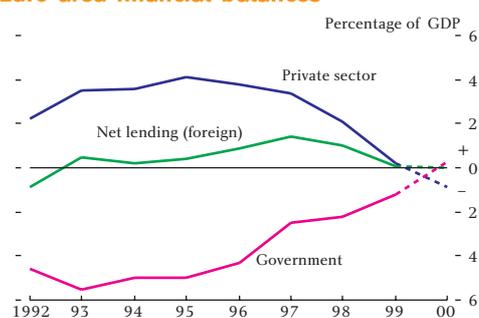
**Chart 62:**  
Euro-area confidence indicators<sup>(a)</sup>



Sources: European Commission and Thomson Financial Datastream.

(a) Expressed as deviation from average during 1995–2000.

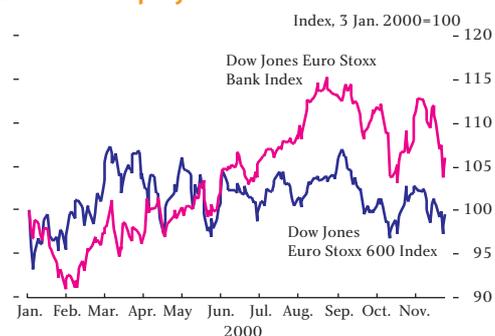
**Chart 63:**  
Euro-area financial balances<sup>(a)</sup>



Sources: European Central Bank Monthly Bulletin, OECD Economic Outlook and Bank calculations.

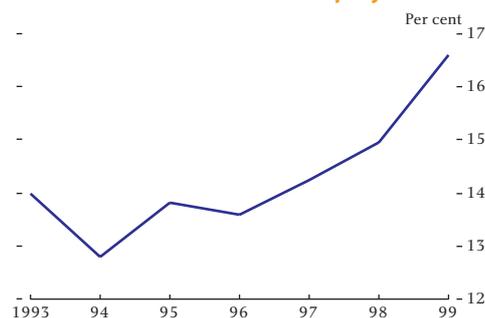
(a) 1992–1999 data are from November 2000 issue of the European Central Bank Monthly Bulletin. Data for 2000 (shown by dashed lines) are derived from the preliminary November 2000 edition of the OECD Economic Outlook.

**Chart 64:**  
Euro-area equity market indices



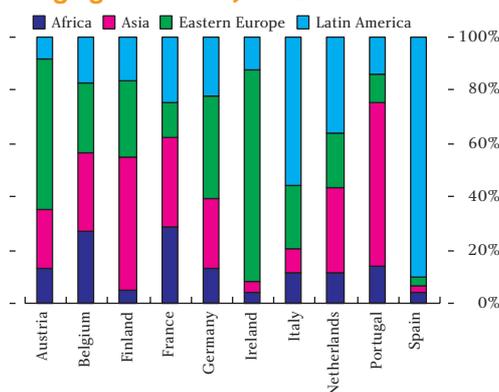
Source: Bloomberg.

**Chart 65:**  
Euro-area banks' return on equity



Source: Bureau van Dijk Bankscope.

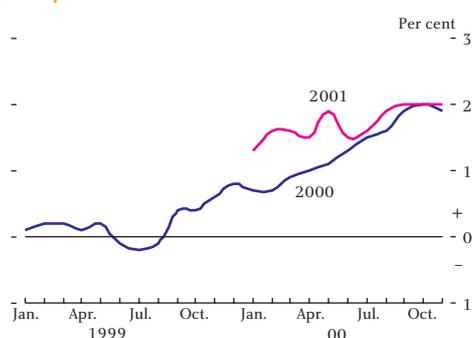
**Chart 66:**  
Consolidated euro-area bank exposure to emerging markets - June 2000<sup>(a)(b)</sup>



Source: BIS.

- (a) Exposure is locational, not risk-transfer adjusted.
- (b) Percentage of total emerging market exposure.

**Chart 67:**  
Japanese consensus growth rates for 2000/2001<sup>(a)</sup>



Source: Consensus Economics.

- (a) Mean of forecasts compiled by Consensus Economics.

Expected profits in the banking sector have held up well relative to the corporate sector as a whole, reflected in the faster growth of the banking sub-index within the Euro Stoxx 600 index (Chart 64). The average rate of return on equity for euro-area banks has been increasing since 1994 (Chart 65).

Euro-area banks increased their cross-border loan exposure during the first six months of 2000<sup>22</sup>. Exposure is greatest to the United States and United Kingdom among OECD countries, while among emerging markets it is greatest in Latin America (but typically denominated in US dollars). Although the Spanish banking sector is ranked third amongst euro-area countries in terms of exposure to emerging markets as a whole, it is the most exposed to Latin America (Chart 66). The banks Banco Santander Central Hispano and Banco Bilbao Vizcaya Argentaria in particular have become significant lenders to and investors in the region in recent years, making large-scale acquisitions of Latin American banks, estimated now to account for over 30 per cent of their total assets. Following their most recent acquisitions, both banks have had a negative reaction from credit rating agencies, but their market capitalisation relative to total assets remains the highest among the major euro-area banks.

## Japan

Japan's pace of economic recovery has slowed. Latest data, calculated according to the new system of national accounts (SNA93), show that real GDP increased just 0.2 per cent in 2000 Q3 (on the preceding quarter), after 0.2 per cent growth in Q2 (revised down from 1.0 per cent) and 2.4 per cent growth in Q1. Before the data were released, the consensus forecast of growth in 2000 had increased since the June Review from 1.1 per cent to 1.9 per cent (Chart 67). While private investment grew strongly in Q3, consumer spending was unchanged in real terms and consumer prices continued to decline. Since the June Review, consensus forecasts for CPI inflation have been revised down to a negative 0.6 per cent in 2000 and a negative 0.1 per cent in 2001.

Against the apparent background of renewed growth earlier in the year, the Bank of Japan (BoJ) concluded that it would be sensible to end its zero nominal interest rate policy on 11 August, raising its target for the overnight call rate to 25 basis points (Chart 68). The move was clearly signalled and did not trigger the sell-off in the bond market which some had feared. The move provided a timely reminder to financial institutions of the need to manage interest rate and duration risk.

According to the BoJ's flow of funds data, the public sector financial deficit (excluding financial institutions in the public sector, such as the post office) increased from 6.1 per cent of GDP in the fiscal year to March 1999 to 8 per cent of GDP in the

<sup>22</sup> Based on the consolidated international claims of BIS reporting banks.

year to March 2000 (Chart 69). That was smaller than expected at the time of the June *Review*, because revenues were stronger and public works expenditure was lower than forecast. General government net debt (excluding those assets set aside for future social security fund expenditure) nevertheless increased from 80 per cent of GDP in March 1999 to 87 per cent of GDP in March 2000 (see Box 1, p 26, in the June *Review*). In September, Moody's downgraded Japan's sovereign credit rating from Aa1 to Aa2, citing the high level of government debt. This had relatively little impact on the bond market, partly because Standard and Poor's reaffirmed its view that the AAA sovereign rating had yet to be materially affected by the growth in government debt. The continued increase in Japanese banks' holdings of Japanese government bonds (JGBs) since the previous *Review* might be a concern (Chart 70), although the major banks are thought to have reduced the duration of their JGB holdings and hence their exposure to increases in yields. Foreigners owned only around 6 per cent of outstanding JGBs as at end-June 2000. But – against the background of JGBs accounting for an increased share of global bond indices – there is said to be increased international involvement in Japan's fixed income swaps and derivatives markets, implying an increased (if small) risk that any sharp JGB market shock could have a material impact on global markets. That might usefully be addressed in firms' and regulators' stress tests and scenario analyses.

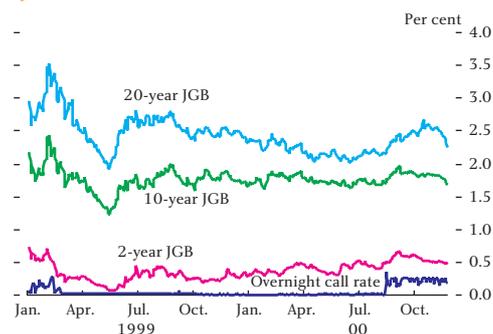
#### Corporate sector

Japan's corporate bankruptcies have risen (Chart 71), reflecting mainly the fading impact of the small- and medium-sized enterprise loan guarantee scheme, which temporarily depressed bankruptcies in late 1998 and early 1999. The rise may also reflect the impact of the new Chapter-11 style corporate bankruptcy law, introduced in April, as well as the restructuring of the banking sector. Japan's corporate sector ran a large financial surplus in the fiscal year to March 2000 (albeit smaller than estimated at the time of the June *Review*), because of cyclical improvements in cash flow. Firms used this to repay ¥10 trillion in loans, reducing their capital gearing (as measured by the debt-to-financial asset ratio) to 78 per cent in March 2000 from 88 per cent a year earlier. Nevertheless several sectors – notably construction, real estate and retailing – still have uncomfortably high levels of debt, and remain particularly exposed to continuing deflation in both land prices and retail prices.

#### Banking sector

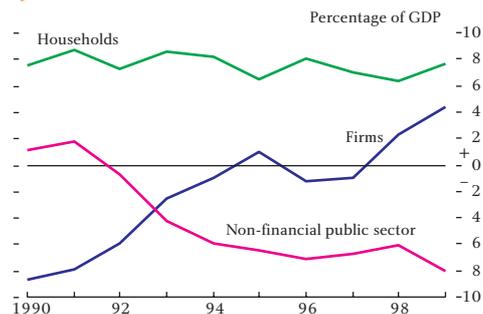
Japanese banks' reported capital adequacy ratios are shown in Chart 72. Most analysts agree that the establishment in July of a strengthened Financial Services Agency, combining the previous Financial Supervisory Agency with the Ministry of Finance's Financial System Planning Bureau, has the potential to improve the oversight of Japan's banking system. There is also broad

**Chart 68:**  
Japanese interest rates



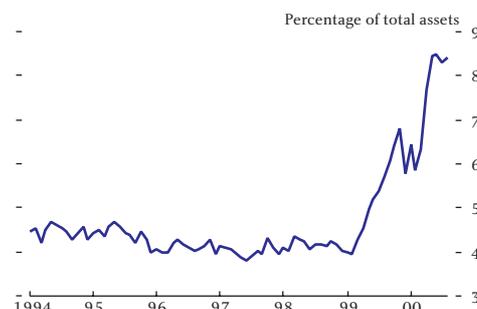
Source: Bloomberg.

**Chart 69:**  
Japanese financial balances



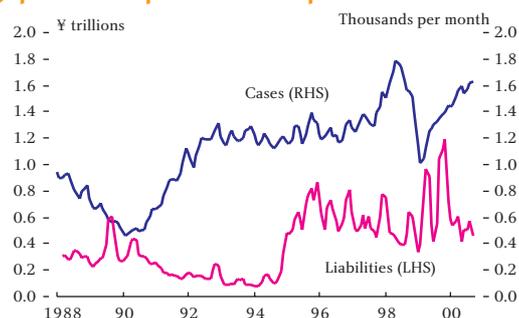
Sources: Bank of Japan and Japanese Economic Planning Agency.

**Chart 70:**  
Japanese banks' holdings of government bonds



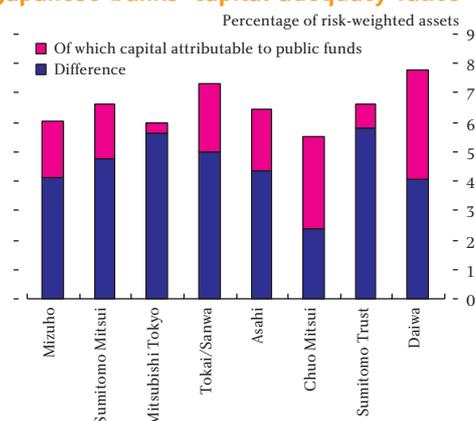
Source: Bank of Japan.

**Chart 71:**  
**Japanese corporate bankruptcies<sup>(a)</sup>**



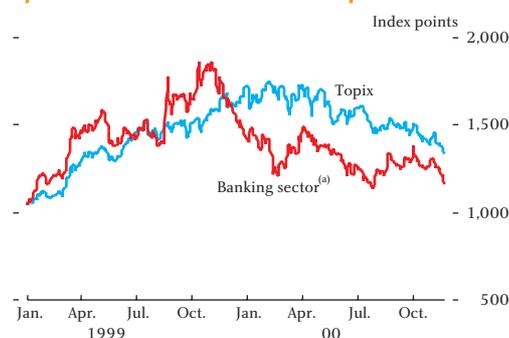
Sources: Thomson Financial Datastream and Bloomberg.  
(a) Three-month moving average.

**Chart 72:**  
**Japanese banks' capital adequacy ratios<sup>(a)</sup>**



Source: Fitch-IBCA.  
(a) As at end-March 2000.

**Chart 73:**  
**Topix index and banks' share price index**



Source: Bloomberg.  
(a) Rebased to equal Topix on 1 January 1999.

consensus among bank analysts and other observers that the regulatory and supervisory changes of the past few years have improved Japanese banks' recognition, disclosure and disposal of bad loans. Doubts remain, however, in the market about whether banks have fully recognised and provisioned against recent high profile bankruptcies and debt forgiveness cases. The major banks' interim results showed higher-than-expected new provisions for bad loans. As a result, the banks revised up their forecast for their full-year loan-loss provisions from ¥1.5 trillion to ¥2.8 trillion. Most bank analysts seem to agree that, if economic recovery continues, the profitability of the *major* banks should be sufficient to enable them gradually to increase their provisions to a prudent level over the next few years. However, the banking sector may still be too weak to cope with any unexpected sharp increase in bankruptcies and consequent crystallisation of bad debts. Inadequate provisioning is apparently a more serious problem at smaller and regional financial institutions.

Despite reductions in cross-shareholdings between banks and their customers, Japanese banks remain vulnerable to stock market declines. The Topix index fell from 1,706 at end-March to 1,471 at end-September (Chart 73), the date for which interim results are produced, reducing major banks' net unrealised gains from ¥6.9 trillion to ¥2.6 trillion; the index has fallen further since then.

Japan is moving towards mark-to-market accounting<sup>23</sup>. From the financial year beginning April 2001, banks will have to book equity cross-holdings at the lower of cost or market value, and therefore fully deduct any unrealised losses on securities from their Tier-1 capital. Although internationally operating banks will still be allowed to count 45 per cent of unrealised gains as Tier-2 capital, the move should increase the incentive for banks to unwind cross-shareholdings. As banks have realised gains to offset bad debt losses in recent years, the average acquisition price of their equity holdings has increased – with analysts estimating the current 'break-even point' on the Topix index to be around 1,300-1,400.

The short-term Japan premium – the extra funding cost for Japanese banks in international markets – has remained negligible (Chart 74). A modest, but recently declining, Japanese bank risk premium remains evident in longer-term swap rates, which straddle the planned April 2002 regime change from full deposit protection to the so-called 'pay-off system' of partial deposit protection. The Japanese authorities recognise the imperative – discussed in previous *Reviews* – of strengthening the banking system ahead of this change, to maintain depositor confidence and minimise the risk of deposit runs and bank failures.

<sup>23</sup> See Jackson, P and Lodge, D, 'Fair value accounting, capital standards, expected loss provisioning, and financial stability', *Financial Stability Review*, June 2000, for a general discussion of fair value accounting issues.

**Table 4: World's largest banking groups<sup>(a)</sup>**

	Rank	Assets US\$ billions	Tier-1 Capital US\$ billions
Mizuho Financial Group	1	1,394.2	63.2
Sumitomo Mitsui Bank	2	951.3	43.9
Deutsche Bank	3	843.8	17.4
Tokyo-Mitsubishi Group	4	830.7	34.0
UFJ Group (Sanwa)	5	782.2	41.9
Citigroup	6	739.6	49.9
BNP Paribas	7	701.9	19.9
J P Morgan Chase & Co	8	686.8	39.0
HSBC	9	638.7	31.6
Bank America	10	632.6	38.2

Source: Bank calculations using data from The Banker Magazine (July 2000).

(a) Includes proposed mergers.

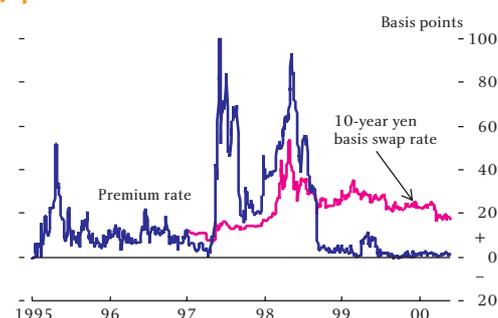
Japan's four mega-bank mergers appear to be progressing according to timetable. In October, three banks merged under the new Mizuho Financial Group holding company, while the other three proposed mergers are scheduled to take effect in April 2001. These new banks look set to become four of the world's five largest banking groups by total assets (Table 4). The banks' restructuring and their recapitalisation (including the injection of public funds last year) should, other things being equal, have reduced banking sector risk. However, large-scale financial sector mergers entail management and operational risks, particularly for those Japanese banks that have to integrate IT systems from different suppliers and adapt to a different, more commercially competitive, environment.

Japan's plans to implement a real time gross settlement (RTGS) system in January 2001 has generated concerns about operational risks and collateral liquidity risks. These are being addressed following several system tests organised by the BoJ.

#### *Life insurance sector*

The life insurance industry is still suffering from the gap between the low nominal rates of return on their assets and the higher rates of return guaranteed to policyholders. Lack of confidence has led to falling sales of new policies and high rates of policy lapses, adding to cash-flow problems. To address the issue of negative spreads (which it seems were tolerated for eight years by regulatory forbearance), Hideyuki Aizawa, the Minister for Financial Reconstruction, suggested in November that insurers be allowed to cut guaranteed policy yields. If implemented, this would limit potential bailout costs to tax payers by making current policyholders accept lower-than-promised returns.

**Chart 74:  
Japanese Premium**



Source: Bloomberg.

Japan's life insurers have over US\$200 billion of foreign securities investments, and often feature in anecdotal explanations of market movements. Japan's banks and life insurers are also the biggest providers of subordinated debt to each other, creating some risk of contagion.

**Table 5: Failures of Japanese life insurers**

		Liabilities ¥ trillions	Negative net worth ¥ billions
Nissan Life	Apr 1997	2.1	302.8
Toho Life	Jun 1999	2.8	650.0
Daihyaku Life	May 2000	2.1	45.3
Taisho Life	Aug 2000	0.2	4.3
Chiyoda Life	Oct 2000	2.9	34.3
Kyoei Life	Oct 2000	4.5	4.5

Source: Press reports.

Since the June *Review*, the authorities have closed a further three Japanese life insurance firms (Table 5). All three were known to be vulnerable, and the closures were implemented with minimal disruption. The final cost will not be known for some time, but even if it exhausts the funds of the Life Insurance Policyholders' Protection Corporation, the risks of distress asset sales should be limited by the orderly transfers of insurance portfolios to solvent insurance firms and measures allowing reductions of policyholders' claims.

## IV Emerging market economies

Emerging Market Economy (EME) prospects continue to be affected by a range of external factors such as world oil prices, economic prospects in the US, and any possible shift in the supply of capital away from high-yield markets. But internal factors are also important. These are country specific, but fall into three broad classes: macroeconomic weakness and high real interest rates (for example, in Argentina), sluggish structural reform (for example, in Russia and, at least until recently, Korea), and ongoing weaknesses in national balance sheets (for example, in Argentina, Brazil, Turkey and Poland). Ongoing macroeconomic weakness and significant government financing requirements in Argentina, and banking sector fragilities in Turkey, are two of the more significant vulnerabilities. Taken as a whole, the risks have on balance increased since the previous *Review* and there is somewhat greater fragility in EME capital markets.

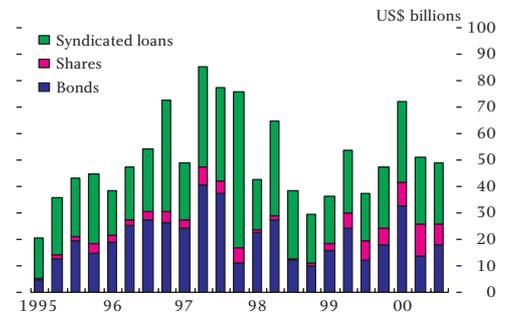
### Capital market developments

The June *Review* described the gradual improvement in credit market conditions faced by EMEs since the beginning of 1999. Since June, and in common with industrial countries (see Sections I and II), market conditions have deteriorated and are now more difficult than at the start of the year. Weaker asset prices could reflect an increase in the credit risk attached to both EME and low-rated corporate debts, or supply factors such as changing liquidity or a reduction in creditors' appetite for risk. The latter could have implications for the availability or cost of external finance in 2001. However, as of September 2000, the Institute of International Finance expected net private external financing to rise to US\$219 billion in 2001 from US\$188 billion in 2000 and US\$152 billion in 1999.

EMEs have raised more external finance (gross) during 2000 than during 1999. Gross bond and loan issuance was US\$142 billion in the first three quarters of 2000, compared with US\$113 billion in the same period of 1999 (Chart 75); and gross equity issuance has also increased, to US\$30 billion from US\$22 billion in 1999 as a whole.

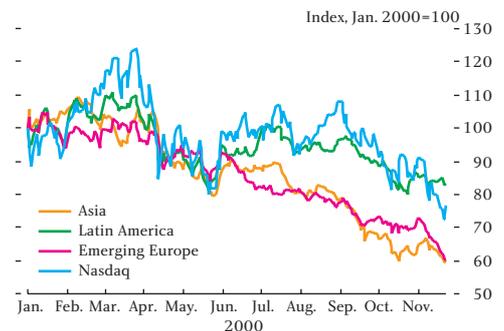
On average, EME equity prices have fallen by 25.2 per cent in US\$ terms since the June *Review* (Chart 76). The falls have been particularly sharp in Asia and Eastern Europe, with Korean and Taiwanese equity prices more than 40 per cent below their June level. The sharp fall in the Nasdaq in April led to a period of heightened volatility in world asset markets which, at its peak in June, was higher than during the LTCM/ Russian crises<sup>24</sup>. But, in contrast to late 1998, this did not persist. The correlation

**Chart 75:**  
Gross foreign currency financing – by instrument



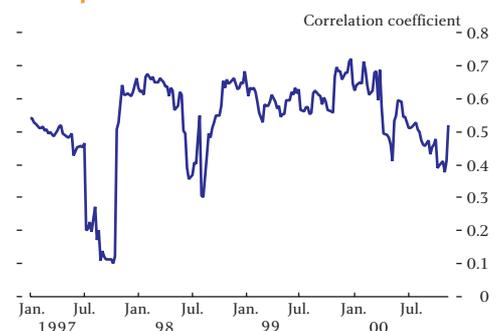
Source: Capital Data.

**Chart 76:**  
EME US\$ equity indices and the Nasdaq



Source: MSCI.

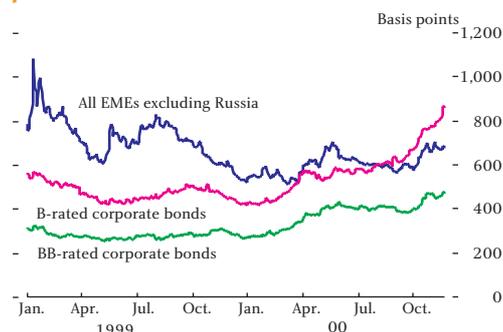
**Chart 77:**  
Correlation of EME equities with the Nasdaq



Sources: MSCI, Nasdaq and Bank calculations.

<sup>24</sup>: Global volatility defined as the standard deviation (calculated using an exponentially weighted moving average) of a capitalisation-weighted average of the Datastream Global Equity Index and the Merrill Lynch Global Broad Market Plus index.

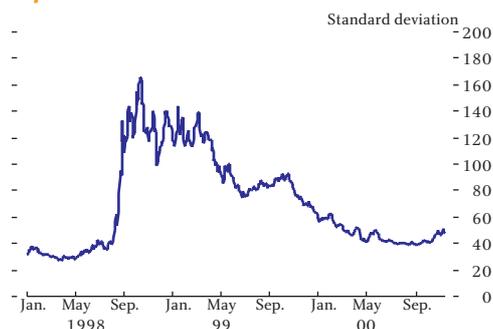
**Chart 78:**  
**EME sovereign and US corporate yield US\$ spreads<sup>(a)</sup>**



Sources: J P Morgan Chase & Co and Merrill Lynch.

(a) On an external debt-weighted basis, the average EME credit rating was BBB at end-october.

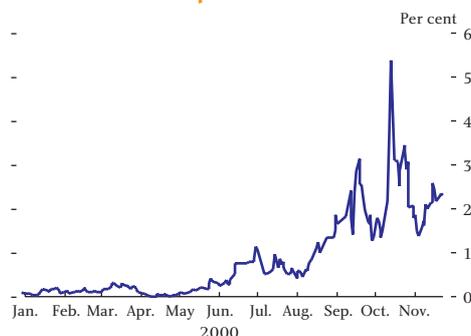
**Chart 79:**  
**EME sovereign US\$ yield spread dispersion<sup>(a)</sup>**



Sources: J P Morgan Chase & Co and Bank calculations.

(a) Market capitalisation-weighted.

**Chart 80:**  
**Risk neutral probability of oil prices greater than US\$45 per barrel implied from six-month options**



Source: Bank of England.

between movements in EME equity prices and the Nasdaq has generally fallen through the year (Chart 77), but has picked up in recent weeks following events in Turkey.

Although bond yields have been more stable than equity prices, average EME credit spreads over US Treasuries have risen since the previous *Review*, with the average spread on J P Morgan's Global Emerging Market Bond Index (EMBI (G)) widening by 57 basis points (bp). Taken together with increases in the first half of the year, this leaves the EMBI(G) spread 155bp higher than at the end of 1999 (excluding Russia, where spreads were significantly affected by the debt exchange in March).

Nevertheless, EME sovereign spreads remain lower than they were two years ago and have not widened as far as those of high-yield US firms (Chart 78).

In addition to the overall widening, there have been some marked differential movements in spreads between countries, reflecting idiosyncratic developments in perceived risks. For example, contrasting fiscal and macroeconomic developments have resulted in a crossover between Argentine and Brazilian yields. Asian spreads have risen through 2000, from 188bp at the end of 1999 to 363bp. The cross-country dispersion of spreads has increased since the previous *Review* and is slightly above pre-Russia crisis levels (Chart 79).

## External threats to EME financing

### Oil prices

Oil prices have trebled since the end of 1998, with the price of Brent crude rising to US\$33.3 per barrel (p/b) from US\$10.6 p/b. The futures market suggests that prices are expected to fall by almost a third over the next twelve months. However, option prices suggest increased uncertainty around that central projection. Taken together, recent price rises and greater uncertainty has led to an increase in the probability attached to high oil prices in the future (Chart 80 and charts in Section I). For oil-exporting EMEs such as Russia, Mexico and Venezuela, rising oil prices represent a beneficial terms of trade shock and have been associated with reduced near-term external financing needs, as locally-owned oil companies' revenues, and government tax receipts, have risen. However, future earnings have become less predictable as oil price uncertainty has increased. Moreover, rising oil prices could worsen prospects for growth in the developed countries, with adverse effects on both EMEs' non-oil exports and the supply of external funds.

Oil-importing EMEs, such as Korea and India have, conversely, experienced deteriorating terms of trade (Table 6). And, although some of them are commodity exporters, non-oil commodity prices have not risen with oil prices: the *Economist's* all-items index has fallen by 3.1 per cent since the June *Review*. Many of the oil-importing economies also face independent internal stresses

such as weak corporate sector balance sheets (for example, Korea) and the need to service significant government debts (for example, Brazil) – see below. In addition to balance of payments effects, rising oil prices will be reflected in higher inflation, to the extent that increased costs are passed through to retail prices. While a one-off change in the price of oil need not have a lasting impact on inflation, it may threaten nominal targets in the near term. Any tightening of monetary policy in response to these price level effects will directly raise the cost of servicing local currency debt and hence affect public sector and corporate financing in countries where the government or firms are highly geared.

#### US monetary policy

The June *Review* discussed the potential impact of US monetary policy changes on EMEs. Since then, the near-term yield curve has flattened and falling implied volatilities suggest some reduction in uncertainty about future policy. This may reflect indications of slowing growth, such as the incidence of US profit warnings and rising US corporate yield spreads (see Section I). So, on these measures, the risks associated with a sharper-than-anticipated tightening of US monetary policy appear to have declined.

There are several possible transmission channels from US monetary and macroeconomic conditions to EMEs. World demand will react to reduced growth or tightening monetary policy in the United States. Any slowdown in world demand would adversely affect EME trade prospects, as commodity prices fell and export volumes declined. Developments along these lines would probably affect the more open Asian economies most. These economies – with the exceptions of Indonesia and Malaysia – are also typically oil importers. Rising US interest rates may potentially affect the costs of servicing EMEs' foreign currency debts. According to CapitalData, 11 per cent of outstanding EME bonds are due to mature during the next twelve months, while some of the remaining EME foreign currency bonds pay floating interest rates. Moreover, US monetary policy changes may constrain local monetary policy, either where currencies are pegged to the US dollar or if changes in floating nominal exchange rates affect other nominal anchors.

#### Risks to financial stability from within EMEs

Developments in the external environment pose one risk to the EMEs. Developments within the EMEs themselves pose another, either directly or indirectly as developments in one country affect others. Many EMEs remain uncomfortably vulnerable to any reversal in market sentiment, because short-term debts are high relative to available liquid assets, such as reserves (Table 7 reports the portion of these debts due to banks in the BIS area)<sup>25</sup>.

<sup>25</sup>: The measures in Table 2 give one indication of vulnerability in countries' balance sheets. An article in the November *Quarterly Bulletin* ('The external balance sheet of the United Kingdom: implications for financial stability?') discusses national balance sheet analysis in some detail.

**Table 6: Top 5 EME oil exporters and importers (1999)**

Production net of consumption  
(000s barrels per day)

<i>Exporters</i>	
Saudi Arabia	7,260
Russia	3,645
Venezuela	2,645
Iran	2,320
United Arab Emirates	2,160
<i>Importers</i>	
South Korea	-2165
India	-1235
China	-1175
Taiwan	-820
Brazil	-690

Source: BP Amoco.

**Table 7: Short-term debts to BIS banks and reserves in selected EMEs<sup>(a)</sup>**

(US\$ billion, end-June 2000)

	Debts due within one year	Reserves less gold
<i>Asia</i>		
China	20.9	161.3
Indonesia	20.2	28.7
Philippines	6.4	13.4
Korea	35.8	90.1
<i>Latin America</i>		
Argentina	36.0	25.7
Brazil	36.0	27.1
Mexico	22.6	33.0
<i>Other</i>		
Russia	11.5	17.7
Turkey	25.2	24.7
S Africa	11.7	6.5

Sources: BIS and IMF.

(a) Data are on a consolidated basis and cover all banks with headquarters or branches in the BIS area.

**Table 8: Regional GDP growth forecasts for 2000 – Consensus**

	Dec 99	Jun 00	Nov 00
North East Asia	6.7%	7.5%	8.1%
South East Asia	4.7%	5.0%	5.6%
Eastern Europe	2.5%	3.8%	5.0%
Latin America	3.2%	3.7%	3.8%

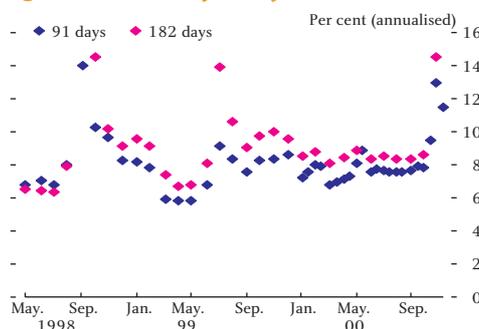
Source: Consensus Forecasts.

**Chart 81: Argentine and Brazilian sovereign US\$ bond yields**



Source: Bloomberg.

**Chart 82: Argentine Treasury bill yields at auction<sup>(a)</sup>**



Source: Argentine Ministry of Economy.

(a) Treasury bills used are US\$-denominated LETES. Yields quoted are primary market yields at auction.

This increases the likelihood that any medium-term structural risks or adverse asset price developments will have consequences for near-term financing.

The June *Review* highlighted internal risks in two areas: fragile national balance sheets (reflecting for example, slow progress in repairing external or internal debt structures); and an ongoing need for structural reforms despite increased capital inflows. A third source of risk stems from the potential impact of macroeconomic weakness on the fiscal accounts or domestic balance sheets. Several of the EMEs face more than one of these risks.

#### *Real economy-based vulnerabilities*

Although growth prospects have generally improved during this year (Table 8), some economies remain in or near recession. In Argentina, the economy remains depressed, with industrial production no higher than in 1997, and consumer prices falling by 0.5 per cent in the year to October. Real interest rates are still in excess of 10 per cent. Real wages are rising and (on a relative consumer price basis) the real exchange rate has risen by 19 per cent since the end of 1995. Continuing macroeconomic weakness coupled with larger-than-expected fiscal deficits has contributed to an increase in sovereign borrowing costs and reduced market access, which have further increased Argentine credit risk. Yields on sovereign US dollar-denominated bonds have increased at all maturities, and yields on many bonds have risen above those on similar-maturity Brazilian bonds (Chart 81). The yield curve has also flattened as near-term spreads have increased by more than those further out. For example, the yield paid by the government at Treasury Bill auctions increased through October, though it did not rise above the peaks seen at the time of the Russia/Brazil crises in 1998 (Chart 82). This could reflect concerns about near-term financing.

At the time of the previous *Review*, Argentina was the greatest risk in terms of the combination of relatively high UK banking system exposures and market perceptions of significant credit risk<sup>26</sup>. Since then, perceptions of Argentine credit risk, as reflected in sovereign yield spreads, have deteriorated relative to most other EMEs. The developing problems in Argentina could potentially have wider implications for EMEs – see below.

In Hong Kong, growth has rebounded strongly in 2000, but Consensus Forecasts suggest that it will moderate in 2001. Bank profitability and capitalisation remain strong. But property prices are still weak and local banks' exposure to the property sector is significant so that further price declines would tend to impair balance sheets. Prices and costs have been highly flexible in the past. Since the end of 1998, price deflation has led to a 6 per

<sup>26</sup> See Buckle, S, Cunningham, A and Davis, E P, 'A possible international ranking for UK financial stability', June 2000 *Review*.

cent real exchange rate depreciation. Interbank rates in Hong Kong have been below those in the US over the past six months, reflecting strong capital inflows. These spreads have not changed significantly during November (Chart 83).

The Chinese macro-conjuncture has improved significantly over the past year, but fiscal prospects remain sensitive to future growth and structural reform, including of state-owned enterprises and the banking sector. According to the central bank, financial restructuring costs to date amount to about 30 per cent of annual GDP. World Trade Organisation (WTO) entry is likely to intensify competitive pressures on domestic banks and non-financial firms, with potential costs in the short term.

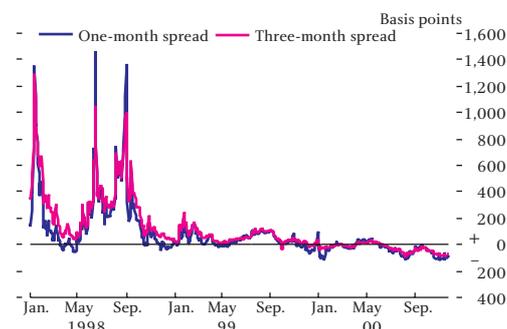
Philippine asset prices fell sharply during October, possibly following weak fiscal outturns and heightened political uncertainties, recovering slightly since then. Despite this, equity prices are 20.1 per cent lower than at the time of the previous *Review* in US dollar terms, the peso has depreciated by 13.3 per cent against the US dollar, and sovereign spreads have risen by 170bp. Following the rise in borrowing costs, the authorities (temporarily) shifted towards shorter maturity local currency finance. Foreign exchange reserves have fallen by US\$1.2 billion to US\$10.9 billion since the previous *Review*, increasing vulnerability to any reversals in investor confidence which reduce market access.

#### Structural vulnerabilities

Korean foreign exchange reserves have continued to increase rapidly during 2000, reaching US\$92.7 billion at end-October following net capital inflows of US\$13.1 billion in the nine months to September. But the rise in reserves has been only partially sterilised, with base money growth of 8 per cent in the year to September and inflation gradually increasing (to 2.8 per cent in October, from 1.4 per cent at the end of 1999). Moreover, corporate sector balance sheets remain weak in aggregate, and vulnerable both to any loss of competitiveness or falls in world demand, and to any sharp changes in domestic interest rates (Korean firms have sizeable domestic currency debts). New consolidated data on debt-equity ratios (released in August) suggest that the major chaebol are weaker than initially thought, with debt-equity ratios typically in excess of the 200 per cent official target for the end of 1999 (Chart 84). There are, however, some signs that the pace of corporate restructuring has been accelerated by creditors, for example with Daewoo Motors' forced receivership. Although this will worsen near-term macroeconomic prospects, medium-term financial stability risks are likely to be reduced as balance sheet weaknesses are resolved.

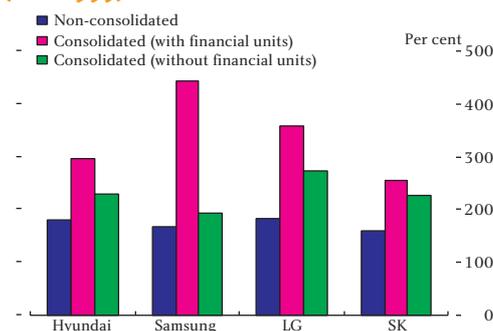
Corporate sector balance sheets remain weak across South-East Asia, despite recent economic growth. Further erosion of

**Chart 83:**  
Hong-Kong interbank rates: spread over US\$ Libor



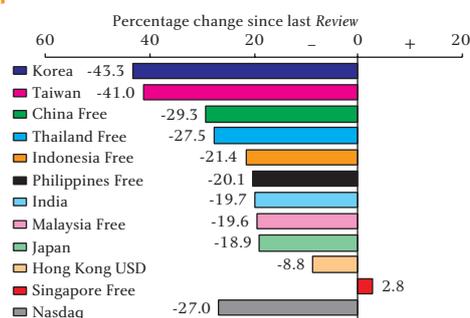
Source: Bloomberg.

**Chart 84:**  
Debt-equity ratios of Korean chaebol (end 1999)



Source: Korean Financial Supervisory Commission.

**Chart 85:**  
Asian equity price movements since the previous Review



Sources: Bloomberg and MSCI.

**Chart 86:**  
Russia – asset prices<sup>(a)</sup>



Sources: Bloomberg and MSCI.

(a) Spread evaluated on a 2007 sovereign US\$ Eurobond.

**Chart 87:**  
Brazilian Federal debt structure<sup>(a)</sup>



Source: Banco Central do Brasil.

(a) Term and duration follow Banco Central do Brasil definitions.

corporate earnings or profits – such as might follow any slowdown in the electronics and IT sectors, which make up a significant proportion of Asian exports, or a slowdown of world demand in general – could exacerbate problems of financial distress. These vulnerabilities may partially explain the relative weakness of Asian equity prices during 2000 (Chart 85).

Banking sectors in the Asian crisis countries remain short of capital, non-performing loans are significant and the costs of restructuring high. According to the World Bank<sup>27</sup>, non-performing loans (excluding those transferred to public asset management companies) remained over 50 per cent in Indonesia in June 2000 and over 30 per cent in Thailand. This leaves the Asian financial sector vulnerable to further corporate distress.

In Russia, the rise in oil prices has benefited both fiscal and current accounts and contributed significantly to GDP growth of 6.7 per cent in the year to 2000 Q2. The current account surplus has increased and, although the capital account remains in deficit, gross foreign exchange reserves rose to US\$25.0 billion in September from US\$12.5 billion at the end of 1999. Spreads on sovereign debt have fallen sharply (by 304bp so far in 2000) and are now close to pre-crisis levels. And, although equity prices have fallen slightly during 2000, they are still significantly higher than at the end of 1998 (Chart 86).

Despite the recovery in asset prices, Russia's economic position remains fragile. In particular, with around 15 per cent of fiscal revenues and 25 per cent of exports due to oil, Russia is exposed to any reversal in oil prices. Reform of the banking and tax systems is still at an early stage, so it is unclear how well the economy would absorb any adverse shocks. Capital inflows have been less than completely sterilised, so that year-on-year growth of base money has increased to 69 per cent in September, from 34 per cent in January 1999. There is some risk that inflation will pick up, with adverse implications for interest rates and demand, though this has not yet been realised.

#### National balance sheet vulnerabilities

There have been some changes in the structure of Brazilian public sector debts during 2000 that are likely to reduce risk, with the average maturity of Federal domestic currency securities rising to 14 months (Chart 87). However, the bulk of these securities remain indexed to either foreign currencies (21 per cent of the stock) or local interest rates (53 per cent), so that debt service costs are sensitive to sharp changes in either monetary policy or the exchange rate. As a result, Brazilian fiscal dynamics remain vulnerable to shifts in investor sentiment. Brazil's current account has remained in deficit through 2000,

<sup>27</sup>: World Bank 'East Asia Brief', September 2000.

but as in 1999 these deficits have been more than covered by foreign direct investments.

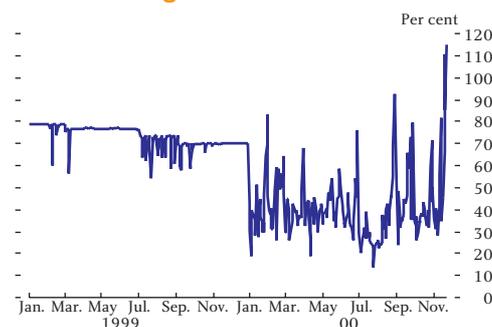
Previous *Reviews* have highlighted the balance sheet of the Turkish banking sector as a potential source of fragility. Turkish banks report significant net foreign currency liabilities. Moreover, net claims on the government have been significant for some time and represent over a quarter of Turkish banks' total assets. In late November, some of these balance sheet fragilities were exposed following an announced investigation into ten failed banks. This resulted in a severe liquidity squeeze on the banking sector, with overnight interbank interest rising above 115 per cent by the cut-off date for data in this *Review* (Chart 88), subsequently rising further, to 782 per cent on 4 December.

Liquidity pressures in the banking sector led to generalised downward pressures on Turkish asset prices. For example, sovereign US\$ spreads have risen by around 450 bp (to 955 bp on 4 December) since the June *Review*. In US\$ terms, equity prices fell by 49 per cent in the month to 4 December. Net capital outflows have been substantial, with reserves falling by nearly US\$3 billion, to US\$ 21.6 billion on 24 November, and perhaps more than US\$4 billion since then. Although triggered by events in the banking sector, these asset price declines may also reflect more general macroeconomic and structural weakness in Turkey. Inflation (at 44 per cent in October) has remained consistently above the 25 per cent end-year target, leading to a 9 per cent real exchange rate appreciation in the first ten months of the year. This has contributed to a widening of the current account deficit. The Consensus forecast for 2000 is for a US\$9.3 billion deficit, compared with a US\$1.4 billion deficit in 1999. The fiscal position remains vulnerable to higher interest rates because of the impact on debt service costs. Recently, yields on benchmark Treasury bills have risen sharply, to 63 per cent on 4 December from 35 per cent a month earlier.

The IMF proposed a strengthened package on 6 December, which, in addition to the Standby Arrangement already in place, increases credits available to Turkey by US\$7.5 billion. The key elements of the programme include further banking sector restructuring; more rapid privatisation; and increased fiscal consolidation. The monetary arrangements are unchanged.

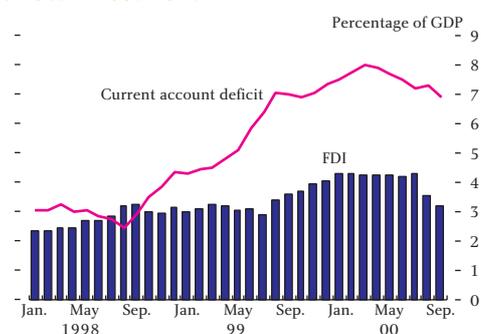
In Poland, the current account deficit rose during 1999 and was 6.9 per cent of GDP in the year to September, compared with 4.4 per cent in 1998. To date, the deficits have largely been financed by foreign direct investments, as the Polish privatisation programme has proceeded (Chart 89). However, the privatisation programme is due to run down over the next few years, implying increased reliance on alternative financing sources or a need to reduce the deficit. The risks associated with any shortfall in financing flows may be magnified by the banking sector's

**Chart 88:**  
Turkish overnight interbank interest rates



Source: Central Bank of the Republic of Turkey.

**Chart 89:**  
Polish current account deficits and foreign direct investment<sup>(a)</sup>



Source: National Bank of Poland.

(a) Figures are on a twelve-month rolling basis; monthly GDP figures are interpolated.

off-balance-sheet commitments, which increased substantially during 1999 and are high relative to assets (Table 9). Most of these commitments appear to relate to forward foreign exchange operations or are commitments to buy or sell financial instruments (such as bonds). However, the net positions may be significantly smaller.

**Table 9: Polish banking sector: off-balance-sheet commitments**

	End-98	End-99
<i>Total off-balance sheet commitments</i>		
Zloty (billions)	160.9	260.8
% assets	50.5	71.6
% capital	716.1	1010.2
<i>Proportion of off-balance sheet commitments due to:</i>		
Foreign exchange operations	56.3	47.5
Commitments on financial instruments	5.7	20.2

Source: National Bank of Poland.

## Links

Developments in EMEs may affect global financial stability through several channels such as through the credit exposures of financial institutions in industrialised countries – UK bank exposures are described in Section VI – and indirectly through any impact on other EMEs' economic and financing prospects.

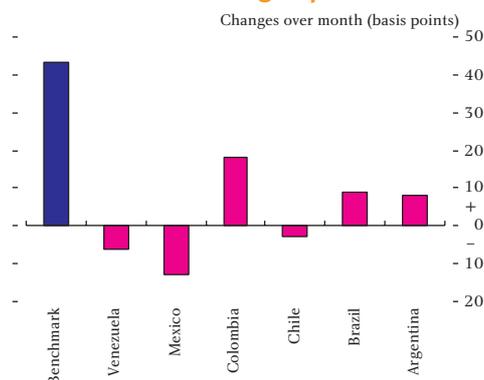
### Links between EMEs

There are several possible channels through which developments in one EME may affect other EMEs<sup>28</sup>. These channels are of two main types. First, there are direct economic linkages, such as trade relationships and intra-EME credit exposures. Second, there are indirect financial linkages which operate through the global financial system. For example, losses incurred by creditors on one asset may affect their appetite for risk generally, or cause a reassessment of risk and return for EME assets as a class. Concerns about future liquidity might also occasionally dominate credit risk as determinants of asset prices.

Argentina's importance as a bond issuer in international markets, coupled with developments since the previous *Review*, suggest that it might be one possible source of spillovers to other EMEs. On the one hand, the real economy linkages between Argentina and most other EMEs do not appear large. Argentina was the destination for just 3 per cent of Latin American exports in 1999. However, some countries are more closely linked, with, for example, 11 per cent of Brazilian exports destined for Argentina

<sup>28</sup>: These possible linkages are the subject of an extensive academic literature. Useful sources include past editions of the IMF's *Capital Markets Review* (available at [www.imf.org](http://www.imf.org)) and research posted on the NBER website ([www.nber.org](http://www.nber.org)).

**Chart 90:**  
**Latin American sovereign spreads<sup>(a)</sup>**



Source: J P Morgan Chase & Co.

(a) The benchmark is the upper quartile of monthly changes in spreads through the first nine months of 2000.

in 1999. On the other hand, financial channels may be more significant. Argentina is the dominant EME bond issuer (according to CapitalData, 17 per cent of all EME bonds issued since 1996 were Argentine), which could potentially generate spillovers if further problems in Argentina were to trigger a reassessment of EME prospects and liquidity more generally. Argentine sovereign bonds also make up 23 per cent of J P Morgan's EMBI+. Poor returns on investments in Argentina might themselves affect investors tracking this or other indices. However, market contacts suggest that fewer leveraged funds have long positions in Argentina than was the case in Russia in 1998. So any liquidity-based spillovers may be smaller or of shorter duration.

Thus far, there is little strong evidence of contagion in asset prices. Some Latin American asset prices have fallen over the past month, but not exceptionally relative to movements earlier in 2000 (Chart 90). And the correlation between Argentine bond prices and those of other EMEs has not changed significantly and is not unusually high (Chart 91). The Brazilian real has depreciated relative to the US\$, but other Latin American currencies are little changed from their levels a month ago (Chart 92). Nor, apparently, have Argentina's difficulties precipitated any wider concerns about currency board arrangements. For example, interbank rates in Hong Kong remain low (Chart 83 above), possibly reflecting both Hong Kong's significant reserves and greater price and wage flexibility. There is a risk that events in Turkey could also affect EME asset prices. So far there is limited evidence of contagion.

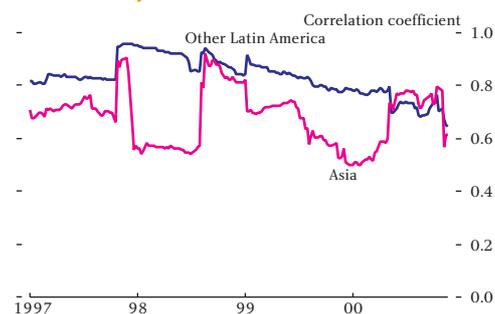
#### Links to industrial economies

Developed country credit exposures to Argentina are significant relative to exposures to other EMEs, but small relative to global credit exposures more generally. For example, BIS-area banks' external commitments to Argentina were US\$68.5 billion at end-June 2000, greater than those to any other EME<sup>29</sup> and significantly higher than four years earlier (Chart 93). However, exposures to Argentina were only 0.9 per cent of total external commitments.

Although the aggregate data suggest relatively small exposures to Argentina, they do not, of course, reveal concentrations of exposure. For example, Spanish banks' lending to Argentina is large relative to the BIS average, at 12.0 per cent of total external commitments (see discussion in Section III). The banking data also largely omit 'off-balance-sheet' exposures – for example through credit derivatives – which may be significant. Market anecdote suggests that trading in Argentine credit derivatives has increased recently.

<sup>29</sup>: There are, however, greater exposures to some offshore financial centres, such as Hong Kong and Singapore.

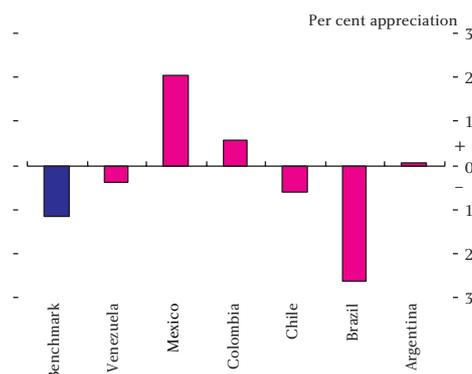
**Chart 91:**  
Correlation of changes in Argentine and other bond prices<sup>(a)</sup>



Sources: J P Morgan Chase & Co. and Bank calculations.

(a) Correlations are derived using exponentially weighted moving averages of weekly changes in the EMBI Global regional indices.

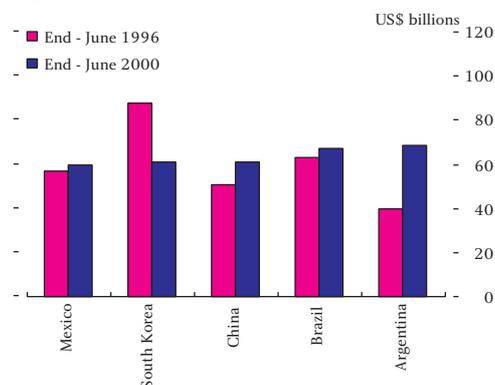
**Chart 92:**  
Changes in Latin American US\$ exchange rates<sup>(a)</sup>



Source: Bloomberg.

(a) The benchmark is the lower quartile of monthly appreciations through the first nine months of 2000.

**Chart 93:**  
External commitments of BIS banks to the largest EMEs<sup>(a)</sup>



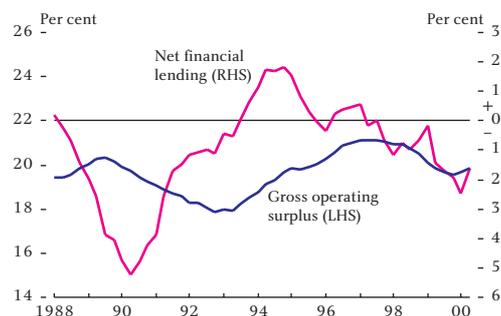
Source: BIS.

(a) Data are on a consolidated basis and cover all banks with headquarters in the BIS area.

## V UK corporate and personal sectors

Chart 94:

### PNFCs' profits and financial surplus<sup>(a)</sup>

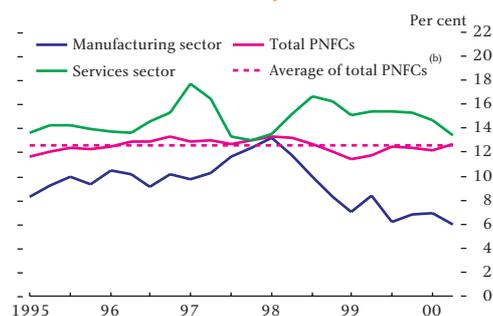


Sources: Bank of England and ONS.

(a) As a percentage of GDP. Data are quarterly and seasonally adjusted. Data show a four-quarter moving average.

Chart 95:

### Net rate of return on capital of PNFCs<sup>(a)</sup>



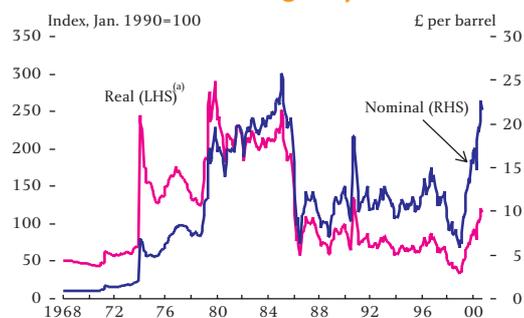
Source: ONS.

(a) Basis of estimate: net operating surplus divided by net capital employed.

(b) Over the period 1995 Q1 to 2000 Q2.

Chart 96:

### Real and nominal sterling oil price



Sources: Bank of England and ONS.

(a) Deflated by UK producer prices.

## Corporate sector

### Profitability and the macroeconomic environment

Output growth in the UK increased from a year-on-year rate of 1.8 per cent in 1999 Q2 to 3.2 per cent in 2000 Q2, accompanied by some recovery in the profit share of private non-financial companies (PNFCs), following a two-year decline. But PNFCs' financial deficit remained unchanged from Q1, albeit well below the levels in the late 1980s/early 1990s (Chart 94). The slight slowing in annual growth in Q3, to 2.9 per cent, and the forecast further slowdown to around 2.5 per cent by early next year (the central projection of the Bank's Monetary Policy Committee in the November *Inflation Report*), are likely to constrain firms' profitability and financial positions.

The rise in corporate profit share in 2000 H1 was accompanied by a small increase in the net rate of return on capital (at replacement cost) in Q2. That was more than accounted for by oil companies' higher profits, associated with strengthening world energy demand. Non-oil PNFCs' rate of return remained in the 11½–12 per cent range, marginally above the 1990s average. Manufacturing profitability has more than halved since its peak in early 1998. Profitability in the services sector has also eased back somewhat since 1998 H1 and is now below its average for the 1990s (Chart 95).

Non-oil corporate profitability has therefore remained modest given the stronger-than-expected growth in the real economy. The continued fall in manufacturing profitability might reflect a combination of accelerating input prices and exchange rate movements. Sterling input prices rose by 12.1 per cent in the year to October 2000, reflecting higher oil prices, which are expressed in US dollars (Chart 96), and the weakness of sterling against the dollar (Chart 97). The rise in oil prices has particularly affected companies in sectors where oil is important as an input, such as transport, distribution and chemicals. At the same time, sterling's renewed strength against the euro has put many companies under greater competitive pressure in European export markets.

The overall effect of rising oil prices on the corporate sector might, however, be limited. First, oil prices are expected to fall back (see Section I). Second, real oil prices have risen more modestly and to much lower levels than in previous oil price shocks (Chart 96). And third, in common with most other industrial economies, the UK has become less reliant on oil for its energy needs. However, implied volatilities derived from options contracts suggest that uncertainty has risen sharply. These issues are explored in more detail in a Box on oil prices and economic activity in the Bank's November *Inflation Report* (page 15).

### Dispersion in corporate performance

The June Review<sup>30</sup> reported evidence covering 1994–1998 of an unusual divergence between the operating profit margins of the most and least profitable companies. This gap widened further in 1999, for which company accounts data have since become available. The median profit margin of the sample of quoted companies on the Thomson Financial Datastream database shows a similar profile to the aggregate series for the return on capital. But profit margins of the most profitable companies rose significantly, while those of the least profitable companies (as defined by the tenth percentile of the sample) appear to have collapsed since 1994. When companies are weighted by size, it becomes apparent that the decline in profit margins was concentrated among smaller quoted companies. But the operating profit margins even of the weighted tenth percentile were as low, or lower, after several years of fairly strong economic growth, as in the recessions of the early 1980s and early 1990s (Chart 98).

Exchange rate movements may explain part of this deterioration in performance. Many of the weaker companies in 1999 were in internationally exposed sectors. But there is also evidence of deteriorating performance elsewhere. A sub-sectoral analysis of the variation in output growth in recent years shows stronger performance in the ‘new economy’ sectors and weaker performance in the ‘old economy’, which may have been less able to make the necessary investments in new technology.

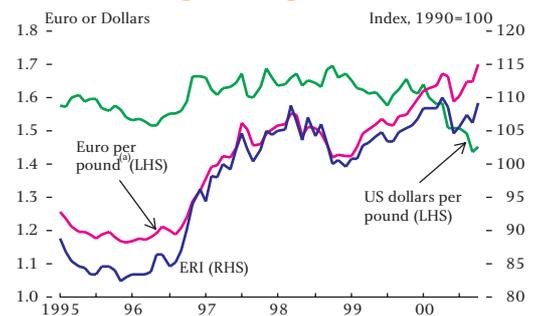
Another possibility is that companies with low current profitability but high expected future earnings growth may have greater access to capital market finance than in the past. The last year has seen many flotations of companies with little or no history of profitable earnings. Some 42 per cent of the 122 new UK listings this year (to end-October) have been techMARK companies, of which nearly half were incorporated in the previous three years. When the sample is adjusted to include only companies with at least a three-year trading history, the fall in profitability of the least profitable companies since 1994 is approximately halved (Chart 98). That of course excludes any underperforming companies which failed within three years of listing.

### Liquidity, capital gearing and income gearing

Widening dispersion is also apparent in other indicators of corporate financial health, notably liquidity and gearing. Whether measured by the current ratio, quick ratio or cash ratio, aggregate corporate sector liquidity has been increasing over recent years, and this is reflected in a modest rise in the median

<sup>30</sup> See Chart 79 on page 58 of ‘The financial stability conjuncture and outlook’, and also Benito, A and Vlieghe, G, ‘Stylised facts on UK corporate financial health: evidence from micro data’, pp. 83-93.

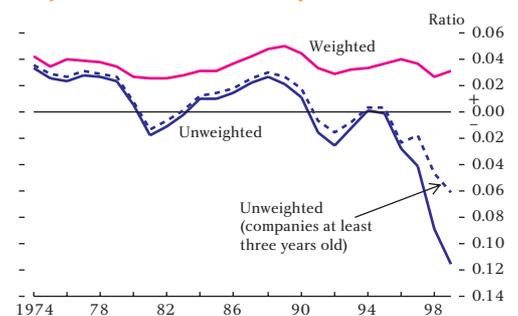
**Chart 97:**  
Selected sterling exchange rates<sup>(a)</sup>



Sources: Bank of England and ONS.

(a) Rates before 1 January 1999 are calculated as a synthetic euro exchange rate based on a weighted average of the component currencies.

**Chart 98:**  
Operating profit margins at tenth percentiles for all companies and companies at least three years old<sup>(a)(b)(c)</sup>



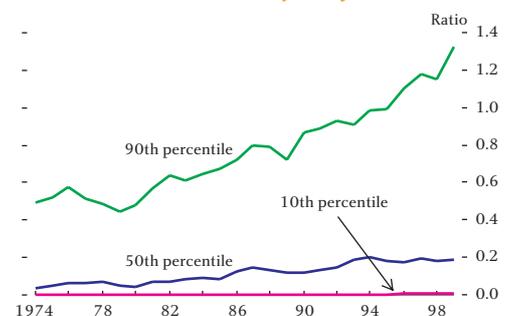
Sources: Bank of England and Thomson Financial Datastream.

(a) Weighted by company turnover.

(b) Solid lines indicate all companies.

(c) The weighted operating profit margin at the tenth percentile for companies at least three years old is not shown. It shows a similar profile to the weighted profit margins at the tenth percentile for all companies.

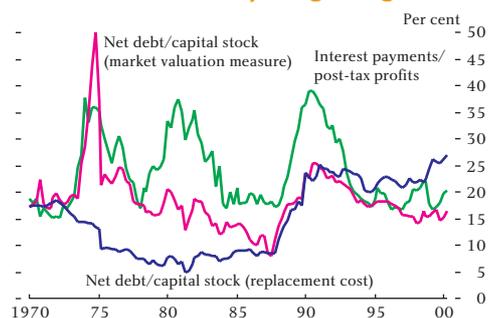
**Chart 99:**  
Distribution of PNFCs’ liquidity<sup>(a)</sup>



Sources: Bank of England and Thomson Financial Datastream.

(a) Cash ratio is calculated as cash divided by current liabilities.

**Chart 100:**  
**PNFCs' income and capital gearing<sup>(a)(b)(c)</sup>**



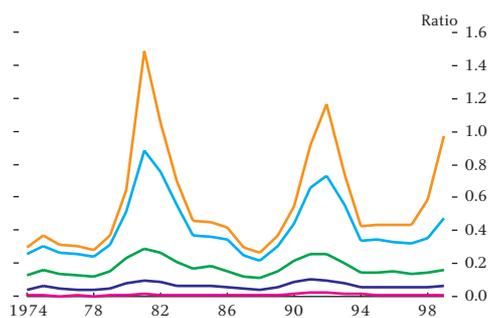
Source: ONS.

(a) Data are seasonally adjusted.

(b) PNFCs' net debt divided by the sum of the net debt and market value of equity.

(c) Replacement cost is calculated by perpetual inventory method.

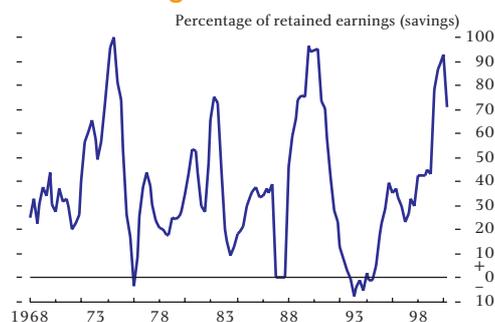
**Chart 101:**  
**Interest gearing<sup>(a)</sup>: cross-sectional distribution over time**



Sources: Bank of England and Thomson Financial Datastream.

(a) Interest gearing is defined as interest payments / (earnings before interest and taxes + interest received). Percentiles are, from top to bottom, 80th, 75th, 50th, 25th and 10th. The 90th percentile cannot be usefully shown on the same scale.

**Chart 102:**  
**PNFCs' total borrowing as a percentage of retained earnings<sup>(a)</sup>**



Sources: Bank of England and ONS.

(a) Backward looking four-quarter moving average.

series over the 1995-99 period (Chart 99). The liquidity of the ninetieth percentile increased most strongly, while that of the tenth percentile was close to zero throughout.

Capital gearing on the replacement cost measure has continued to edge up over the past six months (Chart 100) and, at 27 per cent in 2000 Q2, was above the peak in the early 1990s and higher than at any time in the past 30 years. This measure may, however, exaggerate the rise if replacement cost increasingly understates the economic value of the capital stock, for example because intangibles have become more important to companies. Using market values, the picture appears more benign. The relatively high current price/earnings (P/E) ratios might reflect expectations of faster profits growth than in the past, or a lower discount rate. To the extent that current equity valuations overstate future earnings potential, less comfort should be taken from the market-value measure of capital gearing. But these valuations do not suggest any marked rise in implied dividend growth rates for the corporate sector overall (assuming a constant equity risk premium); the shift is concentrated in particular sectors, especially IT and telecoms (see Section II).

Income gearing also rose a little after 1997, while remaining well below its levels during the most recent recession. That is also true of median and weighted-mean income gearing of the sample of quoted companies. But Chart 101 shows that dramatic increases in interest gearing occurred at the eightieth percentile during the recessions of the early 1980s and early 1990s. More recently, the interest gearing of the most heavily geared quintile of companies rose from 43 per cent in 1997 to 58 per cent in 1998 and 98 per cent in 1999, not far short of these earlier peaks. In other words, almost 20 per cent of quoted companies had only one-times interest cover in 1999.

Again, that partly reflects more companies with low or non-existent earnings becoming quoted. Some 90 per cent of companies with interest cover of less than unity in 1999 actually made a loss (before interest payments). Gearing at the eightieth percentile of companies with at least a three-year trading record rose much more modestly, from 39 per cent in 1997 to 57 per cent in 1999.

The rises in gearing mirrored an increase in indebtedness for many companies. Total borrowing by PNFCs from banks and in the capital markets, relative to retained earnings, has risen almost continuously over the past six years and has recently approached earlier peaks (Chart 102). That might be benign if it reflected more buoyant investment intentions, prompted in turn by the robust performance of the economy generally. But investment spending, especially in the services sector, has been more subdued than expected so far this year, possibly reflecting slower profits growth and lower rates of return in 1999, and/or

earlier strong investment growth having moved some companies closer to desired capital stock levels.

High recent and prospective corporate merger and acquisition activity might have increased both the corporate sector's external financing requirement and its liquidity. The value of overseas acquisitions by UK companies was £139.9 billion in 2000 H1, well in excess of the annual figure of £108.8 billion in 1999, itself a record. Most of the large deals this year, such as the Vodafone-Mannesmann acquisition, have been financed by equity. But corporate sector borrowing might have been boosted by increasing numbers of leveraged buyouts and public-to-private deals. If the earnings projections on which these deals are based materialise, returns on equity should benefit; if not, some companies might find themselves in breach of banking covenants.

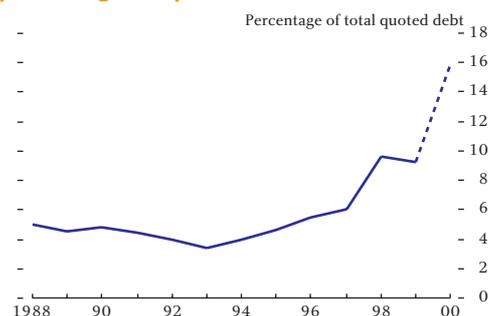
Other things being equal, an increase in companies' reliance on external finance, relative to internal funds, is likely to raise the cost of capital (as discussed in the June *Review*, page 59). The greater the reliance, the larger the effect of any further rise in the external financing requirement on the external finance premium, because potential lenders tend to regard a lack of internal funds as an indicator of poor prospects. The vulnerability of the corporate sector to a rise in interest rates or some other shock may therefore have increased.

#### The UK telecoms sector

Some of these issues are particularly apparent in the telecoms sector. UK-incorporated telecoms companies have financed their expansion in recent years partly by increased borrowing. Even before the acquisition of 3G mobile licences this year, their capital gearing (at replacement cost) had risen from 15 per cent in 1997 to 29 per cent in 1999. Income gearing increased from 15 per cent in 1997 to an estimated 28 per cent in 2000 H1. Although these ratios are still relatively modest, the UK telecoms sector's debt increased from 3.4 per cent of quoted PNFCs' debt in 1993 to 9.3 per cent in 1999 (Chart 103). Following further heavy borrowing this year, this is likely to rise significantly in 2000. Disaggregated data reveal that nearly half of UK quoted telecoms companies were already in the highest quintile by capital gearing and lowest quintile by profitability in 1999.

One risk is that the income generated from the new technology may be lower than expected, and insufficient to service the borrowing. If the bulk of the profits derive from services and applications associated with the 3G networks and handsets, they could accrue mainly to the independent service providers rather than to network operators. There are also risks that the handset technology may take longer than expected to develop and that the 3G technology may become obsolete more rapidly than anticipated. There is clearly also a significant potential upside,

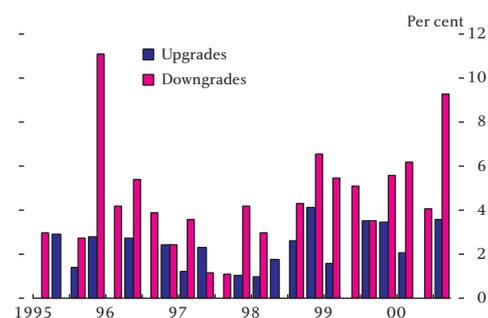
**Chart 103:**  
Telecoms sector indebtedness as a percentage of quoted PNFCs' debt<sup>(a)</sup>



Sources: Bank of England and Thomson Financial Datastream.

(a) 2000 figures (shown by dashed line) used are Bank of England estimates.

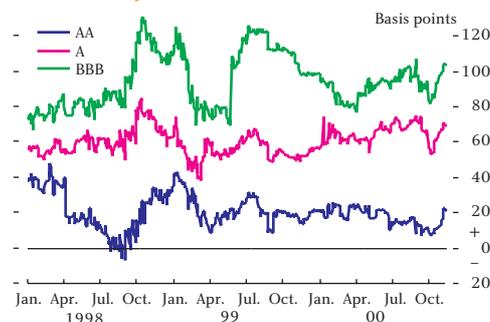
**Chart 104:**  
Rating changes for UK non-financial issuers<sup>(a)</sup>



Source: Moody's Investors Service.

(a) Upgrades and downgrades adjusted for number of companies rated.

**Chart 105:**  
UK corporate bond spreads: differentials to AAA bond spreads<sup>(a)(b)</sup>

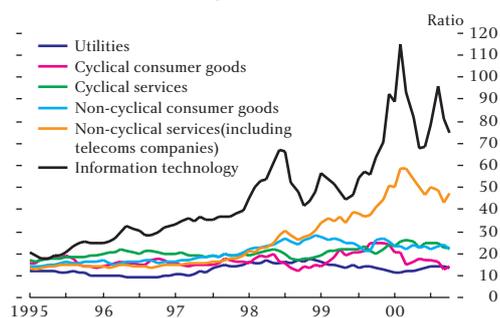


Sources: Bank of England and Bloomberg.

(a) Ten-year maturity fair market bond yields less ten-year swap rates.

(b) Data are a five-day moving average.

**Chart 106:**  
Selected sectoral P/E ratios<sup>(a)(b)</sup>

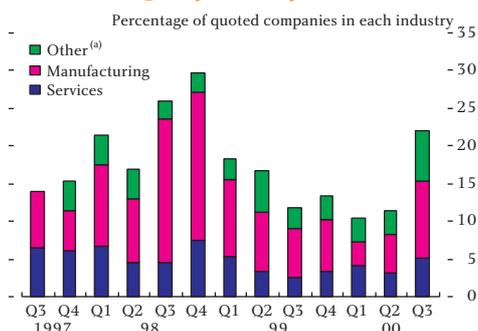


Source: Thomson Financial Datastream.

(a) End-month data.

(b) Sectoral data have been reclassified based on Datastream sectoral classifications.

**Chart 107:**  
Profit warnings by industry



Sources: Bank of England and Financial Times (fledgling and AIM companies are not included.)

(a) Other includes utilities and resources.

**Chart 108:**  
Liquidations rate<sup>(a)</sup>



Sources: Bank of England and DTI.

(a) Per 1000 companies. Data are quarterly.

but growing market concerns about these risks have resulted in credit rating downgrades in both the UK and overseas (see Box 4).

#### Financial market indicators

Growing diversity within the corporate sector is reflected in market-based indicators. First, rating changes have increased in 1999-2000 compared with 1997-98, with an increase in the proportion of UK companies being downgraded (Chart 104). Second, there has been greater tiering in corporate bond spreads. Chart 105 suggests some upward drift in spreads for lower-rated as opposed to higher-rated companies, both in 2000 H1 and most recently. Third, sectoral price-earnings ratios have diverged increasingly since mid-1998, with the non-cyclical services and IT sectors rising markedly (Chart 106). That has been accompanied by greater sectoral differences between implied dividend growth rates (see Chart 37). It lends support to the 'structural change' hypothesis advanced earlier for the widening diversity of corporate performance. Fourth, the number of profit warnings by UK quoted companies increased significantly in 2000 Q3 (Chart 107).

#### Corporate failures

There are signs that the greater pressure among weaker companies is starting to be reflected in evidence of corporate stress. Payment defaults are a direct indicator of cash flow problems. The latest Euler Trade Indemnity survey indicates that payment defaults were some 3.7 per cent higher in 2000 Q3 than a year ago. Receiverships, administrations and Company Voluntary Arrangements rose by 3.2 per cent, and company insolvencies by 8.6 per cent, over this period. The Dun and Bradstreet numbers, which include both liquidations of incorporated companies and bankruptcies of unincorporated businesses, rose substantially in Q3, although, thanks to falling bankruptcies earlier in the year, there was still a significant decline from the previous year.

The rate of company insolvency, however, has been declining since 1992 (Chart 108). Notwithstanding the slight rise in 2000 Q3, it is currently close to the previous trough in the late 1980s. Box 5 attempts to explain the behaviour of the liquidations rate, and suggests that the insolvency rate may rise over the next year. That is also the expectation of several of the corporate recovery bankers with whom the Bank has spoken in recent months. Some have mentioned an increase in the number of companies on banks' watchlists; others have noted that activity in corporate workout units has been rising, albeit from low levels. In both cases, the affected companies are concentrated in certain sectors, notably manufacturing, retail/textiles, transport/distribution and agriculture.

## Box 5: Explaining the corporate liquidations rate

Liquidations are a major signal of financial stress in the corporate sector. Theory suggests that a number of factors will be important in explaining corporate liquidations, some specific to the corporate sector, and others relating to the macroeconomic environment. Changes in insolvency legislation may also be important. Standard regression techniques allow a quantification of the effects of each of these factors on the liquidations rate.

The model is based on dynamic adjustment to a long-run equilibrium, using quarterly data from 1975 Q1 to 2000 Q2<sup>1</sup>. It satisfies the usual statistical diagnostic tests, suggesting that it is well specified and fits the actual data. The equation below describes the relationship between the variables in the long run.

*Model equation for the long run solution:*

$$\ln(Lrate) = 0.48 \ln(DEBT) - 5.59 \ln(GDP) + 0.068 R + 4.95 \ln(RW) - 0.38 DUM - 7.77$$

(4.66)
(4.35)
(8.30)

(4.98)
(2.87)
(21.7)

(t-ratios given in parentheses.)

The variables 'Debt' (net corporate debt / GDP), 'GDP' (linearly detrended GDP) and 'RW' (real unit wage cost) are included in log form. The coefficient of 0.48 on 'Debt' therefore indicates that a 1 per cent increase in the ratio of net corporate debt to GDP results in a 0.48 per cent increase in the liquidations rate, other things being equal. R refers to the real short interest rate (measured as the official base rate less actual inflation) and DUM is the 1986 Insolvency Act shift effect.

Chart A shows that the corporate liquidations rate rose by 80 per cent over the period 1987 Q3 to 1992 Q3. This was driven by the increase in corporate sector debt, which accounted for 82 per cent of the predicted change in the liquidations rate. But in the period 1992 Q3 to 1997 Q3, during when the liquidations rate declined by 54 per cent, the fall in the real interest rate was the single most important

factor, accounting for 31 per cent of the decline. The fall in real unit wage costs and recovery in GDP relative to trend were also both important factors, accounting for a further 28 per cent of the estimated decline.

**Chart A:**  
The liquidations rate: actual and long-run solution



Sources: Bank of England and DTI.

(a) Per 1000 companies.

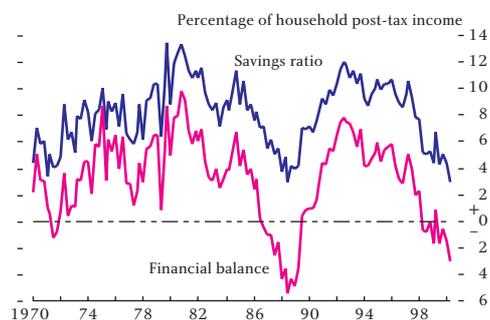
(b) Long-run solution to an econometric model.

The solution from this long-run equation and the actual liquidations rate are illustrated in Chart A. The implied equilibrium level of liquidations is currently above the actual rate by 0.21pp of the annual rate. This implies, ceteris paribus, that an increase in the rate of insolvency is necessary to restore equilibrium. The associated dynamic model indicates that 26 per cent of the deviation from the long-run equilibrium is removed each quarter. In 2000 Q3, the number of liquidations increased by 8.6 per cent, while the liquidations rate increased slightly from 1.07 per cent to 1.14 per cent. That is consistent with the implication that the liquidations rate in Q2 was below its long-run value.

Using MPC forecasts for the explanatory variables, an increase in capital gearing next year similar to this year's would tend to raise the liquidations rate by more than the 0.21pp required to return to equilibrium; allowing for recent outturns being lower than expected leads to an attenuation of this rise.

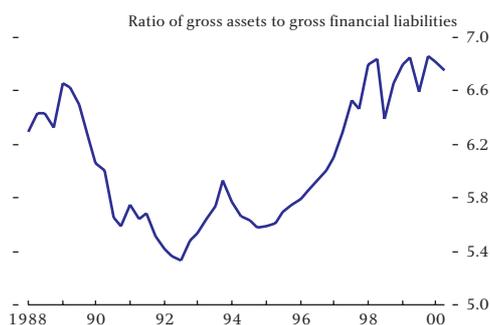
<sup>1</sup> Vlieghe, G., (2000), 'Indicators of Fragility in the UK Corporate Sector', proposed *Working Paper*, Bank of England.

**Chart 109:**  
**Savings ratio and household financial balance**



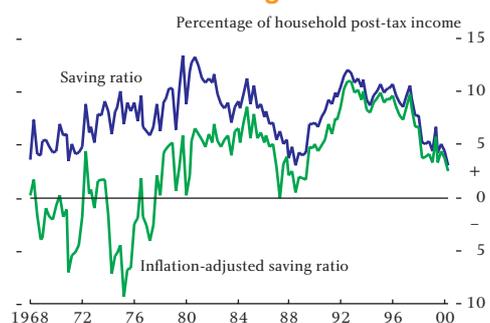
Sources: Bank of England and ONS.

**Chart 110:**  
**Household sector gross assets and gross financial liabilities**



Sources: Bank of England and ONS.

**Chart 111:**  
**Household sector saving ratios**



Sources: Bank of England and ONS.

Corporate default probabilities can also be derived using option valuation techniques (see Box 1). This method suggests that rising corporate indebtedness in 2000 H1 and increased market volatility (see Section II) induced some rise in (forward-looking) default probabilities over the past year, albeit from low levels.

#### *The property sector*

A combination of strong tenant demand and tight supply has put further upward pressure on commercial property rents. Year-on-year growth of total property returns (12.1 per cent in October) remains buoyant, albeit somewhat lower than the 15.3 per cent peak in March. These returns have been associated with continued strong investment in commercial property. Increased competition among banks lending to the commercial property market has been putting downward pressure on margins and lending criteria in recent years. Earlier this year, anecdotal evidence suggested lending margins had stabilised, but more recent soundings indicate further falls. Loan-to-value ratios and residual value risk may also have increased further, although lenders are reported to be focusing more on cashflow cover.

At the latest quarterly Property Forum (for background on the role of the Forum, see the Box on page 72 of the November 1999 *Review*), participants reported continued strong demand for commercial property finance. Finance for speculative development was said to remain limited, however, and comparisons of the current cycle with previous experience suggested that pricing had become more risk-based.

#### **Household sector**

Although the household sector's financial balance has deteriorated and debt-income ratios have risen further over the past year, increases in wealth have strengthened the sector's overall balance sheet. With lower unemployment, fewer households are experiencing mortgage payment distress. But continued rapid growth in borrowing has increased the vulnerability of the sector to an economic downturn or market correction.

#### *The sector's financial position and saving*

The saving ratio fell to 3.0 per cent in Q2, its lowest level since 1988 Q3. The household sector was a net borrower in 1999, for the first time since the late 1980s, and the financial deficit reached 3 per cent of GDP in 2000 Q2 – the highest since 1989 Q2 (Chart 109). That has been reflected in a combination of continued rapid borrowing and falling investment in financial assets.

These developments may partly reflect capital gains on existing wealth holdings (see the November *Inflation Report*, page 18). Earlier increases in equity prices, together with buoyant house prices over the past year, have strengthened the household

sector's overall balance sheet. The gross assets-liabilities ratio has been relatively high since mid-1998, having risen continuously over the previous three years (Chart 110). Prospects for the saving ratio and the financial position depend on whether these price levels are sustained.

The fall in the saving ratio may also partly reflect continued adjustment to low inflation. Inflation erodes the real value of financial assets fixed in nominal terms, and requires households to save more out of current income simply to maintain the real value of wealth. Adjusted for inflation, the saving ratio is not far below its average since 1968 and above the levels of the 1970s and late 1980s (see Chart 111 and the November *Inflation Report*, page 18).

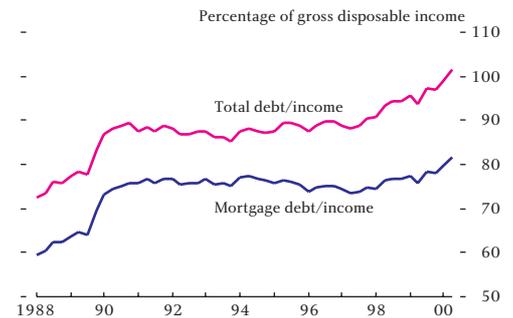
#### Debt-income ratios

The counterpart of rising wealth-income ratios is a continued, albeit significantly smaller, rise in debt-income ratios, to levels higher than in the late 1980s (Chart 112). Apart from the effect of increased wealth on desired, and sustainable, debt-income ratios, that also partly reflects the lagged effects of the substantial earlier increase in the market share of new endowment mortgages, from 20 per cent in 1982 to 83 per cent by 1988. This leaves a greater proportion of mortgage debt principal to be repaid at the end of the mortgage term, increasing debt-income ratios during the transition. After 1988, the endowment mortgage market share fell back, to 23 per cent by 2000 Q2; this reduction will tend to lower debt-income ratios over the next two decades.

The recent rise in loan-to-income ratios in the housing market has been especially marked among owner-occupiers rather than first-time buyers (Chart 113). That may reflect greater opportunities for owner-occupiers to gear up in a rising property market. Compositional effects, such as rises in the proportion of wealthier single-person households in the owner-occupier category, may also have played a part. Some commentators have argued that increasing 'affordability' in the housing market, in the sense of lower mortgage payments relative to earnings, and modest mortgage debt service costs, mitigate concerns about rising debt-income ratios. That does not, however, take into account movements in the real cost of servicing a mortgage.

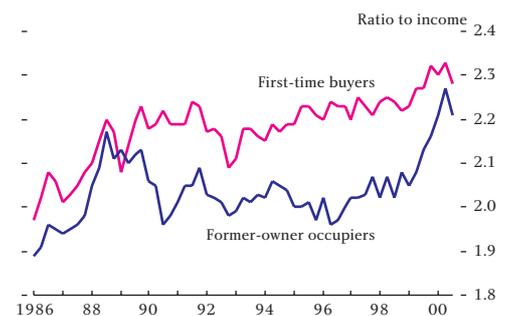
Apart from borrowing for house purchase, mortgage equity withdrawal has also risen recently, from 1.4 per cent to 2.1 per cent of post-tax income over the year to 2000 Q2. That remains well below the peak of 8.2 per cent in 1988 Q3. Consumer credit has continued to rise in relation to disposable income over the past year; it has been above its late 1980s peak since 1997 Q2 (Chart 114). A more stable outlook for interest rates and falling unemployment have been important in giving borrowers the confidence to take on more debt. The rise in debt

**Chart 112:**  
**Household sector debt-to-income ratios**



Sources: Bank of England and ONS.

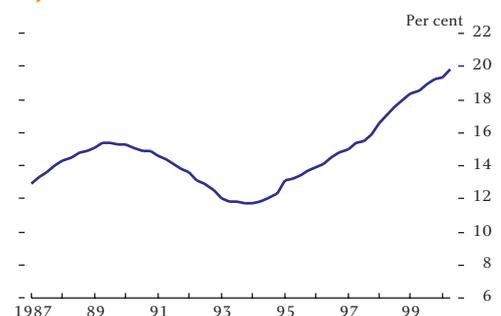
**Chart 113:**  
**Average advance-to-income ratios in the housing market<sup>(a)</sup>**



Source: Council of Mortgage Lenders.

(a) Data prior to 1992 Q2 are for Building Societies, thereafter they include all lenders.

**Chart 114:**  
**Consumer credit as a percentage of gross disposable income<sup>(a)</sup>**

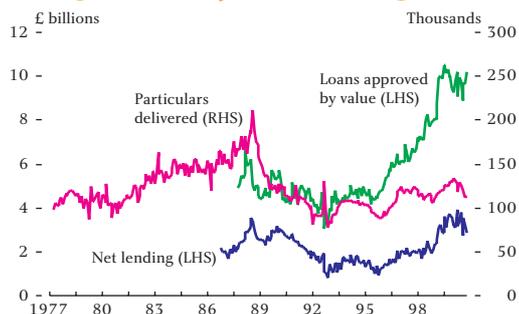


Sources: Bank of England and ONS.

(a) Data are seasonally adjusted.

**Chart 115:**

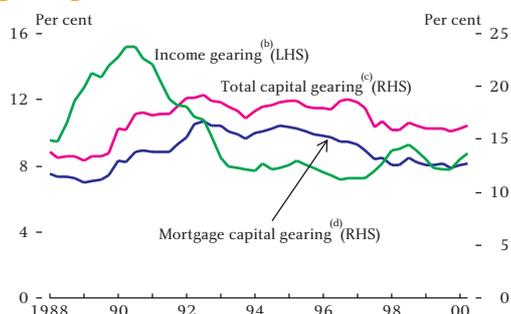
**Lending and activity in the housing market**



Sources: Bank of England and Inland Revenue.

**Chart 116:**

**Household sector income and capital gearing<sup>(a)</sup>**

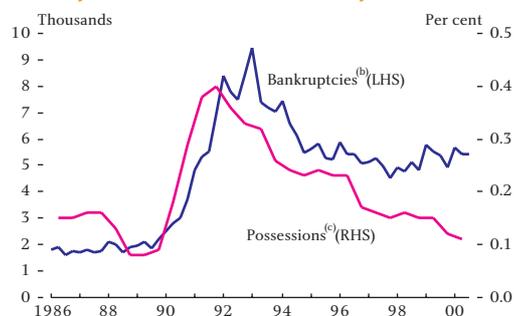


Sources: Bank of England and ONS.

- (a) Data are seasonally adjusted.
- (b) Gross interest payments as a proportion of gross disposable income.
- (c) Total lending to households as a proportion of housing and financial wealth.
- (d) Mortgage lending to households as a proportion of housing and financial wealth.

**Chart 117:**

**House possessions and bankruptcies<sup>(a)</sup>**



Sources: ONS and Council of Mortgage Lenders.

- (a) Data for bankruptcies and possessions are to 2000 Q3 and 2000 H1 respectively.
- (b) Individuals.
- (c) Percentage of outstanding stock of mortgages.

was accompanied by some evidence of a slowdown in the housing market during part of the year. House price inflation has fallen (from its earlier high levels) as have some other indicators of housing activity, such as particulars delivered (Chart 115). But more recently house price inflation has begun to increase again.

*Capital and income gearing*

Notwithstanding the rapid growth of borrowing over recent years, household capital and income gearing remain relatively low and stable (Chart 116), at both aggregate and disaggregated levels. Capital gearing has benefited from the rapid growth of gross wealth in recent years. The usual measure of income gearing does not include capital repayments, so it could understate the true level of debt-service costs. The total debt-service ratio may matter if the household sector cannot easily refinance its debt. Greater competition in the mortgage market, and the growing use of innovative mortgage products, may enable households to manage their debt obligations more efficiently. Flexible mortgages, accounting for an estimated 10 per cent of the total mortgage stock but around 20 per cent of new mortgage lending, allow households to vary the amount of equity they withdraw and to invest more easily and cheaply than previously.

At current interest rates, the household sector's aggregate debt service burden remains manageable and well below the levels of the early 1990s. Disaggregated data, based on the British Household Panel Survey (BHPS), indicate that mortgage income gearing (including capital repayments) of the most heavily indebted decile of households declined substantially, from 38.0 per cent in 1991/92 to 29.3 per cent in 1998/99. In contrast to the corporate sector, this suggests that falling interest rates and rapid growth of post-tax income have more than offset the effect on income gearing of rapid borrowing growth.

*Bankruptcies and distress*

House possessions have continued to fall, to very low levels (Chart 117). The determinants of mortgage arrears and possessions include the employment and marital status, age and number of dependants of the head of household, and the loan-to-value ratio of the mortgage. Changes in these factors have substantially reduced the financial distress associated with mortgage payments over the 1990s. The BHPS shows a fall in the proportion of owner-occupier households with an unemployed head of household facing payment difficulties from 35.5 per cent in 1991/92 to 10.9 per cent in 1998/99.

## VI The UK financial system

As set out in the first five sections of this assessment, the risks to global financial stability have, on balance, increased somewhat since the *June Review*. This section explores how well placed the UK financial system is to face those risks, given the balance of international and domestic business amongst different types of firm (see Box 6). It also reviews some recent developments at the London Clearing House and in the insurance industry.

### Credit risk

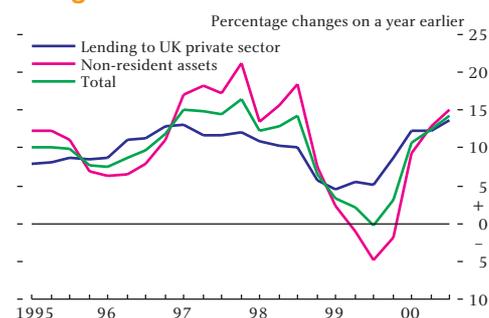
#### Overseas exposures

Around 40 per cent of the UK banking system's on-balance-sheet assets carry cross-border risk. Lending to overseas residents rose by 15 per cent in the year to 2000 Q3 (Chart 118). UK-owned banks' overseas exposures increased by 10.5 per cent in the first six months of the year. That was largely accounted for by increased claims on BIS industrial area economies (Chart 119). Exposures to the USA, which represent almost a fifth of the total stock, increased by just under 10 per cent; half of these exposures were to the US (non-bank) private sector.

The *June Review*<sup>31</sup> set out one proxy for the expected loss on cross-border loan exposures, obtained by multiplying the face value of outstanding loans by rating-based estimates of default probabilities for developed economies; and by the spread between the yield on sovereign US\$ bonds and on US Treasury bonds for emerging market economies. Using this measure, risk-weighted exposures to the 20 developed countries in which expected losses are highest rose by only 5 per cent between December 1999 and June 2000, because of a shift in the composition of lending towards the public sector. On an unadjusted basis, UK-owned banks' exposures to Japan, which account for 5½ per cent of total overseas exposures, increased by over 30 per cent in the first half of the year. The proportion of the stock of lending accounted for by the Japanese corporate sector fell. 30 per cent of exposures were to Japanese banks, which are undergoing restructuring in the wake of widespread loan losses (see Section III).

Loan exposures to EMEs increased by around 4 per cent over the same period. EME claims constituted just over 12½ per cent of the stock of UK-owned banks' overseas exposures at end-June, about one percentage point lower than at end-1999. This share has been gradually falling since the early 1980s, when it was around one third. Nevertheless, the proxies for 'expected losses' on claims on certain EMEs have increased significantly (Chart 120). Claims on Argentina represent UK-owned banks' largest EME exposure (1.3 per cent of total overseas exposures). As a consequence of the uncertainty there (discussed in

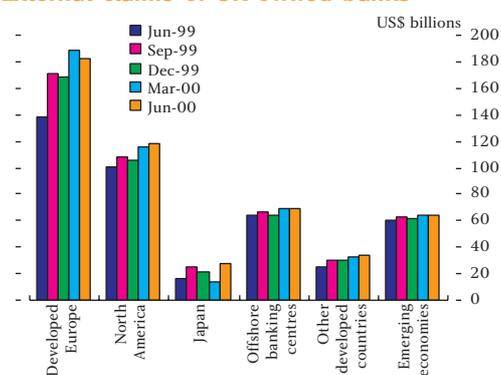
**Chart 118:**  
Growth in UK bank and building society lending<sup>(a)</sup>



Source: Bank of England.

(a) Claims on non-residents includes lending to banks outside the UK banking sector and excludes lending by Bank of England.

**Chart 119:**  
External claims of UK-owned banks<sup>(a)(b)</sup>

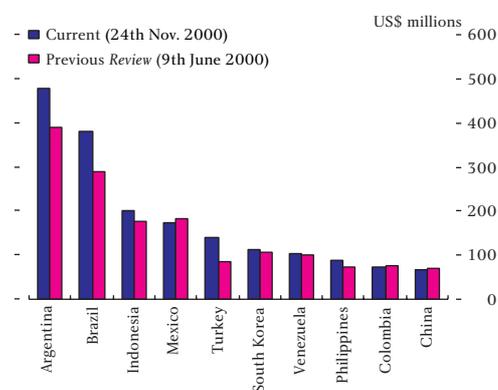


Source: Bank of England.

(a) Contractual debt.

(b) 'Developed Europe' is the BIS-reporting European economies, essentially western Europe. 'Other developed countries' are non-BIS reporting developed economies. 'Emerging economies' are developing economies and eastern Europe.

**Chart 120:**  
UK-owned banks' estimated expected default loss on emerging economy exposures<sup>(a)</sup>

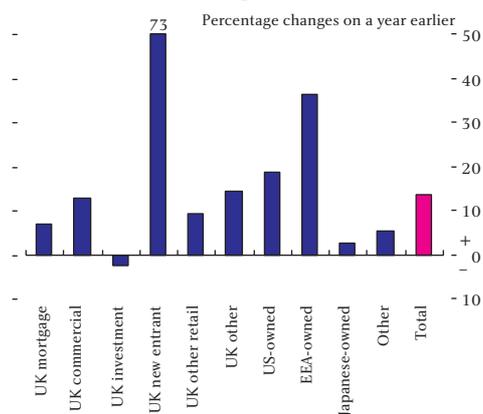


Sources: Bank of England and JP Morgan Chase & Co.

(a) Exposure multiplied by probability of default. Probability of default proxied by spreads on sovereign bonds. See Buckle, Cunningham and Davis (2000).

31: Buckle, S, Cunningham, A, and Davis, E.P (2000) 'A possible international ranking for UK financial stability' *Financial Stability Review*, June.

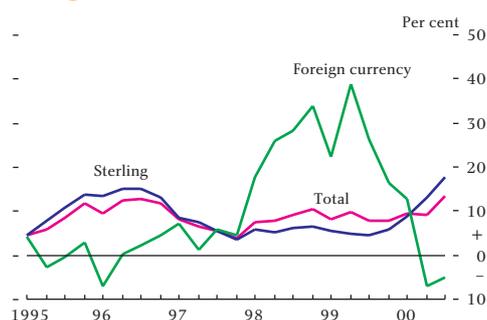
**Chart 121:**  
**Changes in peer groups' lending to UK-residents 2000 Q3<sup>(a)</sup>**



Source: Bank of England.

(a) 'Other overseas banks' are overseas banks other than US, EEA and Japanese.

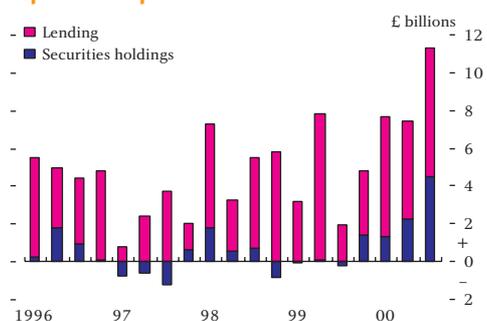
**Chart 122:**  
**UK bank and building society corporate lending<sup>(a)</sup>**



Source: Bank of England.

(a) Four-quarter growth rates, lending to UK resident corporates.

**Chart 123:**  
**Changes in UK bank and building society corporate exposures<sup>(a)</sup>**



Source: Bank of England.

(a) All currency exposures to UK resident corporates.

Section IV), UK banks' expected losses on these claims have, on this proxy, increased by almost 40 per cent. On the same measure, developments in Turkey since the data cut-off for this document have increased risk exposure significantly.

#### Domestic exposures

Bank and building society sterling lending to the UK private sector has recently been increasing at its fastest annual rate since 1990 (see Chart 1.3 of the November *Inflation Report*). Taking sterling and foreign currency business together, lending by new entrants and by other European banks has grown materially faster than the aggregate<sup>32</sup> (Chart 121).

#### Corporate lending

In its discussion of the UK corporate sector, Section V highlighted the continued rise during 1999 in capital and income gearing for the most highly geared companies. Borrowing from banks has accelerated in recent months, growing by around 13½ per cent in the year to 2000 Q3. Sterling borrowing grew by about 18 per cent (Chart 122). An increasing proportion of exposure to companies has, over the past year, been via holdings of securities (Chart 123). Mortgage banks' corporate lending (mostly property and leasing) grew very strongly, from a relatively low base (Chart 124).

Loans to the property and construction industries have accelerated since the June *Review*; four-quarter growth rates rose from 14 per cent and 8 per cent in 2000 Q1 to 22 per cent and 25 per cent in 2000 Q3<sup>33</sup>. Total advances by all banks to the UK commercial property sector have risen slightly from a trough of 4 per cent of banks' advances to UK residents in 1997 to 5 per cent as at end 2000 Q3 (Chart 125). That remains well below the peak of 8 per cent in the early 1990s. Lending to UK manufacturing and to the wholesale and retail trades has remained weak, reflecting in part difficult trading conditions in some parts of these sectors. During 1999, there was a sharp fall (from £18.3 billion to £9.9 billion) in bank lending to companies which appear in the vulnerable zones on at least two of the three indicators of profitability, gearing or liquidity discussed in Section V. Relative exposure to weak companies therefore appears to have fallen (Chart 126). If so, that offers some reassurance about the quality of bank balance sheets, although these data are compiled with a lag of about one year.

Section II described a sharp increase in borrowing by telecoms companies this year. UK bank lending to the UK 'transport, storage and communications' sector (TSC, which includes UK telecoms) increased by about 9½ per cent in the year to

<sup>32</sup>: These data are not adjusted for changes in population and individual banks' structure and can be no more than indicative of underlying developments.

<sup>33</sup>: Lending data in this paragraph include advances only.

2000 Q3, slightly below the rate of growth for the corporate sector as a whole. UK-owned commercial banks accounted for most of the increase, but other European banks also have a major presence in this sector (Box 6). Total outstanding advances to the UK TSC sector are only about 2 per cent of UK-based banks' total loans. These data do not, however, cover their holdings of telecoms securities, lending to non-resident telecoms companies, or off-balance-sheet exposures (eg committed facilities).

UK-owned banks have not been heavily involved in arranging international telecoms bond issues, but have been more active in arranging syndicated loans for telecoms companies; UK-owned commercial banks have a combined share of around 15 per cent of the latter market, compared with a share of around 8 per cent of the total syndicated loans market. Given the analysis in Section II, the Bank welcomes the FSA review of banks' telecoms exposures. It is important that regulators of globally active banks and securities firms should actively share information in this area.

#### Personal lending

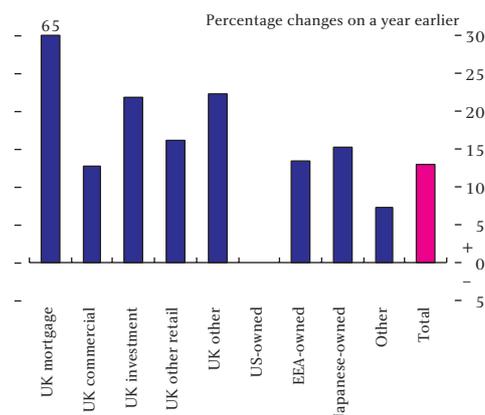
The previous *Review* highlighted rapid growth in unsecured consumer credit as a potential cause for concern. This assessment was shared by the FSA, which has been undertaking a review – in which the Bank has participated – of bank lending policies and practices. Since then, unsecured consumer borrowing from the UK monetary sector has continued to grow rapidly: by over 18 per cent in the year to October.

Chart 127 analyses the pattern of unsecured personal lending growth in the year to 2000 Q3 by bank peer groups<sup>34</sup>. Lending by some peer groups has increased significantly faster than that of the whole sector. This is most obvious for new entrants, which now account for about 6 per cent of the total stock outstanding of consumer borrowing from banks. But it is also true of mortgage banks, which account for 10 per cent of the stock (compared to the commercial banks' share of 60 per cent) and 'other UK banks' – mainly small banks, which comprise only a tiny (roughly one per cent) share of the market.

Mortgage lending growth has recently slowed a little (Section V). An analysis by bank peer group of mortgage lending in the year to 2000 Q3 is shown in Chart 128. The increase in the mortgage banks' lending appears to have been modest, but the measure is affected by securitisations, so it is important that any risk retained by the originator is taken into account. Mortgage loans by new entrants have, as expected, increased sharply, by over 70 per cent; their share of the stock nevertheless remains small (2.4 per cent). Lending by 'other UK banks' in aggregate has also

<sup>34</sup> See note 2 on the limitations of this data. Note that data are not adjusted for the effect of securitisations.

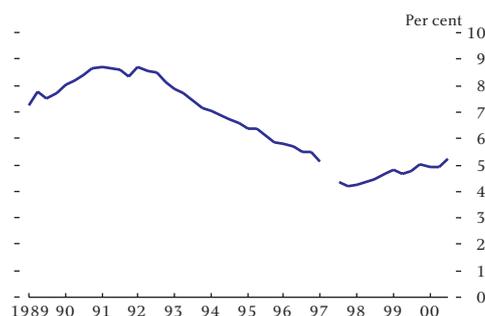
**Chart 124:**  
Changes in peer groups' corporate lending – 2000 Q3<sup>(a)</sup>



Source: Bank of England.

(a) 'Other overseas banks' are overseas banks other than US, EEA and Japanese.

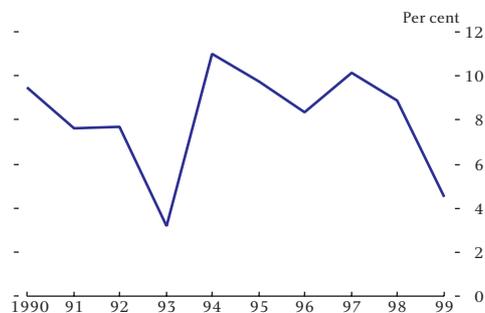
**Chart 125:**  
UK banking sector advances to commercial property<sup>(a)</sup>



Source: Bank of England.

(a) As a percentage of the stock of sterling and other advances to UK residents. There is a break in the series because of a reclassification in the available data for that quarter.

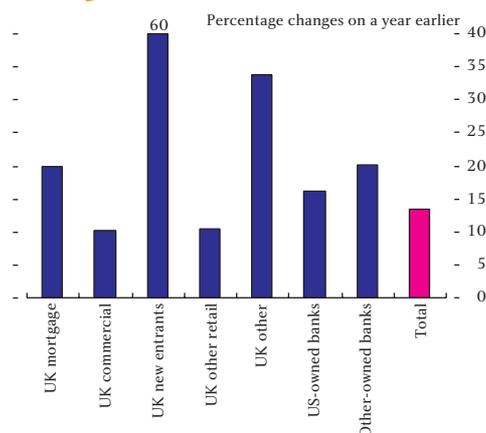
**Chart 126:**  
UK banking sector lending to 'vulnerable' companies<sup>(a)</sup>



Sources: Bank of England and Thomson Financial Datastream.

(a) Percentage of total bank lending to quoted companies. Vulnerable companies are defined as those in the most vulnerable quintile of the company distribution, on any two or more of the three indicators of profitability, gearing and liquidity.

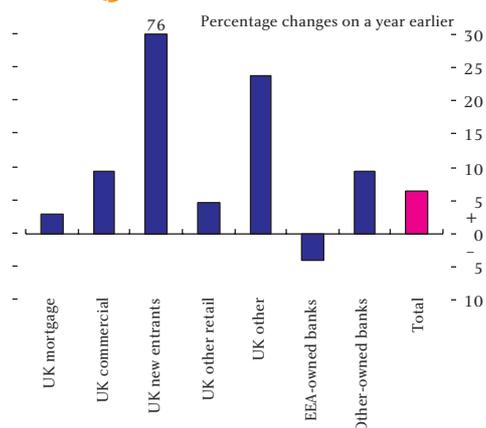
**Chart 127:**  
**Changes in peer groups' consumer credit – 2000 Q3<sup>(a)</sup>**



Sources: Bank of England.

(a) Includes peer groups with more than one per cent of bank consumer credit.

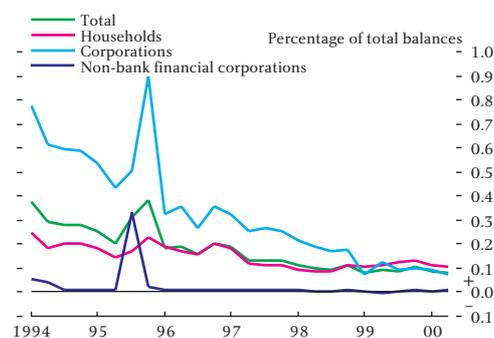
**Chart 128:**  
**Changes in peer groups' mortgage lending – 2000 Q3<sup>(a)</sup>**



Sources: Bank of England.

(a) Includes peer groups with more than 0.2 per cent of bank mortgage lending.

**Chart 129:**  
**UK banking sector write-offs and other loan revaluations<sup>(a)</sup>**



Source: Bank of England.

(a) Quarterly default rate.

increased substantially (by nearly 24 per cent); they account for only 0.3 per cent of bank mortgage loans outstanding.

Nevertheless, despite their small market share, the rapid growth of personal lending by some banking groups may warrant monitoring.

#### *Loan quality, provisions and write-offs*

In 2000 H1, the major UK banks as a whole slightly reduced their ratios of provisions to total lending as compared with the same period of the previous year. That partly reflected a reduction in provisions held against international exposures, as some countries recovered from the 1997-98 crises. Provisions held against domestic exposures have also tended to fall. For four of the large clearing banks<sup>35</sup>, the total ratio fell from 1.63 per cent as at end-June 1999 to 1.49 per cent; and for the five mortgage banks, it fell from 0.52 per cent to 0.47 per cent a year later (the mortgage banks' asset mix means that they tend to hold smaller provisions than the commercial banks).

Nor do arrears and write-offs (Charts 129 and 130) suggest any generalised deterioration in loan quality, despite strong lending growth and intense competition for business. Bank contacts suggest that any tendency for the quality of unsecured retail portfolios to deteriorate has been arrested by a tightening of loan criteria where appropriate. Some banks, though, would like to know more about the distribution of consumer credit across different types of customer.

In the mortgage market, loan-to-income ratios increased over the first half of the year, at least for former owner-occupiers. However, data suggest that for the country as a whole, loan-to-value (LTV) ratios – lenders' traditional insurance against loss-given default – remain stable. Bank contacts suggest that most large lenders have conservative limits on the proportion of high LTV business they accept, and high LTV loans often attract less favourable pricing (or require the borrower to pay Mortgage Indemnity Guarantee premiums). Mortgage arrears and possessions continue to run at very low levels (Section V).

Arrears, write-offs and, for some banks, provisions are essentially backward-looking indicators, and so cannot provide early warning of poor credit quality in the event of shocks. Some bank contacts have expressed unease about the implications of increased indebtedness in parts of the personal sector, although this view is not universal. For corporate sector portfolios, as well as the increased risk attached to specific industries, notably telecoms, there is a general perception that uncertainty has been increased by structural change in the economy, associated with increased competition and rapid technological change.

<sup>35</sup> Barclays, Lloyds TSB, Royal Bank of Scotland Group and HSBC.

## Market risk

UK banks are exposed to potential volatility in international asset markets via a number of channels: counterparty credit risk, direct lending to securities dealers and leveraged funds, and proprietary positions subject to market risk (detailed in Chart 131 by bank peer group). Recent developments relevant to those exposures were reviewed in earlier Sections.

Over the six months to September, UK banks' holdings of tradable assets grew by 15 per cent, to £475 billion. Overseas investments, which account for 64 per cent of the total, rose by a similar amount, reflecting a particularly sharp increase in foreign equity holdings. Holdings of tradable assets have not, however, increased substantially as a share of banks' total assets, remaining at about 15 per cent; these data do not capture the extent to which banks have taken on or hedged risk off-balance-sheet. For the commercial banks, dealing income (including off-balance-sheet transactions) continues to account for only a small share of revenue (7 per cent in 2000 H1).

In Q3, the UK banking sector's gross derivatives market positions were up about 38 per cent on six months earlier to £1.3 trillion, equivalent to about 45 per cent of total on-balance-sheet assets. Amongst UK reporting banks, US and EEA-owned banks have the highest exposures, and interest-rate and foreign-exchange related contracts predominate (Chart 132). Except in a very broad brush way, that is not informative about risk, because the gross data cannot reveal anything about the sensitivity of positions to price changes and because some derivatives positions will be hedging other risks. An alternative means of gauging underlying exposures is to look at reported Value at Risk (VaR). Table 10 gives details for five of the major UK commercial banks between 1996 and 1999. They were prepared using a variety of different models and assumptions, so are not directly comparable. Even so, they suggest that exposures (for even the more market-oriented of the major UK banks) remain small as a proportion of capital in normal conditions. As the 1997-98 crisis underlined, however, VaR will not capture the potential impact of 'extreme' market events.

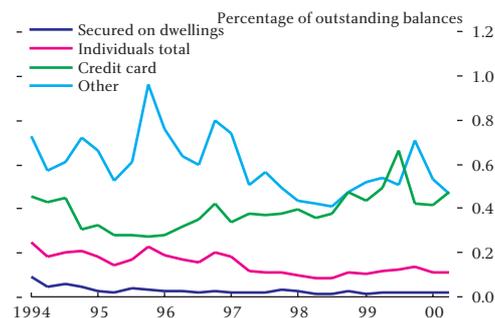
**Table 10: Selected UK banks Value at Risk (percentage of equity)<sup>(a)</sup>**

	1996	1997	1998	1999
Barclays	0.16	0.2	0.26	0.18
Nat West	0.06	0.09	0.11	0.11
HSBC Bank	0.25	0.12	0.18	0.31
Lloyds TSB	0.04	0.03	0.02	0.01
RBS	0.04	0.05	0.04	0.04

Source: Published report & accounts.

(a) Average annual VaR except RBS which reports year-end VaR.

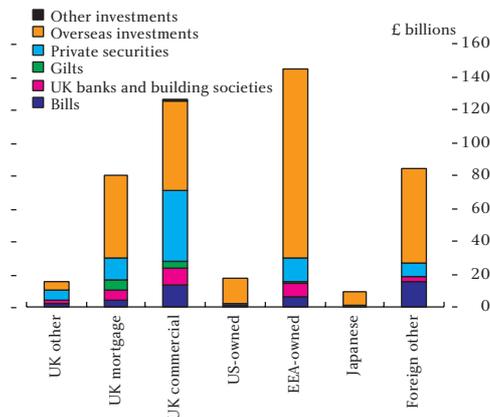
**Chart 130: UK banking sector write-offs and other revaluations on loans to individuals<sup>(a)</sup>**



Source: Bank of England.

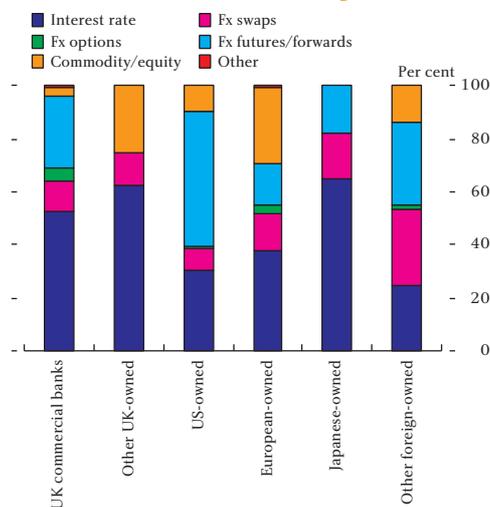
(a) Quarterly default rate.

**Chart 131: Peer groups' investments in traded asset markets – September 2000**



Source: Bank of England.

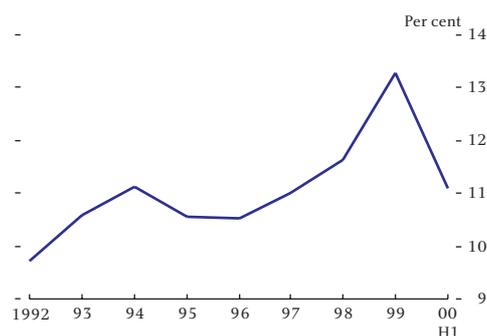
**Chart 132: Peer groups' gross exposure to UK derivatives markets – 2000 Q3<sup>(a)</sup>**



Source: Bank of England.

**Chart 133:**

**UK commercial banks' risk asset ratio<sup>(a)(b)</sup>**



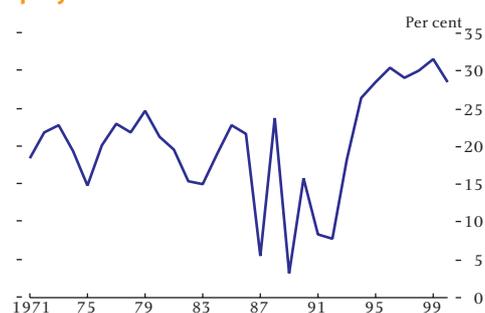
Sources: BBA and published accounts.

(a) Net capital/risk-weighted assets.

(b) Data cover Bank of Scotland, Barclays, Lloyds TSB (Lloyds prior to 1995), Royal Bank of Scotland, NatWest (Royal Bank of Scotland Group from 2000 H1). Midland/HSBC Bank is excluded as 2000 H1 data unavailable.

**Chart 134:**

**UK commercial banks' pre-tax return on equity<sup>(a)(b)</sup>**



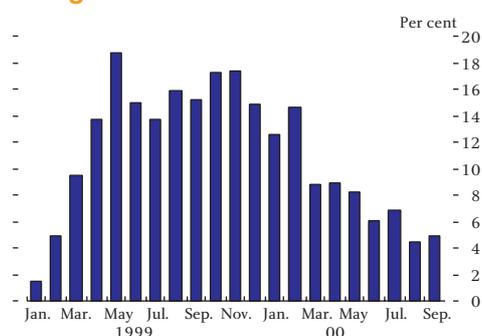
Sources: BBA and published accounts.

(a) Bank of Scotland, Barclays, Lloyds TSB (Lloyds prior to 1995), Midland/HSBC Bank, Royal Bank of Scotland, NatWest (Royal Bank of Scotland Group from 2000 H1).

(b) Book value of equity.

**Chart 135:**

**New entrants' share of net mortgage lending<sup>(a)</sup>**



Source: Bank of England.

(a) Direct Line, Egg, Legal & General, Sainsbury's, Standard Life, HFC Bank, Associates Capital.

**Capital, profitability and business risk<sup>36</sup>**

Banks should set their prices and provisions so as to cover expected losses arising from exposures to risk. Banks' capital is the ultimate buffer against unexpected losses. After steadily rising since the early 1990s, the average risk asset ratio of the largest banks fell back slightly in 2000 H1, in part due to Lloyds TSB's acquisition of Scottish Widows (Chart 133). A number of banks have recently indicated that ratios might fall as a result of further share buy-backs or, increasingly, acquisitions.

The rise in the major banks' capital ratios during the 1990s reflected strong profitability, which persisted into 2000 H1 (Chart 134 and Table 11).

**Table 11: Profitability and capitalisation across selected peer groups, 2000 H1**

	Return on assets (%)	Return on equity (%)	Risk asset ratio (%)
Commercial banks	1.4	26.8	11.9
Mortgage banks	1.2	26.3	12.2
UK-owned investment banks	1.1	17.8	13.5
Other retail banks	1.6	19.1	12.7
Building societies	0.5	n/a	12.3

Sources: Published accounts, FSA and Building Societies Commission *Annual Report*.

Notes:

1. Figures are weighted by the relevant denominator, except for risk asset ratio for commercial banks, UK-owned investment banks and other retail banks, and return on assets and return on equity for commercial and mortgage banks, which are all unweighted averages.
2. Return on assets and return on equity are annualised, using H1 data.
3. For building societies, return on assets is return on mean assets.
4. Building societies have lower profitability by virtue of their mutual structure. They currently report a 'solvency ratio', which is calculated on a more conservative basis than the risk asset ratio.

Interest income did, however, increase more slowly in 2000 H1, especially for mortgage banks. While not much should be read into one set of results, retail banking markets have become more competitive over recent years, reflecting in part increased 'contestability' brought about by, for example, telephone banking and the internet. New entrants accounted for a significant share of new business, notably in credit cards, retail deposits and mortgage lending – apparently often on the back of aggressive pricing. More recently, the big retail banks seem to have recovered share in some markets (Charts 135 and 136), possibly because they have priced more competitively.

One effect of heightened competition has been a decline in banks' overall 'retail spread' (broadly, the gap between household lending and deposit rates); for a sample of banks this had fallen by 26 basis points between the start of the year and September,

<sup>36</sup> Banking sector liquidity is, on this occasion, discussed in a separate article in this Review.

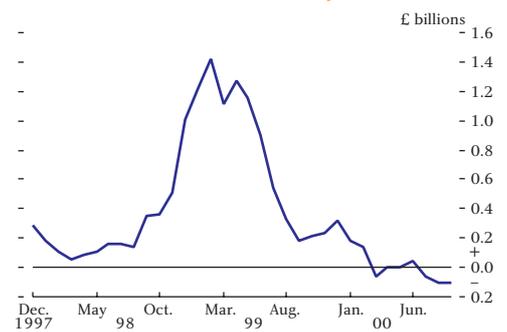
and by 13bp since the June Review (Chart 137). Bank contacts generally expect pressure on retail spreads to persist. Confidence amongst bankers, as measured by the latest (September) quarterly CBI survey, has fallen sharply recently; the balance of respondents optimistic about their overall business situation fell from +5 in June to -33. Respondents expected a sharp decline in the growth of personal sector business volumes. They also confirmed their long-standing view that competition is easily the most important constraint on business prospects (Chart 138). Reflecting that, some banks have stepped up efforts to introduce risk-based pricing, partly with the aim of competing more effectively to retain or attract profitable customers. Upward pressure on the cost of retail funds – another effect of intensified competition – is also one factor behind increased use of securitisation in the UK. In September, for example, Northern Rock securitised £1.3 billion of mortgages; and in November Abbey National announced a £2.4 billion mortgage securitisation – said to be the largest of its type in the European market.

In the medium term, the impact of increased competition will depend on a number of factors. These include whether current pricing structures – of both established banks and new entrants – prove sustainable; the willingness of customers to change banks – remortgaging, for example, influences the rate at which banks' existing loan portfolios are re-priced; and the extent to which banks can reap the benefits of new technology by reducing costs or improving sales per customer, so that profits per customer improve even if *product* profitability declines.

Other things being equal, any intensification of competition should be reflected in equity prices, which in principle should discount expected future dividend growth. That can be assessed using the method discussed in Box 3, Section I; the expected rate of future dividend growth implied by this technique is shown in Chart 139. While these estimates depend on some strong assumptions, such as a constant market risk premium, on the face of it equity prices do seem to imply a view that profit growth in the banking sector is unlikely to be maintained at recent levels.

What is the relevance of this to financial stability? Assuming competition continues to intensify, in the longer run banks might not be able to adjust margins to rebuild capital in the face of losses as readily as in the past (for example, in the early 1990s). Whether or not that will be so is highly uncertain, and is not obviously an immediate concern. In the shorter run, risks could potentially arise if some banks were imprudent in seeking to gain, or maintain, market share.

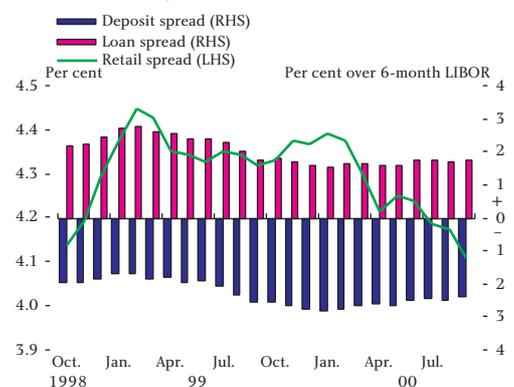
**Chart 136:**  
**New entrants' household deposits<sup>(a)(b)</sup>**



Source: Bank of England.

- (a) Three-month moving averages of monthly net flows.
- (b) Direct Line, Egg, Legal & General, Sainsbury's, Standard Life, Tesco, Marks & Spencer.

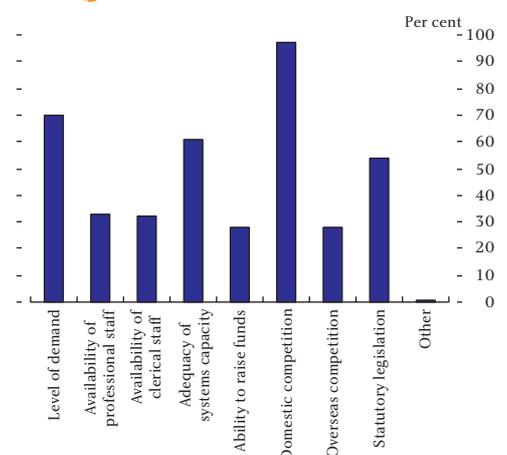
**Chart 137:**  
**Banks' retail spread<sup>(a)</sup>**



Source: Bank of England.

- (a) Weighted rate banks receive on household lending minus rate they pay for household deposits.

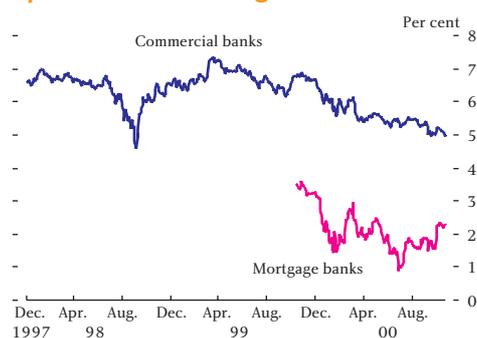
**Chart 138:**  
**Constraints on banking business – 2000 Q3<sup>(a)</sup>**



Source: CBI/PriceWaterhouseCoopers Financial Services Survey, (September 2000).

- (a) Percentage of respondent banks citing this factor as "likely to limit their ability to increase their level of business over the next 12 months".

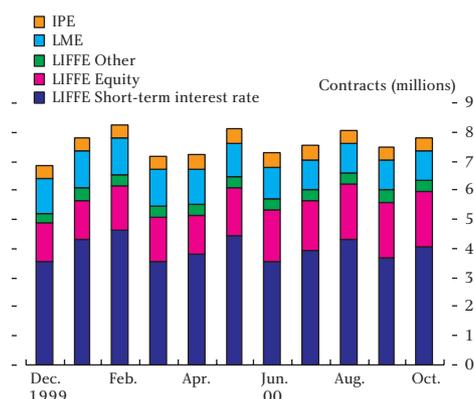
**Chart 139:**  
Implied real dividend growth<sup>(a)</sup>



Sources: Bloomberg, Bank calculations and Thomson Financial Datastream.

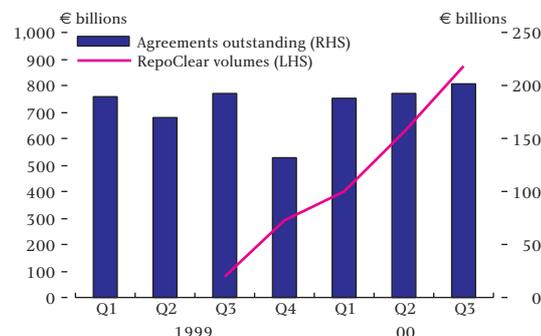
(a) Based on the dividend discount model. Estimates based on two-year rolling betas, a constant four per cent market equity risk premium and constant three per cent risk-free interest rates.

**Chart 140:**  
Open interest by type of contract on exchanges cleared by London Clearing House



Sources: LIFFE, LME and IPE.

**Chart 141:**  
RepoClear volumes and UK banks' euro sale and repurchase agreements



Source: Bank of England.

## The London Clearing House

The London Clearing House (LCH) acts as a central counterparty for exchange-traded contracts on LIFFE, the London Metal Exchange and the International Petroleum Exchange. Chart 140 shows open interest in the main types of exchange-traded contract for which LCH clears. The breakdown has changed little since the June Review, although LIFFE equity contracts have grown as a proportion of the whole over the year. Open interest in LIFFE short-term interest rate contracts remains, by some way, the largest constituent; the majority is accounted for by the Euribor contract.

LCH also acts as a central counterparty for cash and repo trades in European government bonds (RepoClear), OTC interest rate derivatives (SwapClear), and the Tradepoint stock exchange. The RepoClear service continues to expand. One of the key potential benefits to the 22 users of RepoClear is multilateral netting of exposures, which reduces users' balance sheet size, and so can facilitate greater market activity. RepoClear also provides multilateral netting of settlement obligations, which can reduce the settlement risk attached to cleared trades<sup>37</sup>. Since the introduction of the service in August 1999, RepoClear users have experienced an average reduction in delivery volumes approaching 50 per cent.

The November 1999 Review drew attention to the growth of the US repo market following the introduction in 1995 of a similar service to RepoClear. Chart 141 shows repo transactions of UK banks, denominated in euros, before and during RepoClear's existence. There is as yet no sign that RepoClear's growth has encouraged an increase in the size of the market, although transactions by non-UK RepoClear members are not covered by that data.

## Insurance sector developments

### Guaranteed annuities

As discussed in the June Review, guaranteed annuities remain an issue. During the 1970s and 1980s, several insurers sold pension products which offered a guaranteed minimum annuity rate on maturity. The fall in long-term interest rates during the 1990s meant that the guaranteed annuity terms of the insurer were more favourable than the terms on which an annuity could be bought on the open market.

In response, the mutual company Equitable Life adjusted the final bonus payments to policyholders who exercised their guaranteed annuity option, so that they would receive no more overall than policyholders who did not exercise the option. In July, the House of Lords ruled that Equitable Life could not make

<sup>37</sup> See Hills, R and Rule, D (1999) 'Counterparty credit risk in wholesale payment and settlement systems', November *Financial Stability Review*, which discusses the distinction between netting of development cost exposures prior to the settlement of forward transactions; and the netting of settlement obligations in particular bonds.

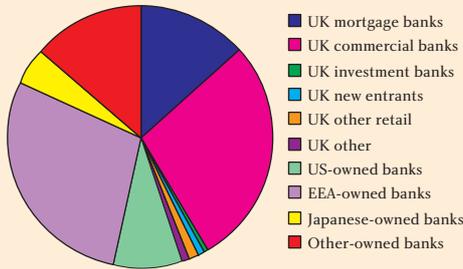
these adjustments. Since then, Equitable Life has been working through the consequences.

#### *Endowment policies*

The June *Review* highlighted that falling interest rates have also produced lower nominal returns on with-profit endowment policies, increasing the risk that payouts on policies used as mortgage repayment vehicles will fail to cover the debt outstanding. Some insurance companies have agreed to meet the cost of any shortfall, subject to certain conditions. Policyholders might seek redress for endowment policy shortfalls (if and when they emerge) because of alleged mis-selling. However, the FSA has announced that there are no grounds for an industry-wide review of past sales.

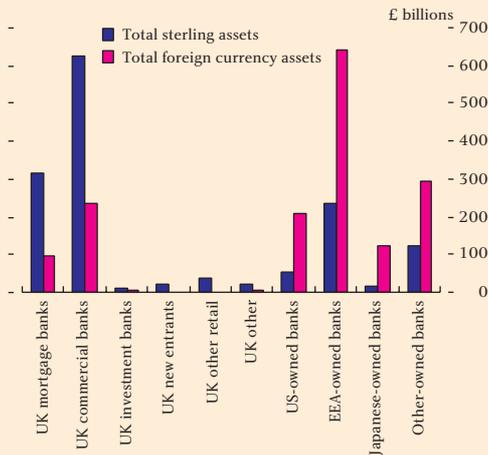
## Box 6: Peer-group-based surveillance of the banking sector

**Chart A:**  
Total assets of UK banking sector by peer group – September 2000



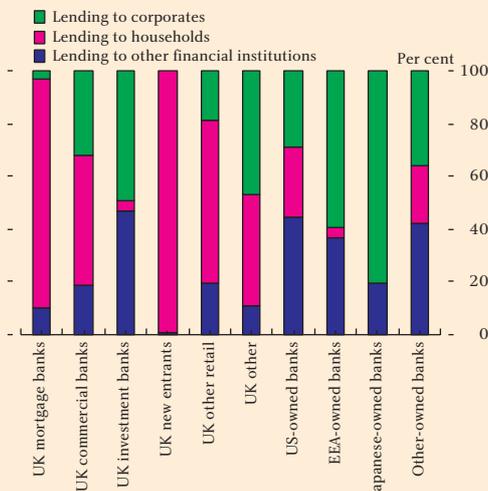
Source: Bank of England.

**Chart B:**  
Breakdown of UK banking sector assets by peer group – September 2000



Source: Bank of England.

**Chart C:**  
Peer groups' lending to the UK private sector – September 2000



Source: Bank of England.

There are 418 institutions authorised to take deposits in the United Kingdom<sup>1</sup>, varying widely in terms of size and business focus. The Bank's surveillance of the UK banking sector focuses on 'peer groups' of banks<sup>2</sup>, grouped by broad business mix, or by country of ownership in the case of foreign-owned banks. These groupings are, of course, somewhat arbitrary, and in some cases there is substantial variation between banks in the same peer group. For instance, the 'mortgage bank' peer group used by the Bank includes both banks that focus heavily on the mortgage market, such as Northern Rock, and more diversified banks, such as Abbey National. Nevertheless, looking at sub-sectors can reveal some important features of UK banking markets. This Box provides background which will be drawn upon in future *Reviews*.

At end-September 2000, UK banking sector assets totalled £3,100 billion, of which the major UK-owned commercial banks accounted for 28 per cent (Chart A). In total, the 112 UK-owned banks accounted for 45 per cent. Since 1987, their share has steadily risen from 36 per cent, in part reflecting the conversion of several large UK building societies into banks. The remainder was accounted for by the 306 foreign-owned institutions authorised to take deposits in the UK. Other EEA<sup>3</sup>-owned banks held 52 per cent of foreign-owned banks' total assets and US-owned banks 16 per cent. The share of EEA-owned banks has increased steadily in recent years, following the introduction of the Second Banking Co-ordination Directive 'single banking licence' for EU banks in 1989<sup>4</sup>.

UK banking sector (on-balance sheet) assets are split fairly equally between sterling and foreign currency. Sterling assets are held disproportionately by UK-owned banks (71 per cent) and foreign-currency-denominated assets by foreign-owned banks (79 per cent) (Chart B). Chart C shows that, of UK commercial and mortgage banks' private sector lending, the proportion of lending to households is significantly larger than that of the four foreign-owned bank peer groups.

<sup>1</sup>: As at 31 August 2000.

<sup>2</sup>: The UK-owned peer groups are: mortgage banks (Abbey National, Alliance & Leicester, Halifax, Northern Rock and Woolwich); commercial banks (Bank of Scotland, Barclays, HSBC Bank, Lloyds TSB, RBS NatWest and Standard Chartered); investment banks (Brown Shipley, Close Brothers, Lazards, NM Rothschild and Singer & Friedlander); new entrants (egg, Legal & General, Marks & Spencer, Sainsbury's, Standard Life and Tesco); other retail banks (Bristol & West, Clydesdale, Co-operative, and Yorkshire); and other UK-owned banks. The foreign-owned peer groups are: US-owned; other EEA-owned; Japanese-owned; and 'other'-owned.

<sup>3</sup>: The European Economic Area (EEA) comprises the 15 EU countries plus Iceland, Norway and Liechtenstein.

<sup>4</sup>: The Second Banking Co-ordination Directive became effective on 1st January 1993. It is now part of a Consolidated Banking Directive, adopted this year.

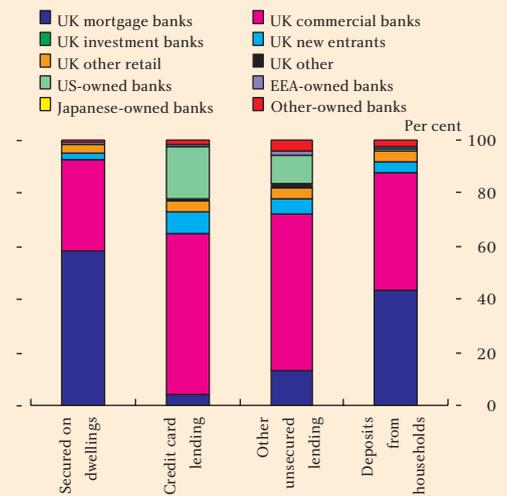
Similarly, Chart D shows that the UK-owned commercial and mortgage banks still have a large share of retail markets. Although new entrants have acquired a significant share of new business flows in some of these markets, they still have a relatively small share of the stock. However, US-owned banks had 20 per cent of the credit card-lending market at end-September.

Taken as a whole, foreign-owned banks tend to focus on investment banking and particular corporate lending markets. Their share of overall corporate lending was about 40 per cent at end-September. EEA-owned banks had particularly large shares of loans to some sectors, such as electricity, water and gas. Chart E shows the shares of lending to broad categories of UK industry.

Foreign-owned banks' relatively heavy involvement in investment banking in the UK is reflected in their sources of income. Dealing profits accounted for 36 per cent of EEA-owned banks' total income in 2000 Q2, and 45 per cent of the income of 'other foreign-owned' banks. Most UK-owned peer groups by contrast earn over half of their income from net interest earnings, the majority from retail banking (Chart F).

UK-authorized banks have large unsecured interbank exposures, centred on a relatively small group of banks. Bank of England research<sup>5</sup> on interbank exposures between a group of 21 UK-owned banks in 1997 showed that 89 per cent of the gross interbank placements were between the eight largest clearing banks. But UK banks also have exposures to foreign-owned banks. The same survey suggested that as much as 30 per cent of sterling interbank deposits are with overseas-owned banks.

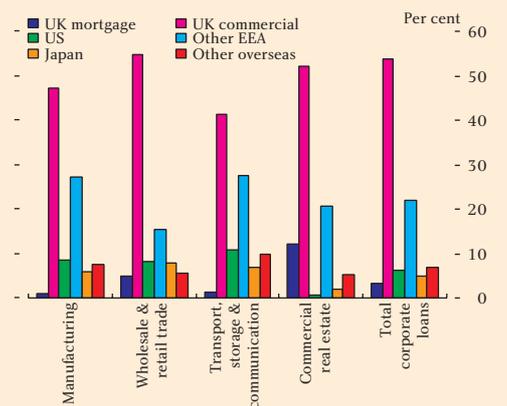
**Chart D:**  
Peer groups' share of retail lending and deposit markets – September 2000<sup>(a)</sup>



Source: Bank of England.

(a) Some peer groups' share may be too small to be visible.

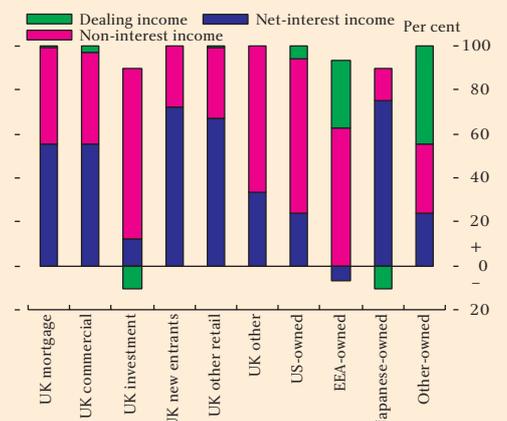
**Chart E:**  
Peer groups' share of corporate lending by industrial sector – September 2000<sup>(a)</sup>



Source: Bank of England.

(a) Loans and advances to UK resident corporates. 'Other overseas banks' are overseas banks other than US, EEA and Japanese. Only includes peer groups accounting for more than 3 per cent of lending to UK-resident corporates.

**Chart F:**  
Peer groups' sources of income – 2000 Q2



Source: Bank of England.

5: Michael, I (1998) 'Financial Interlinkages and Systemic Risk', *Financial Stability Review*, Spring.

## VII Risk-reducing developments in the financial infrastructure

This section looks at the progress since the June *Review* of some key official and market initiatives designed to reduce risks in the international financial system, and at some other developments affecting the environment.

### Developments in market infrastructure

#### *Consolidation of UK securities settlement systems and removing intraday payment exposures*

The transfer of the Central Gilts Office (CGO) from the Bank to the private sector ownership of CRESTCo, operator of the equities settlement system, was described in the June 1999 *Review*. Subsequently, following the passage of the necessary legislation and changes of contracts with members, gilt settlement moved successfully from CGO to CREST on 1–2 July 2000. As well as permitting significant operating efficiencies, the amalgamation of the UK securities settlement systems for government securities and for equities and corporate bonds was a necessary precursor to eliminating the large intraday exposures which currently arise among the banks which settle the payments leg of UK securities transactions.

There is currently no delivery versus payment (DvP) in the Central Moneymarkets Office, which is now also owned and operated by CRESTCo and settles trades in sterling and euro money market instruments. Legal and technical work is, however, underway to allow dematerialisation of money market instruments and their integration into the CREST settlement system. DvP will then be extended to these instruments<sup>38</sup>.

#### *SwapClear*

On 19 October 2000, LCH announced that agreement had been reached with a consortium of eight major banks that will finance the expansion of LCH's SwapClear service in return for control over future development. SwapClear currently clears vanilla swaps in four currencies, but will expand to include further currencies, cross-currency swaps, forward rate agreements and interest rate options. Initial estimates are that a phased roll-out, including transferring the banks' existing eligible swaps onto SwapClear, will occur over a two-year period. If SwapClear is as successful as its developers hope, it will have significant implications for volumes cleared by LCH and so for the risks which LCH bears and has to manage. It will reduce the exposure of SwapClear members to interbank risk and might also affect growth of the swap market.

<sup>38</sup>: See 'The Future of Money Market Instruments: Next Steps' Bank of England, March 2000 ([www.bankofengland.co.uk/markets/money/mmfuture.htm](http://www.bankofengland.co.uk/markets/money/mmfuture.htm))

### *LIFFE futures*

On 15 September 2000, LIFFE announced plans to launch stock futures (futures contracts on the shares of individual companies) from 29 January 2001. Fifteen Universal Stock Futures (USFs) contracts will be listed, covering leading UK, European and US companies such as AT&T, Cisco, Deutsche Bank and BP Amoco. Contracts will be cash settled and the exchange believes that USFs could offer exposure to a stock at about one third of the cost of taking a cash-market position (reflecting the absence of stamp duty and custody and settlement costs), although they do not provide voting rights. If these products prove popular, they might alter equity market trading patterns: for example, reducing the cost of taking short positions and potentially of hedging. They might also stimulate development of the equity options market.

### *Continuous Linked Settlement Bank*

An article in the November 1999 *Review* described the interbank exposures which arise because the two legs of foreign exchange transactions are settled at different times across the payment systems for the two currencies, and the efforts of the Governors of the G10 central banks to promote reduction of the associated systemic risk. The Continuous Linked Settlement Bank (CLSB) is one, private sector, initiative to address settlement risk through payment versus payment – the simultaneous settlement of the two legs of foreign exchange transactions. Following the unwelcome delay reported in June, the CLSB is now scheduled to start live operation in the final quarter of 2001. Efforts to raise new capital from shareholders to cover costs associated with this delay, including extra payments to IBM (the CLSB project's main IT supplier), were successful.

## **Regulatory and legal developments**

### *Foreign exchange settlement risk: new supervisory guidance*

A further, regulatory, initiative to address foreign exchange settlement risk was the publication, in September 2000, by the Basel Committee on Banking Supervision (BCBS) of 'Guidance for Supervisors on Managing the Settlement Risk Arising from Foreign Exchange Transactions'. All banks involved in the foreign exchange market should act on these recommendations in order to improve practices for the measurement and control of settlement exposures.

### *Settlement finality*

The June *Review* recorded the EU payment and securities settlement systems designated under the Settlement Finality Directive as at 8 June 2000. Since then, the Bank Giro Centre in Sweden has been the only addition to the list.

### *French provisioning policy*

Over the past year, France's Commission Bancaire (CB) has reviewed its thinking about provisioning policy, with the aim of

making provisioning more prudent and less pro-cyclical. The CB's 1999 Annual Report, issued in July 2000, confirmed its intentions. Currently, more provisions must be set aside as loans become impaired, potentially accentuating an economic downturn to the extent that credit pricing and terms are affected. The CB hopes that 'pre-provisioning', relying on internal ratings by type of counterparty to determine statistical default rates, would operate counter-cyclically and make banks better prepared for crises. The design should encourage banks to recognise risk characteristics of their loan book by reflecting, from the outset, the risk entailed in granting a loan. In the June *Review* Jackson and Lodge similarly argued that there was a need for a debate by the industry and regulators on provisioning methods against expected losses in loan books to produce a more forward-looking approach to credit risk<sup>39</sup>. The French proposals follow similar moves by the Spanish authorities in December 1999. Among others, Portugal and Denmark also have dynamic provisioning systems. In anticipation of the changes, some French banks have already announced forward-looking provisioning but others are waiting for an EU or BCBS initiative.

#### *Debt restructuring – Elliott Associates L.P. and Peru*

The complexity and risks surrounding country debt restructuring have been highlighted by a legal case involving the government of Peru and Elliott Associates, a New York hedge fund. Elliott began its involvement with Peru in 1996, when the government was negotiating an agreement with creditors to restructure into Brady bonds loans on which it had defaulted in 1983. The hedge fund bought government-sponsored commercial bank loans for around half their face value. It then declined to participate in the restructuring and pressed for full repayment of the loans plus interest. A New York judge initially dismissed Elliott's case, stating that entities cannot purchase debt with the intention of suing. But that ruling was overturned in October 1999. Having obtained judgment in the US courts, Elliott took steps to have the judgment enforced by, amongst others, the courts in Belgium. The Belgian Court of Appeal imposed a restraining order on Euroclear to stop the payment of coupons on Peru's Brady bonds. Prior to the grace period on the Brady coupon expiring, the Peruvian authorities decided to pay the full judgment value (plus post-judgment interest) – more than \$58 million - to avoid a default on its bonds.

A lesson some are drawing from this case is that it may be less difficult to attach sovereign assets than many people had thought. It is important to note that the outcome could have been different had the matters been fully argued – the Belgian orders were preliminary and made in the absence of the parties bound by them. Nonetheless, in the event of a sovereign default,

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<sup>39</sup>: Jackson, P and Lodge, D 'Fair Value Accounting, Capital Standards, Expected Loss Provisioning and Financial Stability', June 2000 *Review*.

more investors may decide to seek legal judgments and then seek to enforce their claims by attaching payments going through payment and settlement systems. This could make it more difficult to achieve orderly sovereign debt workouts where bonds account for a significant share of the outstanding debt.

## Codes and standards

### *Core principles for systemically important payment systems*

The international initiative to establish core principles for systemically important payment systems was described in an article in the *June Review*<sup>40</sup>. Building on the initial December 1999 paper, a second fuller consultative document was published in July 2000, including detailed guidance on how to implement the principles with some examples. The document is already being put to practical use in a range of countries. The final version is likely to be published in January 2001. It has been designated by the Financial Stability Forum as one of the key standards for the development of sound financial systems, and the extent of some countries' adherence has already been assessed as part of the IMF/World Bank Financial Sector Assessment Programme. The results of the assessments have been published as 'Reports on the Observance of Standards and Codes' on the IMF website ([www.imf.org](http://www.imf.org)).

### *INSOL Lending Group*

The Lenders Group of Insol International<sup>41</sup>, the global insolvency body, published in October 2000 a 'Statement of Principles for a Global Approach to Multi-Creditor Workouts' (the Principles, see Box 7). This culminates around five years work by the Insol Lenders Group (ILG), a committee of senior corporate recovery bankers based in London. (The Bank of England is represented on the Group.)

Representatives from over 150 institutions in many countries have been involved in the project, including many banks and investment banks, insurance companies, institutional investors, hedge funds, secondary market and distressed debt purchasers and insolvency professionals, together with governments and regulatory authorities. The Principles have been endorsed by the World Bank and the British Bankers' Association.

The Principles are intended to be statements of best practice for all multi-creditor corporate workouts. They are designed to foster a collective approach by creditors to a debtor company in financial difficulty, based on the view that this can help to preserve value, to the benefit of the creditors as a whole and of others with an interest in the company. The Principles are

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<sup>40</sup>: Sawyer, D and Trundle, J 'Core Principles for Systemically Important Payment Systems', June 2000 *Review*.

<sup>41</sup>: Insol International is the Worldwide Federation of National Associations of Accountants and Lawyers Specialising in Insolvency. The Federation's website is [www.insol.org](http://www.insol.org).

## Box 7: Statement of principles for a global approach to multi-creditor workouts

The Principles are:

1. Where a debtor is found to be in financial difficulties, all relevant creditors should be prepared to co-operate with each other to give sufficient (though limited) time (a 'Standstill Period') to the debtor for information about the debtor to be obtained and evaluated and for proposals for resolving the debtor's financial difficulties to be formulated and assessed, unless such a course is inappropriate in a particular case.
2. During the Standstill Period, all relevant creditors should agree to refrain from taking any steps to enforce their claims against or (otherwise than by disposal of their debt to a third party) to reduce their exposure to the debtor but are entitled to expect that during the Standstill Period their position relative to other creditors and each other will not be prejudiced.
3. During the Standstill Period, the debtor should not take any action which might adversely affect the prospective return to relevant creditors (either collectively or individually) as compared with the position at the Standstill Commencement Date.
4. The interests of relevant creditors are best served by co-ordinating their response to a debtor in financial difficulty. Such co-ordination will be facilitated by the selection of one or more representative co-ordination committees and by the appointment of professional advisers to advise and assist such committees and, where appropriate, the relevant creditors participating in the process as a whole.
5. During the Standstill Period, the debtor should provide, and allow relevant creditors and/or their professional advisers reasonable and timely access to all relevant information relating to its assets, liabilities, business and prospects, in order to enable proper evaluation to be made of its financial position and any proposals to be made to relevant creditors.
6. Proposals for resolving the financial difficulties of the debtor and, so far as practicable,

arrangements between relevant creditors relating to any standstill should reflect applicable law and the relative positions of relevant creditors at the Standstill Commencement Date.

7. Information obtained for the purposes of the process concerning the assets, liabilities and business of the debtor and any proposals for resolving its difficulties should be made available to all relevant creditors and should, unless already publicly available, be treated as confidential.
8. If additional funding is provided during the Standstill Period or under any rescue or restructuring proposals, the repayment of such additional funding should, so far as practicable, be accorded priority status as compared to other indebtedness or claims of relevant creditors.

Three difficult areas during discussions were: the standstill (Principle 1); debt trading (Principles 2 and 7); and new money (Principle 8). The commentary on Principle 1 recognises that a *standstill* may not be appropriate in all cases and allows a creditor to petition for insolvency without allowing a standstill.

The right to *trade corporate debt* during the standstill is in Principle 2, although the commentary on Principle 7 allows creditors the option of agreeing some restriction on debt trading during the standstill if the creditor group consists solely of banks.

On *new money*, the areas of uncertainty related to the degree of priority to be attached to additional lending and whether such lending should be subject to unanimity on the part of creditors. Principle 8 states that the repayment of new money should have priority status as far as practicable. But Principle 8 is silent on unanimity. The commentary states that, ideally, all relevant creditors should be given the opportunity to provide new money, in proportion to their exposures to the debtor at the Standstill Commencement Date. It recognises, however, that not all creditors may wish to provide new money; in these circumstances, the distribution of any benefits associated with new money needs to be decided by negotiation and case by case.

broadly consistent with the London Approach to corporate workouts<sup>42</sup>.

#### *Hedge accounting for foreign exchange exposures*

The Financial Accounting Standards Board (FASB) issued new guidance on US corporate accounting for hedges of foreign exchange exposures on 15 June 2000. FAS 138 took effect immediately and amends FAS 133 which, as originally drafted, would have marked foreign exchange hedges to market separately from the underlying transaction that they were hedging. US counterparties were concerned that, whereas the underlying transaction was required to be marked to market at spot rates (by virtue of FAS 52), FAS 133 required hedging derivatives to be marked to market on the basis of forward rates. The spot/forward differential would generate a distortion to the net value of the hedged transaction. The new provision might encourage the use of foreign exchange hedging by US corporates, potentially facilitating arbitrage between different currency markets, and reducing risk.

#### **International financial institutions**

In order to streamline its processes and remove some distorting incentives the IMF has made changes to its main non-concessional lending facilities and eliminated several redundant ones. Early repayment expectations have been introduced into the main lending facilities (Stand-by Arrangements (SBAs) and the Extended Fund Facility (EFF)) to discourage the use of IMF funds as a source of long-term financing. The IMF has also clarified that the EFF is to be used only in cases of long-term balance of payments difficulties. In addition, there will be a surcharge under SBAs and EFFs to discourage excessive borrowing: 100 basis points for credit in excess of 200 per cent of quota and 200 basis points above 300 per cent. The Contingent Credit Line (CCL) facility, introduced last year as a crisis management instrument, has been made more attractive by making funding more automatic and reducing the interest surcharge and commitment fee. There will also be a presumption of post-programme monitoring for countries with large credit outstanding.

At its September meetings, the International Monetary and Financial Committee (IMFC) endorsed recent efforts to further develop a framework on private sector involvement (PSI) in crisis prevention and management. IMFC agreed that PSI should be based on voluntary approaches as much as possible, including in cases where catalytic financing and policy adjustment are insufficient. They noted, however, that in extreme cases, temporary suspension of payments or standstills may be unavoidable.

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<sup>42</sup>: For a detailed exposition of the issues involved in corporate workouts in the UK, including those relating to creditor co-ordination in the context of the London Approach, see 'Corporate Workouts, the London Approach and Financial Stability', Brierley, P G and Vlieghe, G W, November 1999 *Review*.

# Banking system liquidity: developments and issues

Graeme Chaplin, Alison Emblow and Ian Michael, Financial Industry and Regulation Division, Bank of England<sup>1</sup>

The liquidity of the banking system often receives less attention than its capital adequacy, but is also vital to stability. This article reviews developments in the UK in recent years in the light of a series of official initiatives – gilt repo, real-time gross settlement, new regulatory requirements – that have changed the environment in which banks manage their liquidity. While, at least on a simple measure, the degree of maturity transformation does not seem to have altered much, the composition of banks' liquid assets has changed significantly. For the future, some issues include the industry's use of scenario analysis to assess liquidity needs in stressed markets; how to measure and manage contingent cash flows associated with committed loan facilities and derivative contracts; and the increasing need for banks to manage liquidity and collateral needs intraday in modern payment and settlement systems.

**MATURITY TRANSFORMATION** and the provision of liquidity insurance are core banking businesses. Banks protect customers against liquidity problems by taking in money which can be withdrawn on demand or at short notice, and by providing committed loan facilities to corporate customers and overdraft facilities to personal sector customers. These clearly are services which customers value and for which they are willing to pay. But by insuring others against liquidity risk, banks become exposed to it themselves. In fact, the structure of bank balance sheets – generally illiquid loans funded by highly liquid deposits, and on-demand off-balance sheet commitments – leaves them inherently exposed to the risk of liquidity crisis. Coupled with the macroeconomic and social costs of a breakdown in the payment system and/or in the capacity of banks

to intermediate savings<sup>2</sup>, this vulnerability to crisis provides one rationale for official oversight of the banking system as a whole and for the regulation of individual banks.

One potential trigger for deposit runs is fear that a bank may be insolvent. A vital ingredient, therefore, in protecting against runs is for the business and balance sheets of banks to be fundamentally sound<sup>3</sup>. Official actions, going back over two decades and more, to develop and update capital adequacy standards<sup>4</sup> have indeed been directed precisely at this objective. So are more recent official initiatives to promote greater transparency<sup>5</sup>. Banks must not only maintain a prudent margin of solvency, they must be seen to do so to maintain market and customer confidence.

<sup>1</sup>: We would like to thank colleagues in the Financial Market Operations, Financial Stability and Monetary Analysis areas of the Bank and at the Financial Services Authority (FSA) for many useful comments and suggestions, and those firms who gave up their time to meet us.

<sup>2</sup>: For estimates of the fiscal costs of banking crises see Caprio and Klingebiel (1996, 1999) and of the output costs see IMF (1998a), Aziz et al (2000) and Hoggarth et al (2001, forthcoming).

<sup>3</sup>: The academic literature on banking crises typically distinguishes between two views of panics. One is that they are self-fulfilling prophecies driven by 'sunspots', ie random events unrelated to changes in the real economy (see, eg Diamond and Dybvig, 1983). The other is that bank runs are a natural outgrowth of economic fundamentals (Gorton, 1988). Recent work by Morris and Shin (2000) reconciles these views, suggesting both that banking panics are correlated with poor fundamentals and that inefficient self-fulfilling panics occur. Chui, Gai and Haldane (2000) illustrate this approach in the context of a model of sovereign liquidity crises, and show how prudent national balance sheet management may help forestall country runs.

<sup>4</sup>: A broadly based international agreement on minimum bank capital standards was reached in the Basel Accord of 1988 – Basel Committee on Banking Supervision (BCBS) (1988). A completely revised Accord, to reflect more recent developments in banking and markets, is currently under discussion – BCBS (1999).

<sup>5</sup>: International initiatives include development of enhanced bank disclosure recommendations by the BCBS to facilitate market discipline and so complement minimum capital requirements (BCBS 2000a); revision by the International Accounting Standards Committee of its International Accounting Standard (IAS) 30, addressing disclosures by banks and other financial institutions; and development of risk-disclosure templates by a multi-disciplinary working group comprising representatives of the BCBS, the BIS Committee on the Global Financial System (CGFS), the International Association of Insurance Supervisors (IAIS), and the International Organisation of Securities Commissions (IOSCO).

Solvency is not, however, a cast-iron guarantee against funding problems, which can themselves damage a bank's capital adequacy. Indeed, as the crises in East Asia during 1997–98 show, runs can still overcome entire banking systems<sup>6</sup>. And as the article by Andrew Logan in this *Review* discusses, the roots of the UK's small banks' crisis in the early-1990s included over-reliance on particularly vulnerable financing structures.

The need for sound firm-level and system-level liquidity management is not, therefore, rendered obsolete by improvements in the management and regulation of credit, market and other types of risk. That is reflected in the recent update by the Basel Committee on Banking Supervision (BCBS) of their paper on sound practices for managing liquidity risk<sup>7</sup>. It has also been underlined by the Financial Stability Forum (FSF), which has recommended, for example, that liquidity mismatches in the foreign currency business of banks should be monitored not only at the level of individual banks but also in aggregate; and that where a country's own currency might not, in times of stress, be freely convertible, any such mismatches should be assessed in the light of the country's foreign exchange reserve holdings<sup>8</sup>. Authorities in a number of countries, encouraged by the International Monetary Fund, the Group of 20 and the FSF, are increasingly monitoring liquidity in key sectors, especially the public and banking sectors, and more generally the overall shape of the national balance sheet. The Bank has recently published an example of this kind of analysis for the United Kingdom<sup>9</sup>.

This article complements that work by reviewing developments over recent years in banking system liquidity and in liquidity management practices. It looks particularly at how sterling liquidity management has been affected by a series of market, infrastructure and regulatory reforms during the past decade, as well as by wider developments in the financial system. It draws on quantitative information

on UK banks' liquidity and on discussions with a range of commercial banks and securities dealers. The area is of vital interest to central banks, whose core functions – as providers of the ultimate monetary settlement asset – put them at the heart of liquidity provision, to the banking sector and to the economic system as a whole (Box 1).

### General issues in bank liquidity management

There are two separate but inter-related dimensions to a bank's liquidity. First, its cash flow position and its ability to meet short-term needs by borrowing in the market, and, second, its capacity to meet any liquidity pressures by selling high quality assets<sup>10</sup>. The precise character of a bank's liquidity management depends, however, on its business mix and the structure of its balance sheet – for example, whether it takes deposits from the public, provides committed loan facilities, has an active derivatives business, acts as a dealer providing (and needing) liquidity in asset markets, or provides payment and settlement services for customers and other banks.

The starting point for liquidity management for many banks is to consider the extent to which liabilities falling due are matched by maturing assets. This may be monitored using the 'ladder' approach, which compares cash inflows and outflows at particular time horizons – next day, next week etc. Often assets and liabilities have a so-called 'behavioural maturity' different from their contractual maturity. For example, while many retail deposits can be withdrawn without notice, their average actual maturity (behavioural maturity) is longer. Term deposits, and interbank funding, are often 'rolled over'. Similarly, on the asset side, overdrafts, while technically callable, have an indefinite maturity, while mortgages are often repaid early. Banks therefore need to assess, based on experience and current and prospective market conditions, both the *expected* behavioural maturity of their liability and asset positions, and the risk of *unexpected* liquidity needs.

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6: 'Together with the drying up of liquidity in the international interbank market, the countries in crisis experienced depositor runs from weaker to stronger banks and from the banking system as a whole.' IMF (1998b).

7: BCBS (2000b). The main recommendations were summarised in the June 2000 *Review*, p. 79.

8: FSF (2000).

9: Senior and Westwood (2000).

10: These are related to the concepts of 'funding liquidity' and 'asset market liquidity' discussed in Counterparty Risk Management Policy Group (1999) (Corrigan-Thieke Report).

While a bank might normally be able to assume that maturing assets and liabilities will be replaced, it also has to consider changes in the expected level of new loans and deposits, arising either from its own strategy or developments in the market. Default by a customer means that cash flows are not received when they are contractually due. Other cash flows, such as tax liabilities and dividend payments, also need to be assessed.

A central element of liquidity management is how any unexpected shortfall between cash outflows and inflows is addressed. In normal market conditions, banks have a range of approaches available, depending on their particular characteristics and the desired structure of their book. They can issue certificates of deposit (CDs) or bills. They can borrow, secured or unsecured, directly from other banks. They can sell or repo (borrow against) any high quality liquid assets held as a buffer. For example, banks active in the sterling money markets can use gilt repo, or borrow against a range of other paper and securities. In considering the role of liquid assets, banks will, therefore, make a judgment about the marketability of an instrument, the timescale in which it can be mobilised, and the additional 'haircut' that would be applied when obtaining cash against it<sup>11</sup>.

Liquidity management is, however, rather more complicated than this suggests.

First, there is a cost-benefit trade-off. A bank could protect itself more or less completely by eliminating maturity mismatches, and/or by holding the bulk of its assets in highly-liquid, low credit-risk instruments. That would produce a safe bank, but one with low earnings because it would be a lot more liquid than needed in normal conditions. In practice, therefore, banks' liquidity management has traditionally protected them against mildly abnormal circumstances but not out-and-out panic runs. Where to strike the balance is difficult. Perhaps reflecting this, banks report that they are evaluating their liquidity requirements under a variety of stress scenarios. Their assessment will vary depending on whether it is a liquidity problem for the individual bank, or for the market as a whole. In stressed market conditions, banks may experience, for example, withdrawal of deposits and increased defaults. Asset

liquidity may dry up for all but the highest quality securities, which also affects a bank's ability to maintain securitisation programmes. Such stress testing is, therefore, vital for prudent liquidity management as well as for capital management. As the Asian and LTCM crises demonstrated, credit risk, market risk and liquidity risk can be positively correlated in adverse conditions.

Secondly, banks with business in foreign currencies have to decide the extent to which they should manage it separately from their domestic currency book. In normal conditions there is a deep and liquid market in the currencies of major industrial countries, which enables banks to use foreign exchange swaps to convert available liquidity into the required currency to meet liabilities. However, there may be circumstances in which foreign currency liquidity should be considered separately, and managed on a currency by currency basis; for example, if currency business is significant, or banks have operations in currencies which are less liquid or are liable to become so in stressed conditions. What happened to some Asian banks during the 1997–98 crisis underlines this.

Thirdly, it is necessary to take into account the potential impact on cashflows of a variety of off-balance sheet contingencies, for example, undrawn commitments, including back-up lines for commercial paper programmes and contingent cashflows associated with the exercise of options which a bank has written. These activities have grown rapidly in recent years. Back-up lines will tend to be drawn down in two types of circumstances: where a borrower's credit position has deteriorated, so that the lending bank faces a poor quality credit exposure; or where the capital markets have 'closed down', in which case many borrowers may simultaneously draw down facilities. The latter occurred in the US during the post-Russia/LTCM turbulence, when corporates fell back on commercial banks, causing aggregate credit growth to expand in October compared to a month earlier by 30 per cent at an annualised rate. This kind of wholesale reintermediation of credit need not cause problems for banking system liquidity provided confidence in banks holds up. This confidence allows banks to meet draw-downs by issuing their own liabilities (possibly expanding broad

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<sup>11</sup>: This involves the borrower providing collateral of a greater value than the amount of cash being lent, in order to protect the lender from movements in the market value of the collateral over the period between adjustments to collateral provided.

## Box 1: Banking system liquidity and the central bank

Liabilities of the Bank of England constitute the fundamental liquidity underpinning the sterling monetary system. For the issues considered in this article, the balances of the large commercial (or settlement) banks at the Bank of England play a number of important and inter-related roles<sup>1</sup>:

- Daily flows of payments in the high-value payment system are made by the settlement banks across accounts at the Bank.
- The settlement banks need to maintain positive balances at the Bank on a daily basis (and within each day). The consequent demand for central bank money is the fulcrum of monetary policy implementation. The Bank supplies the funds necessary to meet the banking system's end-of-day need at the official interest rate.
- The Bank is in a position, if necessary in special circumstances, to increase the supply of sterling liquidity by expanding its balance sheet, thereby increasing aggregate settlement bank balances at the Bank.

### Payment system

The Bank of England is the banking system's bank for sterling payments. In the UK's tiered system, the settlement banks act in turn as bankers for other banks that are not direct members of the high-value payment system<sup>2</sup>. Payments between settlement banks, including those arising from these 'correspondent' relationships, are settled by transfers between their accounts at the Bank of England. The settlement banks seek to ensure that any liquidity needs arising from correspondent bank activity are dealt with through the market during the day. But banks with large correspondent businesses may have difficulties predicting the intraday flows that can arise from their correspondents' activities. If unexpected payment flows late in the day lead to deviations in banks' positions, the settlement banks lend surplus balances to each other to cover individual shortages through an *end-of-day transfer scheme*.

The terms on which funds are transferred between banks at the end of the day can affect liquidity conditions during the day. In the past transactions were priced at the high of the day, but since March 2000 borrowing has been priced at the high of the day and lending at the low of the day. This has created an incentive for banks to resolve their positions earlier in the day. These mechanisms are designed to ensure that the liquidity in the system is appropriately distributed by the end of each day.

### Monetary policy implementation

The private sector's demand for notes and for balances with the Bank of England creates a stock of net indebtedness to the Bank on the assets side of its balance sheet. This stock takes the form of largely repo assets acquired by the Bank in its routine money market operations. The assets are short-term and a proportion mature each working day. The Bank operates in the sterling money markets each day – at the repo rate decided by the Monetary Policy Committee (Box 2).

The Bank undertakes its operations with direct counterparties in the repo market. The liquidity provided finds its way to individual institutions either directly, if its counterparties have a short position, or indirectly through transactions in the money markets (repo or unsecured) which the Bank's counterparties undertake with the rest of the banking system.

### Special circumstances

It is for the private sector to manage its liquidity. But the Bank of England's position as ultimate provider of sterling liquidity gives it a capacity to act in special circumstances when appropriate. If special circumstances affect the banking system as a whole, the Bank can conduct its market operations to create a larger than normal stock of banks' balances at the Bank. For example, the Bank would have been prepared to do this around the turn of 1999/2000, if demand for central bank balances had increased on account of concerns about the reliability of computers around the millennium date change. Alternatively, special circumstances may affect an

<sup>1</sup>: Central bank liabilities are held in the form of Bank of England notes. Commercial banks pay for these by drawing on their balances at the Bank of England, but banknotes are not otherwise considered here.

<sup>2</sup>: The settlement banks are direct participants in the UK high-value payment system (Sterling CHAPS) and they settle the cash leg of CREST securities transfers.

individual institution when there is no need to supply more liquidity to the system as a whole. In that case, liquidity could in principle be provided to the institution, with the Bank's regular money market operations scaled down accordingly so that the total provision of liquidity to the system was unaffected.

Official operations to provide 'emergency liquidity assistance' to individual institutions have been very rare in the UK<sup>3</sup>. The UK authorities' policy is that the Bank should have the capacity to conduct such operations, but they should be undertaken only in exceptional circumstances<sup>4</sup> and after discussion with the regulator (FSA) and the finance ministry (HMT). Relevant considerations would include whether, given the state of the system as a whole, the failure of an illiquid institution could have an adverse impact on

the financial system, for example via interbank or payment system linkages or via contagion<sup>5</sup>.

The likelihood of a fundamentally solvent bank being hit by a rapid withdrawal of individuals' deposits is limited in most countries, including the UK, by the existence of (partial) retail deposit insurance, and by broad-based confidence that liquidity management is prudent and subject to oversight by the market and by regulators/financial stability authorities. Banks are perhaps more likely to be vulnerable to withdrawals by uninsured depositors, such as other banks and large non-bank institutions. As discussed by Andrew Logan elsewhere in this *Review*, the last occasion on which the Bank provided emergency assistance – to a few small banks in the early-1990s – followed the withdrawal of wholesale deposits in a fragile macroeconomic and financial environment.

<sup>3</sup>: See Bank of England (1978) and Bank of England (1993).

<sup>4</sup>: The Memorandum of Understanding between HM Treasury, the Bank of England and the FSA states that 'Such a support operation is expected to happen very rarely and would normally only be undertaken in the case of a genuine threat to the stability of the financial system to avoid a serious disturbance in the UK economy.'

<sup>5</sup>: George (1994). The academic literature in this area is reviewed in Freixas et al (1999).

money). But individual banks which write such facilities on a large scale do need to have measures in place to monitor and control the associated risks.

Finally, changes in payment and settlement systems, domestically and internationally, are making intraday horizons a crucial element of liquidity management for some large banks.

### **Sterling liquidity: changes in the environment**

How banks tackle these challenges depends to a large extent on the environment within which they operate – including the structure of money markets and payment systems, how the central bank meets the system's liquidity needs, and regulatory requirements. There have been major changes in each of these areas in the United Kingdom since the mid-1990s. One objective of the work reported in this article was, therefore, to trace through their effects on the demand of the banking system for liquid assets and

on the liquidity of different instruments. The reforms themselves are first summarised (see Boxes 2–5 for more detail).

### **Money markets, and the Bank's official operations**

The key change in the *sterling money markets* was the removal in January 1996 of obstacles to a market in gilt sale and repurchase transactions ('gilt repo')<sup>12</sup>, which created a broadly-based market in secured sterling money. In a gilt repo transaction, gilts are effectively used as collateral against cash borrowed by an institution. The same transaction but in the opposite direction – reverse repo – is used by market participants to make a secured money market loan, to acquire a highly liquid asset, as well as to cover short positions in gilts<sup>13</sup>. The gilt repo market replaced and liberalised the previous arrangements under which only Gilt Edged Market Makers (GEMMs) and discount houses were allowed to go short of gilts, which they would borrow from end-investors via

<sup>12</sup>: The wide-ranging reforms required to introduce the gilt repo market were set out in a series of consultative papers and market notices, and are summarised in Bank of England (1996a and 1997).

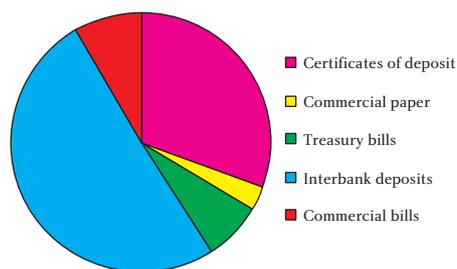
<sup>13</sup>: As well as so-called General Collateral (GC) repo, where money lent is secured against gilts of any kind, there is also a market when a firm wishes to borrow a specific gilt, for example to cover a short position or to deliver into a futures contract.

specialised intermediaries, Stock Exchange Money Brokers (SEMBs). The GEMMs funded part of their long positions in gilts by placing these as collateral with the SEMBs. In this earlier system, the wider secured sterling money market was effectively confined to secured deposits with the discount houses. It is now universal.

In part reflecting this change, a number of important modifications have been made to the *Bank's open market operations* since the mid-1990s (Box 2). These include employing gilt repo as a key instrument in the Bank's own operations; more recently, further widening the types of instrument eligible to be repo'd to the Bank; broadening the set of counterparties with which the Bank deals to include banks and securities dealers; and revising the terms of the late lending facility available to the settlement banks which are required to maintain positive balances on their accounts at the Bank.

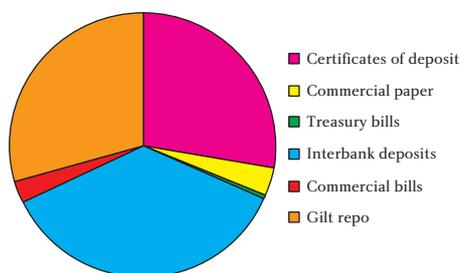
The value of sterling money market instruments outstanding has grown from a little under £250 billion in December 1995, prior to the introduction of the gilt repo market, to around £450 billion in September 2000 (from 33 per cent to 49 per cent of annual nominal GDP). At the same time, there have been some striking changes in the composition of the market (Charts 1 and 2). Gilt repo has grown strongly, with outstandings currently around £130 billion, or some 30 per cent of the estimated size of total sterling money market instruments. Both banks and non-banks are important participants in this market (Chart 3). Correspondingly, the share in the overall money market of unsecured interbank lending has fallen, from around one-half to about one-third – although it has grown in absolute terms from around £115 billion to some £165 billion (from 16 per cent to 18 per cent of annual nominal GDP), and it remains the largest single item. The share of CDs has remained broadly constant, although the absolute amount in issue has risen; and, as discussed below, their share in UK commercial banks' stock of liquid assets has risen sharply. The proportions of sterling money market instruments represented by Treasury bills and eligible bank bills – core instruments for sterling liquidity management a generation ago – were already fairly modest in the mid-1990s and have fallen further since then.

**Chart 1:**  
Composition of sterling money market – 1995 Q4



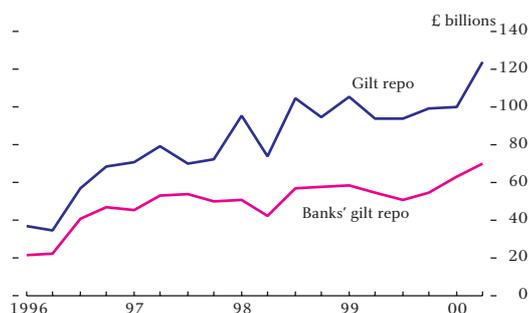
Source: Bank of England.

**Chart 2:**  
Composition of sterling money market – 2000 Q3



Source: Bank of England.

**Chart 3:**  
Gilt repo amounts outstanding



Source: Bank of England.

### Payment systems

Another, but quite separate, major change in the London market was the introduction of Real-Time Gross Settlement (RTGS) for high-value sterling payments in April 1996 (Box 3), replacing the previous end-of-day net settlement arrangements. Since then the settlement banks have needed to manage *intraday* the balance of payments and receipts, the majority of which relate to their customers' business, and to ensure that they have

## Box 2: Changes to Bank of England open market operations since 1997

### Background

From 1980, when there was an overhaul of official monetary operations, the Bank conducted open market operations by dealing primarily through a limited group of counterparties, the discount houses, rather than directly with the wider banking system. It dealt in high quality, short-term money market instruments such as Treasury bills and eligible bank bills (bank acceptances, and so three-name paper). The Bank provided liquidity against such collateral to the discount houses which distributed the liquidity around the wider banking system. These arrangements had historically entailed commercial banks holding a large part of their liquidity as secured money with the discount houses, although they gradually moved away from this as they developed their treasury functions during the 1980s and as the Bank gave them greater freedom to do so.

### Reform of open-market operations, 1997-2000

*Counterparties:* The range of institutions with whom the Bank is prepared to establish a counterparty relationship was widened to include banks and securities houses active in at least one of the instruments eligible in the Bank's operations, increasing the number of counterparties intermediating the Bank's liquidity to the rest of the market<sup>1</sup>.

*Instruments:* From 3 March 1997, following a year of private sector trading in the new gilt repo market, the Bank widened the instruments used in its routine operations to include gilt repo. Since 1997, it has accounted regularly for more than one-half of the total refinancing provided. Since 1998 the Bank has further extended the range of eligible collateral,

notably to include a wide range of central government/central bank securities denominated in euro. This has expanded the range of eligible collateral to more than £2 trillion, hugely greater than the stock of official liquidity provision (typically around £15 billion).

Successive widenings of eligible collateral have diminished the likelihood that the status of particular instruments as eligible in Bank operations would distort relative yields or the choice of liquid assets held by institutions in London. It has also ensured that sufficient collateral is available to allow efficient distribution of central bank liquidity around the system.

*Operational procedures:* Counterparties wishing to obtain liquidity from the Bank should, whenever possible, do so at the two regular rounds of intervention (at 9.45am and 2.30pm) when liquidity is provided at the Bank's repo rate, broadly for a maturity of 14 days. A further facility is available for counterparties at 3.30pm, to meet any residual liquidity shortage remaining from the previous two rounds, with liquidity normally provided overnight at a rate 1 per cent above the Bank's repo rate. This 3.30pm facility was introduced in June 1998 to replace a transitional facility for the discount houses. Finally, the Bank provides a late (4.20pm) overnight-repo facility for the settlement banks – who are subject to the daily positive-balances maintenance requirement – to meet any shortfall in clearing the published liquidity forecast through open market operations and/or any late increase in the liquidity forecast.

<sup>1</sup>: The functional criteria which counterparties are required to meet are described in *Bank of England Quarterly Bulletin* (1997), Box p. 12, and set out in detail in the Bank's Operational Notice, Bank of England (2000a).

sufficient eligible collateral to cover any intraday loans they might need from the Bank. In common with other EU central banks, the Bank provides intraday credit interest-free by way of reverse repo of a defined range of high quality securities, such as bonds issued by the UK and other EU governments. Further important changes in this area are in prospect, with implications for large banks' liquidity management (Box 3).

### The regulation of banks' liquidity

Bank regulators internationally have tackled some of the liquidity management issues confronting banks by setting a framework in the BCBS's *sound practices guidelines*. They offer useful guidance on risk and management issues but stop short of establishing a harmonised regulatory framework for liquidity measurement and management (unlike the Basel Capital Accord in the area of credit and market risk). Liquidity regulatory arrangements are, therefore, for

## Box 3: Payment and settlement systems

In order to settle a debt according to the instructions of a creditor, banks and their customers rely on payment systems, which are basically systems for transferring claims on banks (ie deposits). Payment systems which settle transactions in wholesale financial markets process very large amounts. For example, the sterling high-value payment system, CHAPS, processes payments totalling £200 billion per day, or 22 per cent of annual UK GDP (about one half of these payments represent the sterling leg of foreign-exchange transactions). These payments also have short deadlines. In most cases banks will be asked to transfer funds to be on the account of the recipient by the end of the day.

In virtually all high-value payment systems across the world, final interbank settlement occurs across accounts at the central bank. Participating banks therefore face the liquidity problem of ensuring that they have sufficient funds on their central bank account, so that their own and their customers' payments can settle on the required timescale.

Most large value payment systems in the G10 countries (including the UK) are now *real-time gross settlement* (RTGS) systems, which means that participating banks must have sufficient funds on their central bank account to settle every payment in 'real time'. The liquidity demand on participating banks is greater than with *deferred net settlement systems*, but the potential for inter-bank credit exposures and systemic risk is reduced. In other words, participating banks have exchanged a credit management problem for a liquidity management problem.

### Exchange-of-value settlement systems

Changes to the settlement arrangements for the cash leg of securities transactions will also affect the intraday liquidity needs of settlement banks in the payment system embedded in CREST, the UK securities settlement system. At present, CREST operates a form of delivery-versus-payment (DvP) for gilts and equity transactions under which securities transfers occur throughout the day and funds

transfers are settled via end-of-day multilateral net postings to settlement banks' RTGS accounts at the Bank of England. Under the 'assured payment mechanism', the buyer's settlement bank is obliged to pay the seller's settlement bank at the end of the day. At the point at which the seller delivers the securities, it receives assurance from the buyer's settlement bank that it will be paid. This means that while users of the system are protected from the default of their counterparty, the settlement banks, and in some circumstances their customers, are currently exposed to significant levels of credit risk through the intraday exposures which arise between banks. There is currently a project underway designed to eliminate such credit exposures<sup>1</sup>.

From then, a purchaser's settlement bank will have to ensure that it has sufficient funds on its Bank account to complete settlement. Average daily turnover of gilts and equities is around £200 billion, so there could be a substantial further increase in settlement banks' intraday liquidity needs. Work is being undertaken to quantify the extent of the impact on collateral needs and to explore various avenues by which that impact could be mitigated, while at the same time ensuring sufficient liquidity is available to maintain settlement and payment efficiency<sup>2</sup>.

The planned Continuous Linked Settlement Bank (CLSB) for foreign exchange settlements also raises liquidity issues. The CLSB is being designed to eliminate the principal risk associated with foreign exchange settlement, by acting as an intermediary in the settlement process and with the two currency legs of a transaction being settled simultaneously across its books. Using national RTGS systems, settlement members will pay in their net positions in each of the currencies in which they are short each day, and CLSB will pay out the net proceeds in each of the currencies for which they are long. While CLSB will reduce credit risk in foreign exchange settlement, it will give rise to liquidity management issues because it will incorporate intraday deadlines for payments through RTGS payment systems<sup>3</sup>.

1: For a more detailed description see Hills and Rule (1999).

2: Bank of England (2000b).

3: See Hills and Rule (1999).

## Box 4: The sterling stock liquidity requirement

There are two requirements:

(a) A bank must work to a *sterling stock liquidity ratio* of at least 100 per cent at all times.

The *sterling stock liquidity ratio* is calculated as the stock of sterling liquid assets divided by a measure of outflows. This measure is defined as the contracted wholesale sterling net outflow over the next 5 days *minus* sterling CDs held, up to 50 per cent of the wholesale sterling net outflow *plus* 5 per cent of maturing retail deposits.

CDs are subject to a 15 per cent discount to reflect market risk.

Undrawn committed facilities are not included as contingent outflows.

(b) A bank must also hold a *sterling stock 'floor'* of liquid assets at all times, agreed with the FSA and usually set at 50 per cent of a bank's internal limit for its maximum wholesale net outflow over 5 working days. CDs are not included in the permanent 'floor' requirement.

The SSLR does not cover foreign currency activity.

national authorities to decide. In the United Kingdom, the most important change for the domestic banks in recent years was the introduction of the Sterling Stock Liquidity Regime (SSLR) in 1996 (Boxes 4 and 5). Previously the same maturity ladder-based regime had applied to all banks, comparing contractual outflows and inflows of cash within a number of time bands (next day; the next week etc). This was, however, unsuited to retail banks, which have extensive deposits that contractually are callable (or virtually callable), but which in normal conditions are in practice generally fairly stable. It is also vital that larger banks have ready access to liquidity in stressed market conditions so as to be able to meet liquidity demands elsewhere in the financial system or from non-financial customers. This liquidity can come from selling (or repo'ing) highly liquid assets in the market, or (within constraints set by the size of official operations) to the central bank. The SSLR recognised this and, for their sterling book, required major UK banks to hold a stock of liquid assets against a potential loss of short-term wholesale funding<sup>14</sup>.

CDs are treated in the SSLR as 'second tier' liquidity. They are not accepted in the Bank's open market operations, and they are 'inside' liquidity for the banking system because they are issued by banks. Holding a sterling CD is not, therefore, like holding a UK government Treasury bill or short-maturity gilt.

Liquid assets (other than CDs) which count towards UK regulatory liquidity requirements can also be used to obtain intraday credit from the Bank in the context of the RTGS high-value payment system. In managing their liquidity, banks need to have regard to this 'double duty' feature of the system, as part of the pool of liquidity required to cover end-of-day needs might, in fact, be assigned intraday, through repo transactions, to the central bank.

In addition to its general rules on liquidity, various other FSA regulations touch on liquidity considerations. For example, banks which securitise their assets are expected to demonstrate that they can cope with the liquidity implications of assets eventually returning to their balance sheet, as can occur, for example, with securitisation of revolving credits.

### Trends in banking sector liquidity

What do data collected by the Bank indicate about developments in banks' management of liquidity and about the effects of the reforms described above?

As Table 1 illustrates, sterling assets are by far the largest part of UK-owned banks' balance sheets, although foreign currency assets account for a quarter of their aggregate balance sheet. By contrast, as might be expected, a high proportion of the books of foreign banks operating in the UK is in foreign currency.

<sup>14</sup>: The FSA's practice is to maintain the list of liquid assets which count as stock liquidity in line with those which are eligible in the Bank's open market operations.

## Box 5: Changes to the regulation of banks' liquidity

**Regulatory regime, 1982-96:** From 1982 to 1996 a common regulatory framework existed for all banks, including the major UK banks and branches of overseas banks<sup>1</sup>. This set down general principles of liquidity management and acknowledged that banks could use a combination of techniques – liquid assets, asset and liability matching, and reliance on a range of funding sources – depending on their particular profile. From April 1990 banks were required to agree with their supervisors a formal statement of their liquidity policy, which continues to be an important element of the FSA's approach to liquidity supervision<sup>2</sup>. Banks completed a maturity 'ladder' on a contractual maturity basis for all principal payments. In this 'ladder' approach, banks reported their assets and liabilities in bands by remaining contractual maturity (such as sight, under one week, under one year, under five years). Liquid assets were included at sight, subject to a discount to reflect market risk<sup>3</sup>. A separate statistical return was required for liquidity in foreign currencies, taking all currencies together. Guidelines on maximum permitted mismatches (after adjustments) were set according to a bank's particular characteristics.

**Regulatory changes, 1996:** The key change was to introduce a separate regime (the Sterling Stock Liquidity Regime (SSLR)) for the sterling position of major retail banks<sup>4</sup>. It was recognised that the maturity ladder does not represent their true position because in the short term they can rely on the relative 'stickiness' of a diversified retail deposit base. Moreover, as a group they can sell part of their holdings of highly liquid assets directly or indirectly to the Bank in the course of its daily open market operations.

The stock liquidity regime is designed to ensure that at all times a bank maintains a stock of highly liquid assets which it can mobilise quickly and discreetly to

replace wholesale funding that has been withdrawn because of a perceived problem with the institution. The aim is to provide a breathing space during which the bank can try to arrange more permanent funding solutions.

**Mismatch liquidity regime:** Since 1999 a revised version of the 1982 approach<sup>5</sup> has applied to all banks other than those subject to the SSLR. This includes branches of foreign banks (EU and non-EU). Most banks supervised under the mismatch regime do not have direct access to Bank facilities, and may be less active in the wholesale markets. As discussed in the main text, many smaller banks rely for their day-to-day liquidity on committed funding lines from larger banks, and, provided the FSA is satisfied with the availability of these facilities in stress conditions, banks are permitted to include a proportion of undrawn commitments available to them in the maturity ladder. The percentage is set on a case-by-case basis taking account of factors such as whether the facility is legally binding, the existence of covenants, regular usage of the facility etc.

A broader range of assets is treated as liquid than under the SSLR to reflect the markets in which banks operate. For example, foreign banks may wish to hold assets which are eligible in their domestic central bank's operations. Discounts to market value are applied to securities which are judged, by the regulators, to be vulnerable to changes in market prices.

Banks are now required to report all cashflows (not just principal amounts) in the maturity ladder for periods out to six months. Mismatch guidelines are set for the cumulative periods up to eight days and up to one month. Typically, these would be zero and minus 5 per cent respectively. For some assets and liabilities (eg deposits and overdrafts) where the

1: Bank of England (1982).

2: Bank of England (1991).

3: This was a broader category than simply those assets which were eligible in the Bank's open market operations: from 1982 it included CDs and foreign government securities, and from 1996 it also included non-government debt securities eligible under the EU Capital Adequacy Directive.

4: Bank of England (1996b) and FSA (2000), chapter on Sterling Stock Liquidity. These banks are also required to supply management information to the FSA on their foreign currency liquidity.

5: FSA (2000), Chapter on Mismatch Liquidity.

behavioural characteristics of the cashflows do not bear a close resemblance to actual maturities, banks may request, or the FSA require, that they are treated on a behavioural basis instead. Committed facilities provided by a bank are taken into account, and an attempt is made to capture cash flows arising from options. The FSA decided in 1999 that sterling and foreign currency information should normally be aggregated for routine reporting purposes. However, banks are expected to have a separate management policy for significant foreign currency liquidity positions, and the FSA can request reports on these. Some branches of overseas banks are permitted by the FSA to manage their liquidity on a global basis from their home country head office, provided that the regulator is content with the home country supervisory regime and can rely on the branch being fully integrated with the head office for liquidity management purposes.

### Securities firms

Securities firms are not subject to regulatory liquidity requirements *per se*. Instead their holdings of non-trading and illiquid assets are taken into account in the calculation of their financial resources (capital). There are two different treatments applied by the FSA, which are derived from the CAD and ISD<sup>6</sup>. For a firm that has opted for a capital definition which allows a greater proportion of subordinated loans in capital, or which has a waiver from consolidated supervision, illiquid assets are deducted from capital. For other firms, there is a capital requirement for holdings of illiquid assets, up to a limit of 25 per cent of Tier 1 capital, of 8 per cent multiplied by the counterparty risk weight. 92 per cent of any holdings over this limit are added to the firm's capital requirement.

6: Capital Adequacy Directive, 93/6/EEC and Investment Services Directive, 93/22/EEC

Liquidity measures over the past twelve years are presented below for four groups of banks: the major British banks group (MBBG); other large UK-owned banks; smaller UK-owned banks; and foreign banks<sup>15</sup>. The behaviour of liquidity might be expected to differ across these different types of bank.

In most cases, the liquidity management of the MBBG and of some of the 'other large' banks reflects their access to a fairly stable retail deposit base, as well as the effect of diversified liabilities and assets, and their role as providers of liquidity to others. In addition, they are often direct counterparties of one

or more central banks' open market operations and, as direct members of high-value payment systems in sterling and for other currencies (eg the euro – TARGET), they have to take account of intraday flows and their consequent need for eligible collateral. Such banks manage their liquidity within the wide range of money and securities markets in which they are typically active.

Smaller banks are typically less diversified. Many are engaged particularly in consumer finance, property lending, banking for specific groups (eg associated with particular religions), and provision of banking

**Table 1: UK banking sector asset holdings – September 2000**

	UK-owned banks		Foreign-owned banks		Total	
	£ billions	per cent	£ billions	per cent	£ billions	per cent
Sterling	1,025	74.8	440	25.5	1,465	47.3
Foreign Currency	345	25.2	1,286	74.5	1,631	52.7
<b>Total</b>	<b>1,370</b>		<b>1,726</b>		<b>3,096</b>	

Source: Bank of England.

15: The bank groups were defined as at end-1998, and held constant throughout the period considered here. 'Other large UK-owned banks' are those with a balance sheet in excess of £1 billion which are not included in the MBBG.

services within a wider financial conglomerate. Some rely heavily on wholesale funding<sup>16</sup>.

Securities firms do not fund themselves through retail deposits and so rely on the wholesale markets. A high proportion of their short-term funding is typically on a secured basis, supplemented by committed lines from commercial banks. In recent years their holdings of relatively illiquid assets have tended to rise, for example via firms providing bridge finance prior to bond or equity issues.

### Data on bank liquidity

In addition to data on the SSLR, two proxies for liquidity are presented. The first is a ratio of liquid assets to the total size of the balance sheet. 'Liquid asset' is here defined as any instrument for which in normal market conditions there exists a liquid market in which it can be sold rapidly. Information is also presented on the composition of banks' liquid assets<sup>17</sup>. The second measure is a proxy for a maturity ladder approach. To construct it, estimates were obtained of the proportions of different classes of liability and asset which were under three months maturity, and these proportions have been applied to balance sheet data to calculate a proxy for the gap between liabilities falling due during the next three months and assets maturing during that time. This is effectively a two-rung maturity ladder.

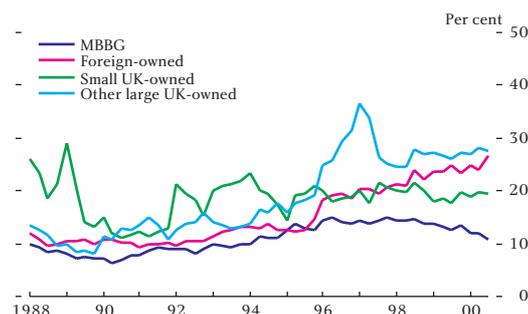
A number of caveats should be stressed. First, the liquid asset ratio includes both 'inside' and 'outside' liquid assets, whose characteristics differ. For example, in stressed conditions affecting the banking system as a whole, holdings of 'inside' liquidity, such as CDs, might no longer provide ready access to cash – for example, it might become difficult for a bank to sell holdings of CDs issued by other banks. Second, the balance sheet data used are those supplied to the Bank in the context of the monetary statistics which relate only to balance sheets within the UK. This is a particularly important caveat in the case of foreign banks: their UK book will often be a comparatively small part of the total, which may be managed globally. Third, the level of detail available in the data requires broad brush assumptions to be made about which

assets can reasonably be regarded as 'liquid'. Fourth, the proxy for the liquidity gap over a three month timescale is based on data which are mainly compiled on the basis of contractual rather than behavioural maturity. Finally, it is not possible systematically to take account of off-balance sheet positions, for example cash flows arising from derivatives (eg books of interest rate swaps). These caveats raise a number of issues regarding possible future data needs of the UK authorities in monitoring financial stability.

### Liquid asset ratios

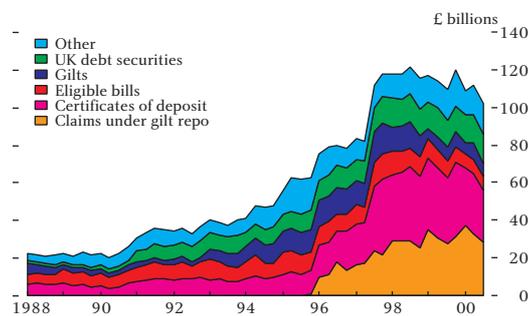
Developments in the MBBG banks' sterling liquidity are highlighted in Charts 4 and 5. Their liquid assets as a proportion of the balance sheet are fairly stable through time, although the ratio rose somewhat during the early 1990s. Eligible bank bill holdings

**Chart 4:**  
UK banks' sterling liquid assets as a percentage of total sterling assets



Source: Bank of England.

**Chart 5:**  
MBBG breakdown of sterling liquid assets



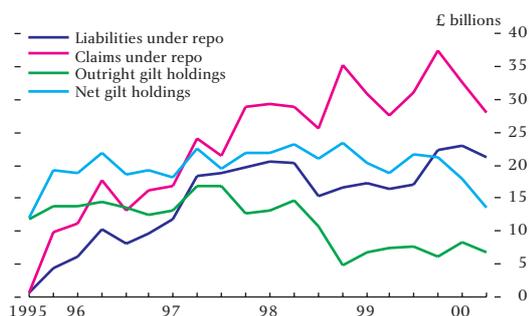
Source: Bank of England.

<sup>16</sup>: There have been two instances of liquidity crisis in the sector in the relatively recent past: in 1973 when the Bank of England launched the 'lifeboat', and again in the early 1990s. For the 1973-4 crisis see Bank of England (1978). The 1990s crisis is discussed in Logan (2000) on pp. 130-145 of this Review. The Bank of England's role in providing lender of last resort liquidity facilities was described by the Governor in his LSE lecture: 'The pursuit of financial stability' – George (1994).

<sup>17</sup>: 'Liquid assets' are here defined as: gilts, CDs, bank and Treasury bills, claims under repo, claims on other banks, and other debt securities (issued by UK or overseas obligors).

have remained broadly constant in nominal terms, so that bills now account for a smaller share of bank liquid assets than before the mid-1990s. Gilt repo has grown rapidly since the mid-1990s. This has been associated with a rise in MBBG holdings of liquid assets. The share of gilt repo in total MBBG liquid assets has risen to around 25 per cent. While the MBBG's net gilt holdings (outright gilts and reversed-in gilts, less repo'd-out gilts and short sales) have remained stable, reversed-in gilt holdings of these banks are now much larger than their outright holdings (Chart 6). This shift reflects three factors. First, gilt repo is more liquid than gilts and a generally more convenient money market instrument. Second, reverse gilt repo typically carries lower short-term market risk than outright gilt holdings, so that regulatory capital requirements are lower. Third, gilts have in recent years become 'expensive' relative to bank funding costs, reflecting the fall in the stock of gilts in issue.

**Chart 6:**  
**MBBG holdings of gilts**



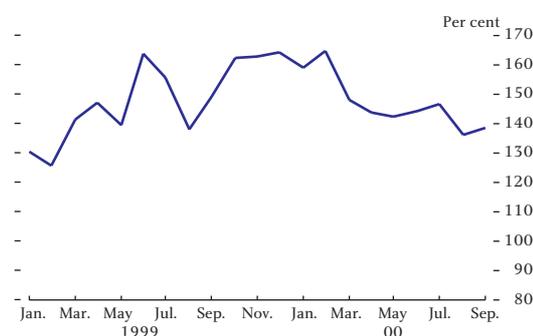
Source: Bank of England.

A further striking development in MBBG banks' stock of liquid assets is the rapid growth in their holdings of bank CDs. In part, this again reflects the introduction of gilt repo, which encouraged an increase in stock lending of gilts collateralised by CDs. There was also a rise in CD holdings following the introduction of the SSLR, since – as described above – this allows CDs to count (to a limited extent) as liquidity. This is a good example of the behavioural impact – both micro and macro – of official rules.

Between the introduction of the SSLR and the beginning of 1999, the average stock liquidity ratio

for the MBBG banks was quite stable at around 125 per cent. From the start of 1999, the ratio climbed to around 160 per cent, reflecting action to protect against possible market disturbances around the millennium date change – MBBG banks increasing their stock of highly liquid assets<sup>18</sup>. From the beginning of 2000, this 'war chest' of liquidity has been reduced (Chart 7). The aggregate liquidity stock stood at £61 billion by September 2000, giving an average ratio of 138 per cent (compared to a peak in December 1999 of £78 billion, and a ratio of 164 per cent).

**Chart 7:**  
**MBBG sterling stock liquidity ratio**



Source: FSA.

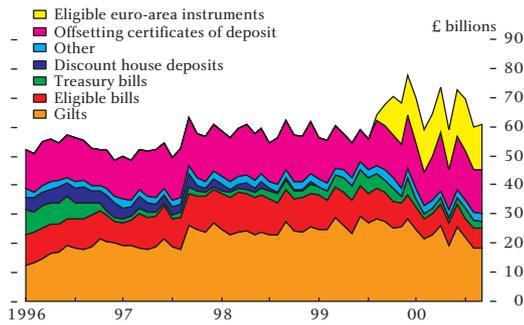
Reflecting the environmental developments over the past five years discussed above, there have been some changes in the composition of SSLR liquidity (Chart 8). Secured deposits with the discount houses – already a relatively small component when the SSLR was introduced – no longer exist. The importance of eligible bills has declined somewhat. And euro-area instruments have become significant – currently of the order of £15 billion. Gilts<sup>19</sup> and 'offsetting' CDs (see above and Box 4) have been the most important elements of liquidity throughout the past five years.

Turning to the other groups of banks, the sterling liquid asset holdings of smaller banks have remained stable as a proportion of their aggregate balance sheet, but for larger non-MBBG banks and foreign banks the ratio has tended to rise. Developments in the shares of different sterling liquid instruments for those banks are broadly similar to those for the MBBG banks (Charts 9, 10 and 11), although foreign

<sup>18</sup>: The liquidity management of the major UK banks over the millennium date change was described in the June *Review* (Box 7, p. 69).

<sup>19</sup>: Outright gilt holdings plus gilts reverse repo'd in, less gilts repo'd out.

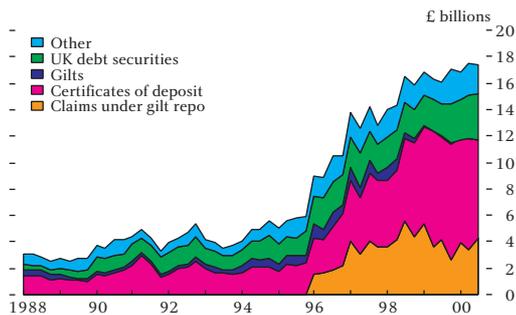
**Chart 8:**  
**MBBG regulatory stock of liquid assets<sup>(a)</sup>**



Source: FSA.

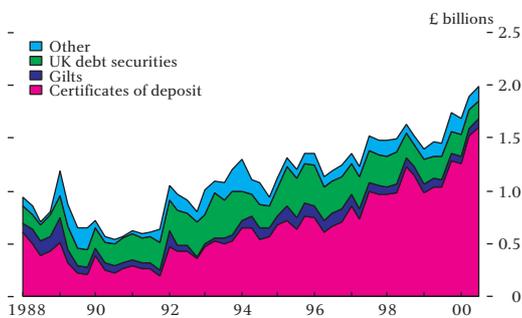
(a) MBBG regulatory liquid assets are smaller than total sterling liquid assets shown in Chart 5. The most important differences of coverage are that in Chart 8: gilts are shown net of amounts repo'd out; not all sterling CDs are 'offsetting' (see Box 4); and not all sterling debt instruments count as regulatory liquid assets.

**Chart 9:**  
**Other large UK-owned banks' breakdown of sterling liquid assets**



Source: Bank of England.

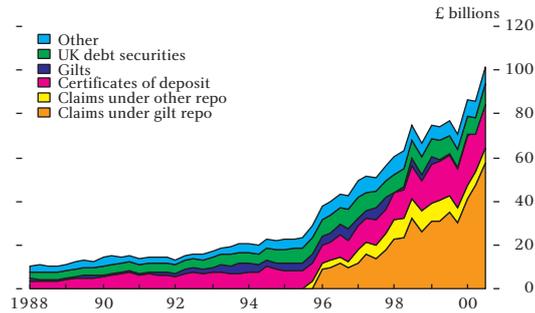
**Chart 10:**  
**Small UK-owned banks' breakdown of sterling liquid assets**



Source: Bank of England.

banks have not built up CD holdings, possibly because they have not had incentives from their home regulatory regimes to do so. CDs do, however,

**Chart 11:**  
**Foreign-owned banks' breakdown of sterling liquid assets**

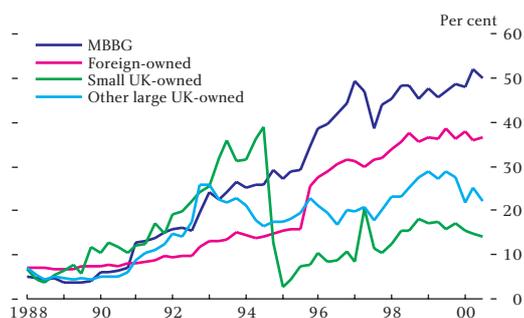


Source: Bank of England.

represent a large proportion of the sterling liquid assets of smaller UK banks, perhaps because of ease of dealing in this instrument. Coupled with their purchase of committed facilities as liquidity insurance (discussed below in the reports of interviews with market participants), this means that their liquidity depends heavily on the stability of the largest commercial banks.

Within the foreign currency book of most groups of banks, the share of liquid assets has risen quite sharply through time (Chart 12). For the smaller UK banks, the ratio of foreign currency liquid assets to the total balance sheet is rather erratic; foreign currency business is only a small part of the business of many of these banks. The most significant class of foreign currency liquid asset held by banks in London is overseas securities. Foreign currency CDs account for a small percentage of the total. Claims under foreign currency-denominated repo are important for overseas banks.

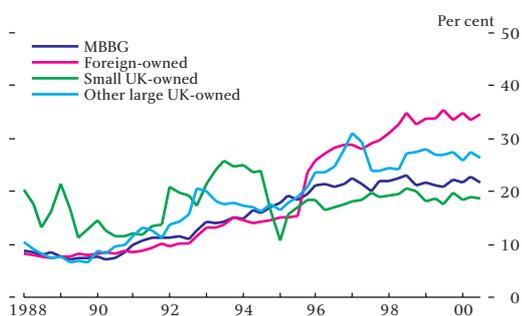
**Chart 12:**  
**UK banks' foreign currency liquid assets as a percentage of total foreign currency assets**



Source: Bank of England.

Turning finally to total liquid assets (in both sterling and foreign currency), Chart 13 shows that for all groups of banks other than smaller UK institutions, the ratio to total balance sheet size has risen materially through time. This reflects the increasing importance of tradable instruments within most financial systems, and hence in the business of the banking groups considered here. It is more likely to be a by-product of developments in markets and banks' business strategies than a deliberate act of liquidity management.

**Chart 13:**  
UK banks' liquid assets as a percentage of total assets



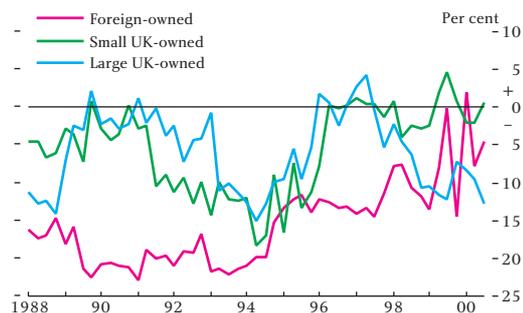
Source: Bank of England.

### Maturity mismatch

The second proxy for bank liquidity is the estimated three month maturity gap, the mismatch between the level of maturing liabilities and maturing assets over this horizon; regrettably this measure cannot be constructed for MBBG banks. As might be expected, in sterling this is usually negative for 'other large', smaller and foreign-owned banks – but to a modest extent (Chart 14). The data are fairly erratic – reflecting the various caveats mentioned above – but they suggest that the extent of maturity transformation across a three-month horizon may, if anything, have tended to decline since the mid-1990s for foreign-owned and smaller UK banks. In contrast, over recent years the extent of maturity transformation, measured in this way, appears to have increased for the 'other large' UK banks.

The foreign currency mismatch position reveals less maturity transformation for foreign-owned and 'other large' UK banks than in their sterling books (Chart 15). The volatility of the smaller UK banks measure probably reflects their small holdings of foreign currency. For foreign-owned banks, the 'foreign' currency may in fact be their domestic currency.

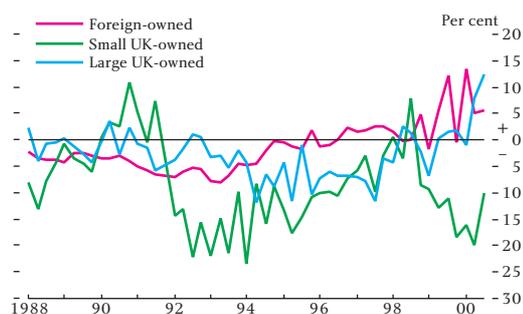
**Chart 14:**  
UK banks' sterling three-month liquidity mismatch as a percentage of total sterling assets<sup>(a)</sup>



Sources: Bank of England and FSA.

(a) Does not include data for the MBBG banks.

**Chart 15:**  
UK banks' foreign currency three-month liquidity mismatch as a percentage of total foreign currency assets<sup>(a)</sup>



Sources: Bank of England and FSA.

(a) Does not include data for the MBBG banks.

Unfortunately, the available data do not permit a breakdown between different non-sterling currencies, so it is not clear whether assets and liabilities are currency matched. But it would appear that, in their UK operations and taking foreign currencies together, these banks are matching short-term liabilities with assets of similarly short maturity.

### Interviews with market participants

The data have been supplemented by informal discussions with five large banks (including MBBG banks), four smaller banks and three securities firms operating in London – some UK and some foreign owned. Although there were common themes, there were also significant differences in their approach to liquidity management.

### Issues arising for all firms interviewed

All firms emphasised that management of liquidity, alongside capital adequacy, was central to their activities. While all banks carefully monitor the maturity profile of their on- and off-balance sheet positions, they tend to concentrate their attention on shorter maturities, in particular the expected cash flows on each day during the following week or so.

Most said that in practice there was enough predictability in these items, and sufficient depth in relevant markets of industrialised economies, to allow liquidity management to proceed smoothly in normal circumstances. In particular, cash flows associated with derivatives were generally not seen as a material problem in overall liquidity management, on the grounds that many derivative positions were hedged, so that net derivative exposures (and their associated cash flows/collateral implications) were generally fairly modest – provided counterparties remained viable.

This approach to managing the impact on liquidity of derivatives does, however, pose a number of potential risks in ‘abnormal’ conditions, when the relationships between prices of financial instruments can alter suddenly. It might then also be more difficult to implement any desired ‘dynamic hedging’. Thus ‘hedged’ – and their associated cash flows – might turn out to be less effectively matched *ex post* than anticipated *ex ante*.

### Large banks

Internationally-active banks typically monitored liquidity at an overall group level, as well as at an individual country level. In all cases internal liquidity limits were said to be tighter than local regulatory requirements.

Large banks generally saw a need to hold a stock of liquid assets for a number of overlapping purposes: to meet regulatory requirements expressed in terms of stock liquidity; to provide collateral for use in high-value payment systems, and some settlement systems; and as a cushion against unexpected requirements for cash. Large banks said that they aim to ensure a steady turnover in this stock of liquid assets, so that a large trade to counter liquidity difficulties would not arouse market suspicion. It was noted that some banks ‘naturally’ hold stock liquidity well in excess of regulatory requirements, as a result of the nature of their business. For example, where a

banking group includes bond market-making on a significant scale, stock liquidity will typically be held as a by-product of the market makers’ inventory.

Market participants confirmed that they do not concentrate their liquidity management solely on a stock of tradable liquid assets. For example, almost all banks operating under the SSLR used a parallel maturity ladder approach to liquidity monitoring – broadly similar to the maturity ladder approach described above – for both overall and foreign currency liquidity. This included varying degrees of behavioural modelling of asset and liability flows, rather than reliance on contractual maturity. For example, the SSLR does not directly take account of contingent liabilities, but many banks include contingent flows in their own behavioural maturity mismatch monitoring – often applying a ‘liquidity risk weighting’ based upon the historical incidence of these flows. Stress tests might be employed alongside this approach.

Some bankers emphasised that judgments about behavioural liquidity were inherently difficult. For example, in stressed conditions funds might be withdrawn from some institutions and flow into banks with relatively high credit ratings. There were signs of this in the run-up to the millennium date change. But the existence and scale of such flows was highly uncertain. Others said that, because of the uncertainties involved, it was essential to have widely diversified sources of funding, even when the firm had a very large balance sheet and a strong credit rating.

A number of reasons were advanced for the significant increase in MBBG CD holdings since 1996 (Chart 5). One was the smaller number of money market instruments traded in liquid markets in the UK compared with, for example, the US. But CDs were widely available and readily tradable under normal market conditions, so they acted as a *de facto* stock of liquidity (albeit subject to some inherent credit risk) provided there were not concerns about the banking system as a whole. The use of CDs as pledged collateral in borrowing gilts from institutions such as life assurance and pension funds was also said to have fuelled demand for CDs, and so encouraged CD issuance.

Large banks emphasised that the gilt repo market was being used to reduce utilisation of limits vis à vis

other large players. A previous FSR article<sup>20</sup> examined the financial interlinkages – and hence credit exposures – between the major international banks; in particular from unsecured interbank lending, foreign exchange settlement risk, and from OTC derivative books, especially swaps. While various techniques are deployed to mitigate the risks associated with these exposures, for example collateralisation and netting<sup>21</sup>, there can nevertheless be pressures on credit lines, which were said to have intensified following consolidation among the major firms, as well as the continuing growth in derivative markets. Firms stressed that they needed to maintain headroom within their lines, for example to be able to accommodate unanticipated surges in business, or in the case of the UK settlement banks, unanticipated exposures arising out of business executed for customers late in the day<sup>22</sup>. In that connection settlement banks (Boxes 1 and 3) stressed that, amongst other things, successful operation of the payment system required close relationships between them and the banks for which they provide clearing services, particularly where foreign banks, operating in different time zones, wanted to make substantial payments late in the day.

Large banks said that they are making increasing use of securitisation vehicles – creating assets rather than holding them. Not only is this attractive in reducing regulatory capital requirements, but it also acts as a funding mechanism, often at a higher credit rating than that of the bank itself. However, as a result, banks may find themselves taking on new and unpredictable obligations as liquidity providers to securitisation special purpose vehicles (SPVs). Liquidity facilities enable SPVs to assure investors of timely payments. These include smoothing the timing differences in payment of interest and principal on pooled assets and ensuring payment to investors in the event of market disruptions. They are particularly important for revolving credit securitisations (eg credit cards) where customer payments can be unpredictable, and for short-term paper (CP) financed ‘conduit schemes’ (in such schemes, an SPV sponsored by a bank purchases assets from a variety of sources).

There had also been recent growth in the provision of undrawn facilities. For a sample of major UK banks, commitments under one year increased from around 20 per cent of their aggregate balance sheet in 1995 to nearly one-third now. This may in part be due to the 1988 Basel capital treatment, which placed a zero capital requirement on committed facilities of under one year maturity. In consequence, facilities are virtually all written for 364 days. The new Basel Accord is likely to incorporate a capital requirement.

### Smaller banks

The liquidity management, and perspective on sterling money markets, of smaller UK banks differed substantially from that of the larger banks. Smaller banks’ liquidity management tended to rely on a maturity ladder approach, with little reliance on holdings of liquid assets and instead ‘crisis liquidity’ was based heavily on committed facilities from larger institutions. They said that they drew down regularly on committed facilities, so that any forced drawings due to liquidity pressures would not spark undue interest. They also noted the importance of ensuring that their bankers were well informed about their business. Nonetheless, they recognised that such funding could prove to be problematic in a crisis and some were apparently looking at other methods of raising funds in such conditions.

Like large banks, the smaller banks emphasised the need to distinguish between contractual and behavioural maturity of both liabilities and assets. This was important given that they may not have ready access to wholesale markets in order to adjust their liquidity position, especially in stressed market conditions. Those particularly dependent on retail funding sought to lock in customer deposits for fairly long maturities (three months to over one year), paying higher rates to attract such funds. There was some suggestion that the market for retail deposits was becoming more competitive with the introduction of new participants such as internet banks. Where smaller banks were part of larger, diversified financial groups, they felt that this assisted in obtaining funding.

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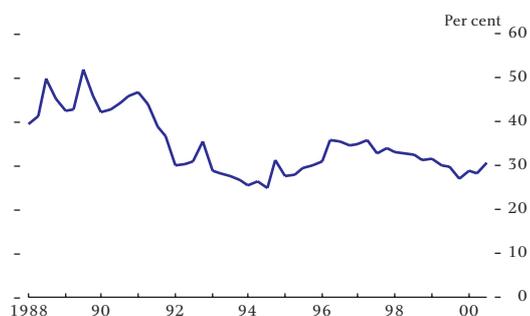
20: Michael (1998).

21: The introduction of central counterparty arrangements such as the London Clearing House SwapClear and Repoclear facilities should in principle further mitigate these risks while reducing the collateral, and hence liquidity, requirements of these activities. They concentrate risk on the clearing house.

22: Where customer business is executed late in the day, it can cause settlement banks to become unexpectedly short or long of cash. This can be adjusted in the end-of-day transfer arrangements between settlement banks, but that in turn affects exposures between such banks (Box 3).

The smaller banks generally did not hold especially large stocks of liquid assets apart from CDs (Chart 10). This was partly because they are generally specialised institutions, with no business reason to hold a large liquidity stock, which can be costly purely as a liquidity buffer given the return relative to smaller banks' cost of funding. In turn, this meant that smaller banks tended to have less expertise in dealing in liquid asset markets than larger, diversified banks. Some smaller banks therefore held a buffer stock of deposits with major banks. Such deposits are held particularly with the MBBG and other-EU banks. Total money market deposits account for around one-third of the aggregate balance sheet of the small bank sector (Chart 16).

**Chart 16:**  
**Small UK-owned banks' market deposits<sup>(a)</sup> as a percentage of total assets**



Source: Bank of England.

(a) Deposits with banks and building societies in the UK and overseas.

### Securities firms

These firms regarded their funding as inherently more fragile than that of large banks, partly because they do not have a retail deposit base. They stressed the importance of obtaining funding on a secured basis, primarily through repo markets, which gave their counterparties comfort. This in turn meant that they needed to ensure that their assets were largely securities for which a reasonably liquid repo market existed, and that they had sufficient capital or other longer term funds to finance the haircuts applied by counterparties. Any 'illiquid' assets have to be funded from capital, in line with regulatory requirements (Box 5).

Their assets were described as generally sufficiently liquid to allow their book to be reduced to enable

them to withstand a sustained reduction in access to market funding. Emphasis was placed on limits to exposures to particular instruments, partly for that reason. (However, even an apparently highly liquid book may be difficult to sell in the face of a general deterioration in market liquidity, as in autumn 1998<sup>23</sup> – this situation is distinct from funding difficulties specific to a particular securities house.)

For some securities firms, other aspects of their liquidity management included ensuring that there existed at all times an identifiable portfolio of highly liquid assets which could be liquidated to meet immediate obligations if necessary, and having back-up committed facilities from major banks. The latter effectively transfer some of the liquidity risk within securities house operations to the banking system, and to the large commercial banks in particular. These firms felt that participation in central bank open market operations was helpful in providing an additional potential means of obtaining cash at short notice.

### Conclusions and issues

A number of conclusions emerge from the analysis above:

- So far as can be judged from the proxy measures of maturity examined, the extent of maturity transformation at a three-month horizon in the UK banking system seems to be fairly stable through time. Moreover, banks' sterling liquid assets as a proportion of their sterling balance sheet appear to have been stable or rising during the past decade or so.
- The liquidity of the small UK banks (and, in some respects, securities firms) relies to a considerable extent on holdings of CDs issued by the large banks and committed facilities provided by them. The tiered payment system also puts the settlement banks at the fulcrum of liquidity management in sterling markets. How they manage their liquidity is, therefore, of prime importance for the system as a whole.
- The introduction of the gilt repo market has provided a deep and liquid market which has aided the largest banks and others. Reflecting this, there

23: On market conditions following the Russia/LTCM crisis in Autumn 1998, see CGFS (1999).

has been a material shift in the composition of the large banks' liquid assets from holding gilts outright to reverse-repo holdings. Unsecured interbank deposits do, however, remain a significant proportion of their liquid assets; and the capacity to issue CDs is a vital ingredient of day-to-day funding policy.

- The SSLR has increased incentives for the largest banks to hold sterling CDs – issued by each other and by other banks. This provides protection against idiosyncratic problems in normal circumstances, but would not do so in the event of system-wide disruption.

There are also a number of issues for the future – for banks and for the authorities:

- The industry is beginning to consider how it can effectively use stress testing and scenario analysis to aid liquidity management. Pressures on liquidity are most likely to manifest themselves during 'extreme' events, when historical relationships between positions hedged in terms of liquidity are liable to break down. The authorities also need to follow the development, and application, of techniques for measuring 'liquidity-at-risk' (an analogue of Value-at-Risk). Difficulties with creating liquidity-at-risk measures include obtaining sufficiently long runs of data and dealing with structural breaks in market behaviour.
- A related challenge is to model more effectively contingent cash flows, including committed credit facilities such as CP back-up lines and cash flows arising from derivative positions. It will also be important for the authorities to monitor the behavioural effects of the new Basel Accord on, for example, the terms of committed facilities.
- Increasing use of RTGS systems world-wide and other developments, such as DvP and CLSB, which will involve time-critical payments during the business day, will concentrate financial institutions' attention on the management and pricing of 'daylight' liquidity. The authorities will need to assess the consequent demand for eligible collateral.

More generally, regulators need to keep under review their liquidity requirements for individual institutions in the light of changes in market structure and other

relevant developments. For example, the development of alternative banking channels, such as e-banking and telephone banking, has potential implications for liquidity management. Central banks should monitor the liquidity of the system in aggregate, and of key sub-sectors – in domestic and foreign currencies separately. At present, such monitoring is incomplete given gaps in the information available to the UK authorities.

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# Leading indicator models of banking crises – a critical review

James Bell, Structural Economic Analysis Division and Darren Pain, Financial Industry and Regulation Division, Bank of England

The recent financial crises in south-east Asia have stimulated a significant body of empirical research on the subject of potential leading indicators of banking crises. In particular, a number of statistical models have been developed that may be used to provide early warning of impending banking problems. This article reviews the results of a selection of recent empirical studies and assesses the practical usefulness of these leading indicator models. It concludes that, at least for the time being, the models are subject to some significant weaknesses and limitations, especially as potential tools for policymakers.

**THE SERIOUS DISRUPTION** to financial markets and banking systems in south-east Asia in the late 1990s provided a timely reminder of the economic and social costs that can be associated with periods of financial, and in particular banking, instability. It has also stimulated a significant body of research on potential early warning indicators of banking crises. Researchers, most notably at the International Monetary Fund (IMF) and World Bank, have developed a number of empirical models that assess such indicators. There are two strands to this literature: models that rely on *macroeconomic* indicators as key explanatory variables of banking crises; and models that assess how *microeconomic* factors (eg bank-specific characteristics) may have contributed.

This article reviews the key issues raised by the use of such leading indicator models<sup>1</sup>. It first considers what theory has to say about how banking sector problems may arise and what this implies for the search for leading indicators. It then reviews the empirical results of some recent studies of leading indicators to investigate their robustness. Finally, it assesses what factors policymakers need to consider in making practical use of leading indicator models.

## Some conceptual background

It is useful to distinguish between the failure of individual banks and disruption to the banking system as a whole.

### Individual bank failure

Banks, like other firms, are likely to face financial difficulties when the value of their assets falls below their liabilities (ie technical insolvency). The value of a bank's assets are most likely to fall if borrowers default on their loans (ie credit risk) or changes in asset prices generate falls in the value of their marketable investments (ie market risk). In both cases, banks can reduce the risks they face by appropriate pricing and screening of transactions, diversifying their asset portfolio, or taking collateral (see Freixas and Rochet (1997)). But in a world of uncertainty and information asymmetries, such risks cannot be eliminated entirely. Entrepreneurs will generally know more about their investments than the banks that lend to them. Banks may be surprised by the impact of particular events on the quality of their loan book or by the behaviour of asset markets. So shocks that adversely affect the financial health of bank borrowers or give rise to sharp dislocations in asset markets are likely to be associated with an increase in the probability of bank distress.

<sup>1</sup>: This article is not intended to be a comprehensive review of this literature. Previous studies that investigate what factors may have contributed to individual bank failures are reviewed more extensively by Logan (2001). Kaufman (1999) and Eichengreen and Arteta (2000) provide taxonomies of those models that consider indicators of system-wide banking crises.

Shocks to market interest rates are likely to be particularly important for banks. If banks do not anticipate correctly movements in, for example, the yield curve, the rate of return on their assets may fall sharply relative to the rate that they pay on their liabilities. This was the case in the United States in the early 1980s for the Savings and Loans institutions, which found themselves with substantial fixed-interest assets when market interest rates, and consequently their funding costs, rose sharply.

More generally, a number of authors have noted that banking crises may arise from an endogenous 'boom and bust' type of behaviour on the part of banks (see for example Gavin and Hausmann (1996) and the article by Andrew Logan in this *Review*). During economic upswings, banks may underestimate the problems associated with asymmetric information, such as adverse selection and moral hazard. As a result, banks may over-lend to projects that have poor long-term prospects. But the very process of lending contributes in the short term to the success of the projects, as borrowers bid up the price of, for example, land and other property and the resulting increase in wealth raises aggregate demand (Honohan (1997)). This process may be particularly in evidence during and immediately after a period of financial liberalisation<sup>2</sup>. In such an 'overborrowing' environment, banks can be vulnerable to a sharp deterioration in the financial health of their borrowers, particularly if there is also a fall in the value of assets taken as collateral on the loans.

Other authors (for example Boyd, Chang and Smith (1998)) suggest that the problems of asymmetric information – adverse selection, moral hazard or costly state verification – may be particularly acute at times when inflation is high, because of the potential depressing effect on real interest rates<sup>3</sup>. When real interest rates decline, saving will tend to fall and the demand for borrowing will tend to rise. If the expansion in potential borrowing is accompanied by a reduction in the quality of borrowers, banks may be exposed to more credit risk than they realise. That is, the average credit worthiness of borrowers may fall. Thus inflation, to the extent that it results in lower

real interest rates and induces 'inappropriate' borrowing, may increase the likelihood of banks facing unexpectedly high losses.

Inflation may also lead to problems at banks through more standard macroeconomic channels. For example, high inflation may increase economic uncertainty if it is accompanied by large relative price changes. This may lead to greater volatility in goods and asset (ie collateral) values, which in turn could lead to greater levels of expected default in the economy. If this volatility premium is not priced correctly by banks, unexpected losses may arise. Some authors also note that sharp *falls* in inflation could lead to lower nominal income and cash flows, thereby adversely affecting the financial health of banks (see Evans, Leone, Gill and Hilbers (2000)).

In addition to the risk of insolvency, banks also face the risk of a sudden withdrawal of their deposits (ie liquidity risk). A distinguishing feature of most banks is that their assets are largely illiquid term loans, while their liabilities comprise predominantly unsecured, short-term deposits. This generates the possibility of individual bank runs<sup>4</sup>. A formal exposition of bank runs, albeit in the context of a stylised model with a single mutual bank, is given by Diamond and Dybvig (1983). In this model, the instability derives from the existence of two equilibria: one is a bank run; in the other, depositors trust their bank and maintain their deposits. The bank run equilibrium arises when there is a co-ordination failure among depositors. That is, individual depositors withdraw for fear that all other depositors will withdraw their deposits (for whatever reason), making the bank illiquid, even though the bank was fundamentally sound in the absence of the run.

Institutional arrangements can in theory overcome the co-ordination failure amongst depositors. In particular, deposit insurance can eliminate the bank run equilibrium. But, if the insurance premiums do not fully reflect the riskiness in bank portfolios, deposit insurance may increase the incentives to take on incorrectly priced risk (moral hazard). This, in turn, could make the bank more vulnerable to adverse

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2: See, for example, Hoggarth, Milne and Wood (1998).

3: The relationship between real interest rates and actual inflation is, in fact, not as straightforward as implied by this view. One possible effect is that, if higher inflation outturns increase expectations of future inflation, then *ex ante* real interest rates may fall, at least temporarily.

4: In theory, a narrow bank, in which the maturity structure of its assets and liabilities are matched, is not subject to bank runs. But in a period of financial market turbulence it may not be able to realise the assets at a value sufficient to match its liabilities.

macroeconomic conditions. Similarly, the provision of emergency liquidity assistance ('lender of last resort') by the authorities may create incentives for banks to take on excessive risk<sup>5</sup>. Thus a badly specified or operated safety net, rather than aiding stability, could in principle increase the likelihood of bank failure.

### Banking system failure

A problem at an individual bank may be associated with failure of other banks, if each bank is simultaneously affected by the same shock. This would suggest that banking system problems might be more likely if the banks have similar fundamental characteristics. The banking crises in the Nordic countries (Finland, Norway and Sweden) during the early 1990s are an illustration of this. Sharp changes in macroeconomic policy and large falls in asset prices, especially property, accentuated a cyclical downturn, causing loan losses to rise rapidly for a number of banks. As a result, many banks faced insolvency, and official intervention was required to recapitalise the banking systems<sup>6</sup>.

But banking systems, particularly those in developed countries, generally consist of many heterogeneous banks, which may be less susceptible to common adverse shocks. As a result, systemic risk requires some notion of contagion or the transmission of financial distress from one bank to another. Various authors provide taxonomies of contagion (see for example, Kaufman (1994) or Masson (1998)). Some authors differentiate between 'pure' (non-information-based) contagion, information-based contagion, and other institution-to-institution transmission mechanisms. The distinction is generally based on the assertion that only 'pure' contagion is independent of economic fundamentals, operating in the absence of any explicit linkages between institutions<sup>7</sup>. That is, the failure of a bank results in widespread runs regardless of any assessment of similarities or differences between banks – a bank panic.

A similar form of pure contagion can in fact occur when banks are linked through direct exposures. A number of authors show that co-ordination failures can arise in models that extend the Diamond and Dybvig (1983) framework to include many heterogeneous banks<sup>8</sup>. For example, Freixas, Parigi and Rochet (1999) show that a similar unstable equilibrium can develop in the interbank market. Specifically, in their model, depositors are uncertain about where they need to withdraw. If there are idiosyncratic shocks to individual banks' liquidity, institutions may not provide funds to each other through the inter-bank credit market, even though they may all be fundamentally solvent. This is because if depositors believe that they will not be able to obtain funds from a bank in a location where they want to consume it is optimal for them to withdraw their deposits from their own bank. But since it is optimal for depositors in all other banks to do the same, banks cannot provide emergency liquidity support to each other. Thus a shock to an individual institution can be associated with a breakdown in the interbank market (and therefore in the banking system).

In what other ways could banking problems spread across the sector and ultimately lead to a systemic banking crisis? We can identify two groups of transmission mechanisms from the literature, both of which describe some form of 'spillover' effects. First, direct exposures between financial institutions could result in unsustainable losses for creditors on default of debtors. These might arise through banks' involvement in payment and settlement systems or more generally through their interbank exposures. Derivative market counterparty credit exposures might also be important. Second, shocks to financial asset markets can hit investors beyond those holding those assets, through the effects on overall financial market liquidity. The problems associated with Long Term Capital Management (LTCM) in the autumn of 1998 provide a useful illustration. When LTCM rapidly liquidated its portfolio, the liquidation in different markets depressed the prices of assets held by LTCM's counterparties. The

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5: See Freixas, X, Giannini, C, Hoggarth, G, and Soussa, F (1999) for further discussion of the theory and Bank of England (1994). Elsewhere in this *Review*, Chaplin, Emblow and Michael discuss the importance of monitoring banking sector liquidity given the structure of bank balance sheets.

6: For a discussion of the Nordic Banking Crises, see Drees and Pazarbasioğlu (1998).

7: Distinguishing pure and information-based contagion is not straightforward, not least because it is difficult to assess whether a response is unrelated to economic fundamentals. A bank crisis may be triggered by the release of information indicating poor performance of some or all banks. But it might also arise because there is asymmetry of information among depositors about bank returns. Bank depositors may receive information that bank risks have increased, but they do not know which individual banks are most affected. Since depositors are unable to distinguish individual bank risks, they therefore withdraw their deposits from all banks. (See Calomiris and Gorton (1991)).

8: See, for example, Freixas, Parigi and Rochet (1999) and Allen and Gale (2000).

resulting losses were potentially much worse than initially calculated by these banks (see Johnston, Chai and Schumacher (2000) and Bank for International Settlements (BIS) (1999)). The potential for ‘herding’ behaviour in financial markets can make this market liquidity channel particularly important.

### Implications

Theory suggests, therefore, that the ‘causes’ of both individual bank failure and systemic banking crises are potentially numerous. Moreover, the existence of multiple equilibria raises the question of whether bank failures are predictable at all, if bank runs can occur because of some random event<sup>9</sup>. Similarly, if ‘pure’ contagion is important, the search for leading indicators of bank crises/panics could be futile.

However, Morris and Shin (2000) show that in some circumstances the triggering of self-fulfilling bank runs and panics occurs without ‘random’ events. Provided there is uncertainty about the soundness of an institution (ie not all depositors can perfectly observe the fundamental value of the bank), then a robust correlation between the underlying fundamental valuation of the bank and the possibility of a run can be established.

Previous episodes of banking sector distress would suggest that in fact ‘pure’ contagion rarely takes place. A number of empirical event studies have examined whether, following a bank failure, share prices fall more for banks with similar characteristics than those with dissimilar ones to the failed bank. These studies all suggest that information-based contagion through perceived similarities between banks is more significant. (See for example Kaufman (1994), Liu and Ryan (1995), Aharony and Swary (1996), and Docking, Hirshey and Jones (1997).)

In principle, therefore, information on fundamentals (firms’ performance, capital resources, market structure, macroeconomic environment, etc) may be useful in spotting impending bank and system-wide problems. Developments in macroeconomic variables, such as output or interest rates, are likely to be important, either because they may come as a surprise to banks or because they create conditions which encourage banks to ‘overlend’. In particular,

rapid loan growth (or an increase in leverage more generally) may indicate that banks are taking on excessive risk, while slow output growth may lead to rising bad debts. Indicators of banks’ ability to price effectively for the risk they take on, particularly during periods of financial liberalisation, might be useful in assessing how they are affected by such macroeconomic outcomes.

Institutional features relating to the architecture of the financial system (the type of payments and settlement arrangements, the size and nature of interbank exposures, the structure of the banking system safety net etc) are also likely to be influential, although their effects are sometimes ambiguous. Allen and Gale (2000) suggest that contagion is less likely to occur when there is a ‘complete’ structure of interbank claims, in which every bank has symmetric linkages with all other banks. However, interbank connections may enable the losses of an insolvent bank to be absorbed by the rest of the system without prompting depositors to withdraw. As a result, market discipline is weakened (Freixas, Parigi and Rochet (1999)).

### Recent empirical work

Against this conceptual background, a number of researchers, particularly at the World Bank and the IMF, have developed statistical leading indicator models of banking problems. They seek to establish which indicators provide an early warning signal of either individual bank failure or a banking crisis.

### Leading indicator models

Two main approaches have been adopted in the literature – the ‘signalling’ approach and the qualitative response model.

#### *The ‘signalling’ approach*

These models compare information on indicators in periods of tranquillity with identified periods of crisis. Indicators are selected on the basis of whether changes in their behaviour between normal times and periods of crisis provide a reliable ‘signal’ of a crisis. More formally, an indicator,  $x_t$ , is said to ‘signal’ an impending crisis if that indicator crosses some threshold value,  $\bar{x}$ . The critical threshold value is chosen so as to strike a balance between having many false alarms (type II errors) and the risk of missing many crises (type I errors). Specifically, the ‘optimal’

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<sup>9</sup> Boyd, Gomis, Kwak, and Smith (2000) suggest that “...a case can be made that banking crises are often, although not necessarily always, driven by ‘sunspots’ (ie random events).”

threshold for each indicator is typically set so as to minimise the noise-to-signal ratio,  $w$ , defined here as:

$$w = b(\bar{x}^j) / [1 - a(\bar{x}^j)] \quad (1)$$

where  $a(\bar{x}^j)$  = probability of type I error associated with threshold  $\bar{x}$ ;

$b(\bar{x}^j)$  = probability of type II error associated with the threshold  $\bar{x}$

A type I error occurs when the null hypothesis is mistakenly rejected and a type II error occurs when the null hypothesis is mistakenly accepted. Under the null hypothesis that there *will* be a crisis, it is appropriate to minimise equation (1). Other authors, using a 'no crisis' null hypothesis, minimise  $\tilde{w} = a(\bar{x}_j) / [1 - b(\bar{x}_j)]$  (see, for example, Kaminsky (1998)).

Each time an indicator crosses the critical threshold, sending a signal of a future crisis, there are two possible scenarios: (i) the crisis happens shortly afterwards; or (ii) the crisis does not occur within that time frame (a false alarm). There are no definitive criteria for selecting the time frame. Kaminsky and Reinhart (1996) and Kaminsky (1999), for example, employ a 24-month window for both currency and banking crises, although they also consider 12 and 18 months.

#### Qualitative response models

This approach employs regression techniques to estimate the relationship between the various potential indicators and identified discrete outcomes such as a bank failure or a banking crisis. Specifically, qualitative information on the occurrence of such events is used to construct a dependent variable, which can take on a limited number of discrete values<sup>10</sup>. This dependent variable is assumed to be drawn from some continuous probability distribution<sup>11</sup>. Regression analysis is then used to

capture the effect of movements in the indicator variables on the probability of the event occurring<sup>12</sup>.

#### 'Macro' vs. 'micro' approaches

In using these models, two different approaches can be distinguished in the empirical literature. The 'micro' approach typically focuses on individual banks' balance sheet data, possibly augmented with market price data, to forecast the failure of individual institutions<sup>13</sup>. These early warning models are sometimes used to augment traditional supervisory processes such as CAMELS<sup>14</sup> ratings. The second approach, which has grown in prominence in recent years, uses macroeconomic variables as well as some institutional variables (usually proxied by dummies) to explain and ultimately predict systemic bank crises. These studies typically focus on a large sample of countries, some of which are known to have had a banking crisis during a certain period.

#### Empirical results

##### 'Micro' approach

The literature on early warnings of individual bank failure is well established, with the earliest empirical studies dating back to the mid-1970s. However, most of these studies are based exclusively on episodes of bank failure in the United States. This section therefore concentrates on the results from one of the few studies where indicators are compared across countries (González-Hermosillo (1999))<sup>15</sup>. It suggests that bank failure is essentially a function of liquidity, market and credit risk, which can all be influenced by individual bank characteristics and the macroeconomic environment. To capture the impact of these different effects, González-Hermosillo estimates a regression model employing bank-specific indicators (proxying market risk, credit risk, liquidity risk, and moral hazard factors), together with macroeconomic and regional variables. The study also explicitly investigates how individual bank failure can be affected by overall fragility in the banking sector

<sup>10</sup>: Sometimes, authors restrict themselves to binomial (rather than multinomial) models, where the value of the dependent variable is either 1, when the event occurs, or 0, when it does not.

<sup>11</sup>: The choice of the distribution is arbitrary, but typically in the literature the normal (PROBIT) or logistic (LOGIT) distributions are assumed.

<sup>12</sup>: Unlike standard linear regressions, the interpretation of the coefficients on the different explanatory variables in qualitative response models is generally not straightforward. While the sign of the regression coefficients have their normal interpretation, the sizes of the coefficients do not represent the marginal effects on the dependent variable. The marginal effect of any particular variable on the event probability depends on the level of all the explanatory variables.

<sup>13</sup>: See Logan (2000a) for a discussion of the early warning models used by central banks and banking supervisory bodies in a number of G10 countries.

<sup>14</sup>: CAMELS stands for Capital Adequacy, Asset Quality, Management, Earnings, Liquidity, Sensitivity to market risk and was developed by US regulators. Variants of this framework are extensively used by banking supervisors in a number of countries to assess the health of individual banks.

<sup>15</sup>: The authors investigate episodes of banking distress in south west United States (1985-1992), north east United States (1986-93), California (1986-93), Mexico (1992-1995) and Colombia (1980-88).

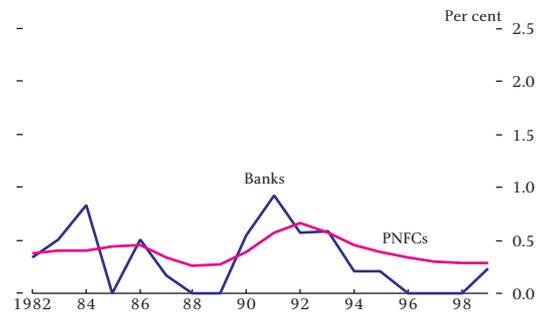
(ie taking account of contagion). Specifically, it includes in the regressions the ratio of total bank loans to output in the relevant country or region as a measure of the banking sector's fragility.

Following work by the US FDIC<sup>16</sup> on early warning systems, González-Hermosillo (1999) distinguishes indicators of fragility from underlying risk factors which might influence bank failure. A common theme which emerges is that non-performing loans and often equity capital ratios deteriorate rapidly before a bank fails. But there is less agreement about the indicators of the sources of risk that are important in predicting bank failure. The main highlights of the study are:

- Significant property-related lending (both commercial and residential) appears to be associated with increased probability of failure.
- The yield achieved on loans may be an important indicator of bank failure. A higher average loan yield sometimes reduces the probability of failure, suggesting that credit risk may have been priced appropriately. But there are examples where higher yields are indicative of excessive risk taking and increased likelihood of failure (eg California).
- The degree of reliance on interbank funding is a significant factor influencing bank failure. But the direction of the relationship is ambiguous. In the US episodes, a greater proportion of interbank funds was associated with lower probability of bank failure, suggesting that other banks have better information than other depositors about a bank's financial condition. However, in the Mexican banking problems of 1994–95, higher interbank deposits seemed to increase the probability of failure, perhaps signalling that these types of deposit may be more susceptible to a run.
- The greater the proportion of a bank's assets held in tradable securities, the lower the probability of failure. This reflects the bank's ability to deal with deposit withdrawals by liquidating assets.
- Lower real interest rates were generally associated with higher probability of failure in the US episodes. But this could reflect the fact that US interest rates generally declined throughout the period of the study.

- Contagion was present in some cases but its impact was usually small.

**Chart 1:**  
**UK bank and PNFC failure rates<sup>(a)</sup>**

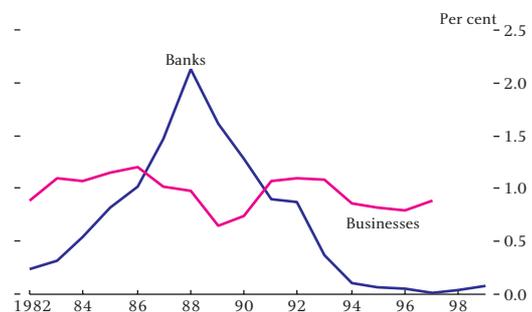


Sources: Bank of England, Deposit Protection Board and ONS.

(a) Bank failure rate: number of institutions where UK Deposit Protection Scheme was invoked as a percentage of the total number of authorised institutions. Private Non-financial Corporations (PNFC) failure rate: number of PNFC insolvencies as a percentage of the total number of PNFCs.

The lack of consistent results across different country episodes may reflect the different proxies used for each of the risk factors. But it might also suggest that individual banking crises exhibit a number of idiosyncratic characteristics. More generally, it might be that individual bank failures are intrinsically difficult to predict, perhaps because random events can trigger self-fulfilling bank runs. The time series of bank failures in the United Kingdom has been more 'volatile' than that of other corporate failures (Chart 1). The same is true in the United States, where bank failure rates used to be much lower than for corporations, but in the mid-1980s jumped up temporarily to a level well above that for other firms (Chart 2).

**Chart 2:**  
**US bank and business failure rates<sup>(a)(b)</sup>**



Sources: Federal Deposit Insurance Corporation and Dun and Bradstreet Ltd.

(a) Bank failure rate: number of failed institutions as a percentage of all FDIC insured institutions. Business failure rate: number of business failures as a percentage of total listed concerns.

(b) Business failure data for 1998 and 1999 are not available.

<sup>16</sup>: See Federal Deposit Insurance Corporation, 1997, 'History of the Eighties: Lessons for the Future', Washington: FDIC, December.

**Table 1: Chronology of banking crises<sup>1</sup> (1971-1997)**

Country	Study				Demirgüç-Kunt and Detragiache (1998a) (1998b) (1999)
	Lindgren, Garcia and Saal (1996)	Kaminsky and Reinhart (1996) and Kaminsky (1998)	Hardy and Pazarbasioglu (1998)		
			'Crisis'	'Distress'	
Algeria				1990	
Argentina	1980-2, 1989-90, 1995	1980, 1985, 1994			
Benin	1988		1987		
Bolivia		1987			
Brazil		1985, 1994			
Bulgaria	1991-96				
Cameroon	1989-93, 1995-96		1989		
<b>Canada</b>				1983	
Central African Republic	1976-92				
Chad	1979-83				
Chile	1981-87	1981			1981*
Columbia		1982		1984	1982-85
Congo	1994-96		1994		
Côte d'Ivoire				1988	
Costa Rica				1994	
<b>Denmark</b>		1987		1990	
Dominican Republic				1992	
Ecuador				1992	1995*
El Salvador				1995	1989*
Equatorial Guinea	1983-85				
Estonia	1992-95				
<b>Finland</b>	1991-94	1991	1991		1991-94
<b>France</b>				1994	
Guinea	1980-85				
Guyana					1993-95
India					1991-94
Indonesia		1992	1997	1992	1992-94
<b>Iceland</b>				1985	
Israel		1983			1983-84
<b>Italy</b>					1990-94
Jamaica				1994	
<b>Japan</b>				1992	1992-94
Jordan	1989-90			1989	1989-90
Kenya				1993	1993
<b>Korea</b>			1997		
Kuwait	mid-1980s				
Latvia	1995-96				
Lebanon	1988-90				
Liberia	1991-95				
Lithuania	1995-96				
Macedonia	1993-94				
Madagascar				1988	
Malaysia	1985-88	1985	1985		1985-88
Mali				1987	1987-89
<b>Mexico</b>	1982, 1994-96	1982, 1992	1982, 1994		1982, 1994
<b>New Zealand</b>				1989	
Nepal					1988-94
Niger	1983-96				
Nigeria					1991-94
<b>Norway</b>	1987-93	1988	1991		1987-93
Panama	1988-89				1988*
Papua New Guinea					1989*
Paraguay				1995	
Peru		1983		1983	1983*
Philippines	1981-87	1981	1981	1997	1981-87
<b>Portugal</b>					1986*
São Tomé	1980-96				
Senegal	1983-88		1983		1983-88**
Somalia	1990				
Sri-Lanka					1989-93
South Africa	1985		1985	1989	1985
<b>Spain</b>	1977-85	1978			
Swaziland					1995*
<b>Sweden</b>	1990-93	1991	1992		1990*
Tanzania	1988-96				1988-94**
Thailand	1983-87	1979, 1983	1983		1983*
Togo				1989	
<b>Turkey</b>	1982, 1991	1991	1982		1991, 1994
Uganda					1990-94**
Uruguay	1981-85	1971, 1981		1982	1981-85
<b>USA</b>					1980*
Venezuela	1994-96	1993	1994		1993-94
<i>Total no. of countries involved</i>	36	20	16	25	36
<b>Bold = OECD member country</b>					

\* Included only in Demirgüç-Kunt & Detragiache (1999); \*\* Included only in Demirgüç-Kunt & Detragiache (1998a) and (1998b)

1: This chronology is based on a selection of recent empirical studies. See Eichengreen and Arteta (2000) for a more comprehensive list of recent empirical studies.

### 'Macro' approach

Studies of banking crises require a classification and dating of when they occurred. This is not as easy as it might seem and necessarily involves a degree of judgment. There is no general consensus on what constitutes a systemic crisis. Researchers instead tend to rely on the judgments of observers with expertise about countries' banking systems.

Demirgüç-Kunt and Detragiache (1998a, 1999) adopt one (or more) of the following criteria in identifying crisis periods across countries:

- The ratio of non-performing assets to total assets in the banking system exceeded 10 per cent; or
- The cost of the rescue operation was at least 2 per cent of GDP; or
- Banking sector problems resulted in large-scale nationalisation of banks; or
- Extensive bank runs took place or emergency measures such as deposit freezes, prolonged bank holidays, or generalised deposit guarantees were enacted by the government in response to the crisis.

Other authors use slightly different criteria. For example, Kaminsky and Reinhart (1996) assess a

banking crisis to have occurred if either (i) bank runs lead to the closure, merger or takeover by the public sector of one or more financial institutions, or (ii) in the absence of runs, the closure, merging, takeover or large-scale government assistance to a bank triggered a string of similar outcomes for other financial institutions.

Table 1 gives details of the 'crisis' countries incorporated in four recent studies. A feature of these (and similar studies) is the significant concentration on emerging market economies (EMEs) – in the studies quoted in the table, developed countries account for no more than 30% of all crises. Moreover, the periods of crises are not always the same across the various studies. For example, in Demirgüç-Kunt and Detragiache (1999), banking crises in Chile, Ecuador, El Salvador, Panama, Peru, Portugal, Swaziland, Sweden and Thailand are included in the panel study, while these countries did not feature in Demirgüç-Kunt and Detragiache's 1998a study. There are also notable differences in the dates attributed to banking crises. For example, 1992 in Ecuador is described as a period of increased fragility by Hardy and Pazarbasioglu (1998), but a crisis is recorded as occurring in 1995 by Demirgüç-Kunt and Detragiache (1999). Frydl (1999) identifies similar inconsistencies between authors' dating of banking

**Table 2: Noise-to-signal ratios for key indicators of banking crises (Kaminsky (1998))**

Indicator	Noise-to-signal ratio	Indicator	Noise-to-signal ratio
<b>'Overborrowing cycles'</b>		<b>Problems on capital account</b>	
Ratio of M2 to base money	0.5	Reserves	0.7
Domestic credit/GDP	0.6	M2/reserves	0.7
Domestic and external financial liberalisation dummy	0.8	Real interest rate differential (domestic vs. overseas)	0.5
<b>'Bank runs'</b>		World real interest rate (US)	0.5
Bank deposits	1.0	Liabilities of domestic residents in BIS reporting banks (up to one year maturity)	0.5
<b>Monetary policy</b>		Liabilities of domestic residents in BIS reporting banks	0.9
'Excess' M1 balances	0.8	Deposits of domestic residents in BIS reporting banks	0.6
<b>Problems on current account</b>		<b>Growth slowdown</b>	
Exports	0.6	Industrial production	0.5
Imports	1.6	Domestic real interest rate	0.5
Terms of trade	0.8	Lending/deposit rate ratio	1.9
Real exchange rate	0.3	Stock prices	0.3

crises. In comparing two studies, Frydl finds that only around one half of all crisis observations are common, and that in those common episodes less than a third show identical crisis periods.

Table 2 summarises the empirical results in Kaminsky (1998), which is an example of a study based on the signalling approach. The lower the noise-to-signal ratio, the more informative is the indicator. The average noise-to-signal ratio for all the indicators is 0.8, suggesting that, on average, the indicators provide fewer false alarms than accurate signals. But a number of indicators are significantly better than the average at predicting banking problems. These include indicators that capture 'overborrowing' (the ratio of M2 to base money – the M2 multiplier – and domestic credit/GDP), a slowdown in actual or expected economic growth (weaker industrial production and higher domestic real interest rates) and asset price corrections (fall in the real exchange rate and a fall in stock prices).

Table 3 presents the results for some of the other studies cited in Table 1, which all use the multinomial regression approach. It also includes the results of Hutchinson and McDill (1999), a study that in large part uses the dating scheme in Demirgüç-Kunt & Detragiache (1998a).

In common with the results from the signalling approach, the multinomial regression approach suggests that banking sector problems are associated with:

- High real interest rates
- Low output growth
- Rapid domestic credit growth
- Falls in the terms of trade/real exchange rate.

The results also indicate that high inflation tends to be associated with an increased probability of a banking crisis. Together with the result that higher real interest rates increase the probability of a banking crisis, this suggests that the timing of their

influences could be important. Higher inflation ahead of a crisis, to the extent that it lowers real interest rates, may give rise to rapid credit expansion at the same time as a fall in the average creditworthiness of borrowers. An increase in real interest rates could mark the end of this process and the start of increased distress for borrowers. This is consistent with the finding in the multinomial regressions that higher domestic real interest rates are a coincident indicator of banking crises.

The empirical studies also suggest that institutional features are important in leading indicator models. In particular, episodes of financial liberalisation appear to be associated with a higher probability of banking sector crisis. This would indicate that, when controls on lending are relaxed, banks take on riskier exposures that are either mispriced or make the overall portfolio less diversified. Similarly, the presence of deposit insurance, although it is designed to limit the potential for bank runs, appears to increase the likelihood of a banking crisis.

Eichengreen and Arteta (2000) investigated the sensitivity of the empirical results of leading indicator models. The authors considered a range of alternative explanatory variables in regressions, corresponding to the factors cited by previous researchers as influencing banking crises, across a common set of crisis dates, sample intervals and countries<sup>17</sup>. If the empirical results are robust, the indicators should be statistically significant across a range of regression models.

A key conclusion of the Eichengreen and Arteta analysis is that a number of the results of earlier studies are not robust across different specifications (Table 4). For example, the study finds that deposit insurance does not necessarily increase the risk of a banking crisis in EMEs<sup>18</sup>. And, although the deposit insurance variable was positive and significant in regressions including Organisation for Economic Co-operation and Development (OECD) countries as well as EMEs, this result was sensitive to weighting observations by GNP. In unweighted regressions the deposit insurance variable was insignificant. Similarly, there was not robust empirical evidence that systems

<sup>17</sup>: The baseline regressions are based on an update of the identified crises used by Caprio and Klingelbiel (1996). This covers crisis episodes from the mid-1970s to 1998.

<sup>18</sup>: Eichengreen and Arteta (2000) use a sample of EMEs with 102 identified crisis episodes (systemic and non-systemic) in the period 1980-1997. Apart from two cases, this sample includes the 23 emerging market crises studied in Demirgüç-Kunt and Detragiache (1998a) (1998b).

**Table 3: Key results of multinomial regression studies of indicators of banking crises<sup>(a)</sup>**

Indicator	Study				
	Hutchinson & McDill (1999)	Demirgüç-Kunt & Detragiache (1999)	Demirgüç-Kunt & Detragiache (1998a)	Demirgüç-Kunt & Detragiache (1998b)	Hardy & Pazarbasioglu (1998)
<b>General</b>					
OECD	--				
Regional dummies					-- /+ + (less significant in lagged model)
<b>Banking sector characteristics</b>					
Central bank independence	--				
Explicit deposit insurance	+ (not significant in lagged model)		++		
Financial liberalisation proxy	++ (less significant in lagged model)			++	
Institutional quality (Interactive term with financial liberalisation dummy)	++			- (contemporaneous)	
Law and order index			--		
GDP per capita			--	-- (less significant in lagged model)	
Gross foreign liabilities/GDP			-		
Change in banking sector deposit liabilities/GDP					- (not significant in lagged model)
<b>Macroeconomic developments</b>					
Real GDP growth	-- (not significant in lagged model)	-- (contemporaneous)	-- (contemporaneous)	-- (not significant in lagged model)	-- (less significant in lagged model)
Real exchange rate depreciation					-- (not significant in lagged model)
Real credit growth	- (not significant in lagged model)	++ (lagged two years)	++ (lagged two years)	+ (lagged two years)	
Real interest rate		++ (contemporaneous)	++ (contemporaneous)	++ (less significant in lagged model)	+ (less significant in lagged model)
M2/reserves		++ (contemporaneous)	+ (contemporaneous)	++	
Inflation		++ (contemporaneous)	++ (contemporaneous)	++ (not significant in lagged model)	++ (lagged two years)
Change in terms of trade			- (contemporaneous)	-- (not significant in lagged model)	
Change in stock market index	- (only significant in lagged model)				
Growth in imports					- (not significant in lagged model)

(a) Based on models employing both LOGIT and PROBIT formulations.

-- (+) Parameter coefficient negatively (positively) significant at the 1% or 5% significance level in any of the selected model specifications; - (+) significant at 10% level of significance.

**Table 4: Results of sensitivity analysis of indicators of banking crises (Eichengreen and Arteta (2000))**

Indicators	Sign of coefficient	Robust ?	Comment
<b>Macroeconomic</b>			
Domestic credit growth	+ve	✓	
M2/Reserves	+ve	✓	
Budget surplus	+ve	X	Significance only due to collinearity with insignificant variables.
OECD interest rates	+ve	X	Not robust to extending sample from 1975–92 to 1975–97.
OECD output growth	-ve	✓	
Exchange rate	-ve	X	Significant effect of currency movement generally eliminated when introduced as a lagged term. Correlation therefore likely to reflect ‘causality’ running from banking crises to currency crises.
<b>Institutional</b>			
Domestic financial liberalisation	+ve	✓	Dummy variable for removal of deposit rate controls.
International financial liberalisation	-ve/+ve	X	Dummy variable for capital account liberalisation significant only when interacted with domestic financial liberalisation variable.
Deposit insurance	-ve	X	Not robust to different deposit insurance variables and common crisis dates.
Institutional quality	-ve	X	Not robust to changes in sample of countries and different institutional quality proxy.

with weaker legal and regulatory structures (proxied by a dummy variable for institutional quality) are likely to suffer a greater likelihood of banking crises. The analysis also throws doubt on the potential leading indicator properties of the exchange rate for problems in the banking sector. The effects of the exchange rate on banking crisis risk differ across specifications. If anything, the evidence is more supportive of the link running from banking crises to currency crises rather than the other way round<sup>19</sup>.

However, some results do appear to be more robust. Rapid domestic credit growth, large bank liabilities relative to reserves (which itself could be proxying a build-up in bank assets, to the extent that banks seek to attract funds to finance lending growth) and domestic financial liberalisation all appear to be influential in generating systemic banking crises. This suggests that banking systems are most at risk when financial deregulation and the macroeconomic environment combine to create an unsustainable lending boom (Eichengreen and Arteta 2000)<sup>20</sup>.

### An assessment

Recent empirical studies are a useful attempt to make the identification of potential crises more rigorous. As the following discussion makes clear, however, at least for the time being the models are subject to some serious weaknesses and limitations, especially as potential tools for policymakers.

#### *Choice of sample and indicators*

The concentration on banking crises in the EMEs, although understandable given their greater frequency of late, has influenced the types of indicator that have been selected as helping to predict crises. The available data for emerging market economies are typically much less complete in terms of quality and quantity. As a result, the indicators employed in these studies are largely derived from the macro variables available from the IMF’s International Financial Statistics database. In fact, a number of authors use data availability as a criterion for selecting which countries to include in the study (eg Demirgüç-Kunt and Detragiache 1998b), which in itself could give rise to sample selection bias.

<sup>19</sup>: This would be consistent with the literature on ‘twin crises’. See, for example, Kaminsky and Reinhart (1996).

<sup>20</sup>: Other authors, nonetheless, question the role of credit booms in banking crises. Boyd, J, Gomis, P, Kwak, S and Smith, B (2000) examine patterns of credit growth in a sample of 21 countries which have experienced a single crisis. They find that in 10 out of the 21 countries there is “at least one pre-crisis period in which the ratio of private credit to GDP grows at an unusually rapid rate with no crisis occurring in the subsequent three years.”

Moreover, there are good reasons to think that banking crises in developed and developing countries may evolve differently. Banks typically account for a larger share of total assets of financial institutions in EMEs compared with developed countries. And, according to Rojas-Suarez and Weisbrod (1996), the maturity of bank liabilities is typically shorter, supervision and regulation is typically less well developed, and opportunities to hedge risk are fewer, in EME countries. It is likely that such structural characteristics of the banking sector are important in 'risk-proofing' the system<sup>21</sup>. These factors are not well covered by studies which focus on explaining banking crises in EMEs.

A particular weakness of the models relates to the way in which they capture the notion of contagion. Few, if any, variables are included in the macro-type studies to represent such effects, and the micro approaches make use of very crude proxies. Previous empirical investigations of the direct linkages between banks tend to find that the number of participants and the size of payment flows influence the level of systemic risk, although the nature of the relationship is not always straightforward. The characteristics of the payment system – Real Time Gross Settlement (RTGS) or netting, how finality is achieved, government guarantees etc – may be particularly significant (see Angelini, Maresca and Russo (1996) and McAndrews and Wasilyew (1995)).

The size and nature of interbank exposures are likely to affect the probability of system-wide disruptions. In the UK, the clearing banks deal with most of the imbalances in the UK interbank market. Of the £54bn gross exposures within the sterling interbank market in mid-1997, nearly all were between eight UK clearing banks (Michael (1998)). This suggests that the failure of these types of, typically, large institutions could lead to serious knock-on effects elsewhere in the financial system<sup>22</sup>. Such

inter-linkages are not well captured in the simple statistical leading indicator models.

#### *Banking fragility versus banking crisis*

A key problem for the empirical studies of banking crises is the lack of a generally accepted measure of fragility which can be determined prior to a crisis occurring. The approaches so far adopted have tended implicitly to assume that a period of fragility is simply a less severe version of a crisis, ie that the three points 'no problems', 'fragility', and 'full-blown crisis' lie on the same continuum. In practice, however, this may not be the case. We might view 'fragility' as relating to the structure of the financial system, and 'crisis' as the results of the interaction between that fragility and some exogenous shocks. A crystal glass is fragile because of the structure of its molecules. But there is no problem (or crisis) unless the glass is struck by a sufficiently hard blow (shock)<sup>23</sup>. So policymakers need to draw a distinction between fragility (meaning the financial system's vulnerability to shocks) and crises (which may come about if a system is struck by a sufficiently large shock)<sup>24</sup>. Most of the leading indicator models, particularly those concerned with banking crises rather than individual bank failure, do not fully capture this distinction.

Moreover, policy intervention may mean that banking problems that pose a threat to systemic stability are contained without a crisis being observed<sup>25</sup>. So, if we attempt to explain fragility with reference only to recognised crises, information from all those periods of fragility which did not result in crisis will be lost. Indeed, if policymakers learn about past predictors of crises and act effectively on this information, we would expect the predictors of crises to be different each time. More generally, this is an illustration of the perils of reduced-form modelling of banking crises. Without a proper structural model of banking system disruptions, there is no reason to expect leading

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**21:** This seems to be the view of policymakers. See Group of 22 Report of the Working Group on Strengthening Financial Systems, October 1998.

**22:** Simulations by Furfine (1999) suggest that the risk of contagion in the interbank markets of developed countries may actually be quite low. But Furfine's data represent only 20 per cent of the interbank exposures in the US system. As a result, he suggests that his results may under-estimate the potential for interbank exposures to lead to systemic risk.

**23:** Rudiger Dornbusch made a similar point, in a different context, in his presentation to the 1997 Federal Reserve Bank of Boston conference: 'Beyond shock: what causes business cycles?' ([www.bos.frb.org](http://www.bos.frb.org)) He gave the example of the collapse of a building during an earthquake. He suggested that 'while the proximate cause of the collapse was the earthquake, the underlying cause maybe better attributed to poor construction techniques. Because of its structural defects, the building was going to collapse when the right shock came along. So it goes with financial and real economic collapses...'

**24:** For further discussion of this point see 'Financial Stability Issues', Bank of England Financial Stability Review, November 1999.

**25:** An example is the episode of the failure of several small UK banks in the early 1990s. The provision of emergency liquidity assistance is judged to have prevented a potentially systemic disruption. See Logan (2000b) in this Review.

indicator models to perform well across different countries or across different samples over time.

#### *Type I versus type II errors*

The value to policymakers of both the macro and micro approaches to modelling leading indicators is in the signals they give to take 'prompt, corrective action', or at least undertake further investigation to gather more information. According to Demirgüç-Kunt and Detragiache (1999), 'the premise behind the warning system is that either banking crises can be prevented or that their cost can be substantially reduced if an accurate advance warning is received by the decision maker.' But interpreting signals from such models is not straightforward. Depending on the policymaker's preferences, it may not simply be a case of minimising the noise-to-signal ratio associated with a particular indicator or collection of indicators, as in the signalling approach. If authorities view type I errors, ie 'missing' crises or 'surprises', as more important then they should select a criterion that is based more on reducing type I errors and accepting more type II errors (ie falsely identifying potential crises).

As outlined in Demirgüç-Kunt & Detragiache (1999), and in the Annex to this article, for a simple, stylised policymaker's loss function, the higher is the cost of missing a crisis relative to the cost of taking preventative action, the more concerned the policymaker will be about type I errors relative to type II errors, and vice versa. The larger the cost differential, the more the policymaker will be able to reduce its losses by lowering the threshold associated with the warning signal (holding everything else constant). That, in turn, would lower the probability of type I errors at the expense of increasing the probability of type II errors<sup>26</sup>. Moreover, the higher is the unconditional probability of a banking crisis, the more weight the decision-maker will place on type I errors relative to type II errors.

In practice, banking crises are rare events<sup>27</sup>. Therefore it is important to weigh up the costs of taking unnecessary preventative action against those associated with a banking crisis occurring.

Preventative costs include the cost of greater investigation into the stability of the system by the financial authorities, direct actions of regulators to avoid banking problems (eg forced disclosure of information, limits on lending and replacement of management), and possibly emergency liquidity assistance to avert a crisis. The costs of a crisis are typically thought of as the fiscal injection necessary to recapitalise the banking sector. But, on wider definition, they also include "that part of the burden born by depositors and borrowers in the face of wider spreads for bad loans that were left on banks' balance sheets" (Caprio and Klingebiel (1996)), as well as the impact of a severe disruption in the banking sector on the macroeconomy – see Hoggarth, Reis and Saporta (2001) for further discussion. Neither of the two types of cost is easily measured in practice. Nonetheless, policymakers need to assess them as one element in deciding how to employ the leading indicator models in practice.

#### *Leading versus coincident indicators*

Many of the empirical models proposed in the literature are based on coincident correlations between the dependent and explanatory variables<sup>28</sup>. They are designed, therefore, to explain crises rather than to forecast or predict them. And the lagged values of many of the variables, rather than contemporaneous observations, are often not significant when introduced into the regressions.

The practical use of such empirical models as leading indicators is therefore restricted by the necessity to be able accurately to forecast values for the explanatory variables. Demirgüç-Kunt and Detragiache (1999) recognise that this forces the model user to rely on those variables for which frequent, often external, forecasts are readily available. When these authors restricted their model to only those explanatory variables, the resulting model was not the specification that best fitted the data.

Table 5 shows how Demirgüç-Kunt and Detragiache's estimated crisis probabilities are affected by forecast errors. The 'good' errors column shows the crisis probabilities that result from the model when each

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<sup>26</sup>: Note that the trade-off between type I and II errors is non-linear. The marginal benefit to the policy maker of reducing type I errors at the expense of more type II errors will diminish to zero as the threshold value falls. In the extreme, with a low enough threshold, the system would predict crises all the time.

<sup>27</sup>: Notwithstanding the definition problems, the combined crisis dates of the empirical studies quoted in Table 1 over the period 1980-1995 indicate the unconditional probability of a crisis in IMF countries is less than 2 per cent.

<sup>28</sup>: A similar result is found in Logan (2001) in the empirical investigation of individual failures of small UK banks during the early 1990s.

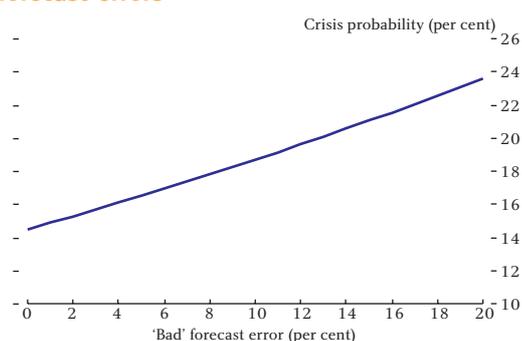
**Table 5: Crisis probabilities with contemporaneous data and 5 per cent forecast errors**

Crisis probability (per cent)	5% 'good' forecast error	Contemporaneous data (ie zero error)	5% 'bad' forecast error
Indonesia (1997)	12.7	14.5	16.5
Malaysia (1997)	3.3	3.7	4.2
Korea (1997)	3.9	4.4	4.9
Philippines (1997)	5.5	6.0	6.5
Thailand (1997)	13.0	14.0	15.0
Mexico (1993)	11.1	11.7	12.2

Source: Demirgüç-Kunt and Detragiache (1999) and Bank estimates.

explanatory variable (except the constant) is changed by 5 per cent from the actual value in the direction that would *reduce* the estimated crisis probability (ie too low a forecast if the variable coefficient is positive and vice versa). The 'bad' errors column shows the opposite, ie what would happen if the explanatory variables were incorrectly forecast by 5 per cent in the direction that would *increase* the crisis probability. Chart 3 shows what happens to the estimated Indonesian crisis probabilities for different sizes of 'bad' forecast errors. These calculations suggest that the crisis probabilities are not particularly sensitive to modest forecast errors.

**Chart 3:**  
**Indonesian crisis probabilities with different 'bad' forecast errors**



Sources: Demirgüç-Kunt and Detragiache (1999) and Bank of England calculations.

However, the recent South East Asian crisis suggests that, in some cases, actual forecast errors can significantly affect the prediction. Demirgüç-Kunt and Detragiache (1999) compute the crisis probabilities for 1996 and 1997 in five Asian crisis countries using actual data for the main indicators in their preferred model. These are compared with those that could have been constructed based on forecast information available in May 1997. The results, shown in Table 6,

suggest that forecast crisis probabilities were low for the five Asian countries, in large part reflecting their strong economic performance in the years up to 1996, whereas the actual data gave a much clearer indication of crisis. That suggests that leading indicator models would have failed to alert people that the banking sectors in these five Asian countries would undergo crises in the second half of 1997.

**Table 6: Crises probabilities using forecast and actual data**

Crisis probability (per cent)	Based on forecast data	Based on actual data
Indonesia (1997)	2.4	14.4
Malaysia (1997)	1.8	3.7
Korea (1997)	2.3	4.4
Philippines (1997)	3.5	5.9
Thailand (1997)	3.3	13.8

Source: Demirgüç-Kunt and Detragiache (1999).

### Concluding remarks

The search for leading indicators of banking crises has generated considerable interest in recent years. Empirical studies have, however, met with only limited success. Some common themes do emerge from the studies – specifically, the importance of macroeconomic conditions in banking crises and shocks to certain asset prices. But a number of the results are not robust to a change in the sample or the definition of crisis. In a number of cases the explanatory variables are only correlated contemporaneously with the crisis, thus limiting their use in leading indicator models for policymakers.

The samples of crisis countries included in empirical studies are also heavily skewed towards EMEs. It is not clear how far any results carry over to industrial countries' banking systems. For example, the nature of the exchange rate regime has often proved to be particularly important for banking sector stability in EMEs<sup>29</sup>. Financial markets, the institutional infrastructure and prudential supervision are all more developed in industrial economies. Banking problems, even if they arise from similar fundamental sources, are therefore likely to evolve differently.

In making use of leading indicator models of banking crises, it is important to be clear on the questions being asked. Two possibilities would be (i) to assess which *ex ante* indicators are more important in identifying banking sector *fragility*, and (ii) to review which indicators have genuine predictive power ahead of banking *crises*. In practice, (ii) is what leading indicator models attempt to do. But implicit in such an exercise is a trade-off between failing to predict crises when they subsequently occur, and, on the other hand, crying wolf too often (and so incurring heavy costs of increased scrutiny of banks etc). Policymakers need to assess where along this trade-off they want to be located if they are to use these indicators meaningfully. Even then there is a need for caution, given that these models do not necessarily capture causal relationships. As in the monetary stability sphere, policymakers can use leading-indicator models to inform their decisions about prospective systemic problems in their banking sectors. But they should be used in conjunction with other indicators to assess and understand what potential shocks and vulnerabilities are important in the current conjuncture and why.

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<sup>29</sup>: For example, countries with currency boards cannot have their own 'lender of last resort' (LOLR) facilities. They must either ensure that their banking system is highly liquid (Argentina pursues this course – see [www.bcra.gov.ar](http://www.bcra.gov.ar) for more details of their regulatory framework) or somehow acquire access to a LOLR from the country to whose currency they are pegged (see Wood (2000)).

## Annex: Policymaker's decision process

Following Demirgüç-Kunt and Detragiache (1999), let  $p(T)$  denote the probability that the model will issue a warning for a given choice of the threshold value  $T$  of the dependent variable; let  $e(T)$  be the joint probability that a crisis will occur and the model *does not* issue a warning; let  $c_1$  be the cost of taking preventative actions as a result of having received a warning, and  $c_2$  be the cost of an unanticipated banking crisis. Then a simple linear loss-function for the decision-maker is:

$$L(T) = p(T)c_1 + e(T)c_2 \quad (1)$$

From Bayes' Theorem we know that  $e(T)$  is equal to the conditional probability of the system *not* issuing a warning given that a crisis *will* occur multiplied by the unconditional probability of a crisis occurring (denoted here as ' $v$ ', which is independent of  $T$ ). In other words,  $e(T)$  is equal to the probability of a type I error,  $p_I(T)$ , multiplied by ' $v$ '. We can interpret  $e(T)$  as the probability that the policymaker will incur the 'surprise crisis' cost  $c_2$ .

The probability of the system issuing a warning  $p(T)$  is the probability that the policymaker incurs the 'preventative' cost  $c_1$ . It can be expressed as the probability of *correctly* predicting a crisis plus the probability of *incorrectly* predicting a crisis. That is equal to one minus the probability of a type I error multiplied by the unconditional probability of a crisis occurring (ie  $(1-p_I(T))v$ ) plus the probability of a type II error, multiplied by the unconditional probability of a crisis *not* occurring (ie,  $p_{II}(T)(1-v)$ ).

So, the loss-function in equation (1) can be rewritten in terms of the type I and type II errors associated with the policymaker's choice of threshold  $T$ . That is:

$$L(T) = c_1[(1-p_I(T))v + p_{II}(T)(1-v)] + c_2p_I(T)v \quad (2)$$

Equation (2) can be rearranged as:

$$L(T) = vc_1[1 + p_I(T)(c_2 - c_1)/c_1 + p_{II}(T)(1 - v)/v] \quad (3)$$

From equation (3), the higher the cost of missing a crisis relative to the cost of taking preventative action (ie the larger is  $(c_2 - c_1)$ ), the more concerned the policymaker will be about type I errors relative to type II errors, and vice versa. The larger the cost differential, the more able the policymaker will be to reduce its loss-function by lowering the threshold  $T$

(holding everything else constant). That, in turn, would lower the probability of type I errors at the expense of increasing the probability of type II errors. Moreover, the higher is the unconditional probability of a banking crisis ( $v$ ), the more weight the decision-maker will place on type I errors relative to type II errors.

As Demirgüç-Kunt and Detragiache (1999) also point out, minimising the noise-to-signal ratio,  $p_{II}(T)/(1-p_I(T))$  – the criterion typically adopted in the 'signalling approach' – generally does not minimise the expected loss-function in equation (3). Instead, the policymaker must weigh up the costs of action and inaction as well as the underlying likelihood of a crisis in his country's banking system in deciding how best to proceed.

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# The early 1990s small banks crisis: leading indicators

Andrew Logan, Financial Industry and Regulation Division, Bank of England

Bank failure is fortunately a rare event in the UK. The last time it was widespread was in the small banks' crisis of the early 1990s. This article assesses whether the banks that would go on to fail during this period shared any common characteristics. Identification of such 'leading indicators' should assist the Bank of England in its surveillance work on the banking sector.

**THE MOST RECENT CASES** of official emergency liquidity support to UK banks occurred in the early 1990s, when the Bank lent to a few small banks in order to prevent wider loss of confidence in the banking system. A rather larger group of small banks got into difficulty and was subject to intensified regulatory monitoring; 25 banks failed or closed due to problems during this period.

In terms of policy debates about preserving stability, this near crisis has attracted less attention than the failures of individual banks, such as Bank of Credit and Commerce International (BCCI) and Barings, which were individually larger and more prominent but whose problems did not in fact threaten the system. Nor has the episode featured in research on banking sector crises, perhaps principally because the actions taken by the UK authorities succeeded in arresting the spread of problems. It is important, though, to try to learn lessons from near-crisis episodes. Recent research in the Bank has, therefore, investigated whether there were warning signs that the small bank sector was heading into difficulty from the late 1980s, when the economy as a whole was overheating<sup>1</sup>.

Based on information in mid-1991, the most important leading indicators of failure were a high dependence on net interest income, low profitability, low leverage, low short-term assets relative to liabilities and low loan growth. Taken together, these

indicators suggest that the banks that failed over the following three years were already weak by the early 1990s. By then, it might have been difficult for regulators to do more than manage down the scale of the problems. A stronger test of the ability to predict failures – and so perhaps prevent crises – uses information in the period prior to the weakening in balance sheets. This finds that rapid loan growth in the late 1980s boom was a good longer-term indicator of failure. A cyclical comparison indicates that the banks that subsequently failed tended to exhibit a pronounced boom and bust cycle in lending growth, unlike those banks that survived.

The article begins by describing the UK small banks' sector in the early 1990s, the evolution of the crisis and the Bank's liquidity support operation. The next section provides an overview of the statistical analysis: the definition of failure used, the data sources employed and the types of variable that were tested to assess their leading indicator properties. The results based on data in 1991 Q2 follow (this being the last quarter before the closure of BCCI on 5 July 1991, an event which escalated the difficulties at several small banks). The following section repeats the analysis using variables for earlier periods – mainly 1990 Q2, the quarter prior to the start of the early 1990s recession. Finally, the value of the leading indicators of failure for small banks are compared with those of corresponding measures for some larger retail banks.

<sup>1</sup> The work has some similarities with early warning systems employed by bank regulators in some countries as part of their off-site surveillance of banks. Reidhill and O'Keefe (1997) give an overview of the development of such systems since the mid-1970s by the federal banking regulators in the United States. The history of the development of early warning systems by European banking regulators is more recent. Laviola, Reedtz and Trapanese (1999) and Peter (2000) provide details of those constructed by the Banca d'Italia and the Banque de France. An overview of the early warning systems used by member institutions of the Basel Committee on Banking Supervision (BCBS) and of system development are given in Van den Bergh and Sahajwala (2000) and Logan (2000). See also Cole, Cornyn and Gunther (1995), Espahbodi (1991), Korobow, Stuhr and Martin (1977), Martin (1977), Korobow and Stuhr (1975) and Sinkey (1975).

**Table 1: Authorised banks in the UK (at end February)**

	1990	1991	1992	1993	1994
UK commercial and merchant banks	75	70	72	73	71
<i>Of which members of the MBBG<sup>(a)</sup></i>	<i>n.a.</i>	<i>n.a.</i>	38	37	34
UK branches and subsidiaries of foreign banks	340	336	328	332	360
Small and medium-sized UK banks	125	116	111	96	80
Total	540	522	511	501	511

Source: Bank of England.

(a) See footnote 3 for details on membership of the Major British Banking Groups (MBBG). Figures for 1990 and 1991 are unavailable because the MBBG classification did not exist until April 1991.

## Background

### The UK small bank sector in 1991

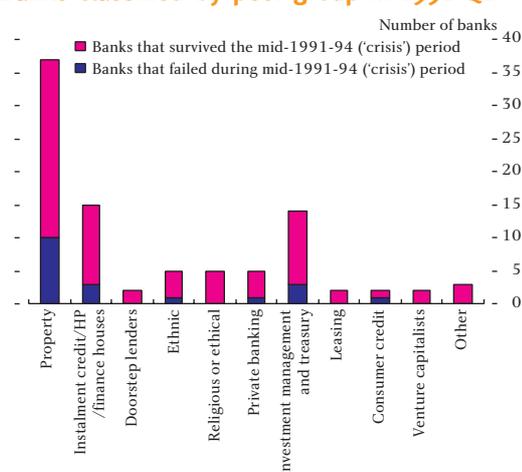
The UK banking system can be split into three broad groups: large UK-incorporated commercial and merchant banks, small and medium-sized UK-incorporated institutions<sup>2</sup>, and UK branches and subsidiaries of foreign banks. Table 1 shows the number of banks in each category from end-February 1990 up to end-February 1994. At the end of February 1991, 116 small and medium-sized UK banks were authorised. It was possible to compile a full dataset for 92 of them.

Chart 1 splits the small and medium-sized banks operating in 1991 Q2 into peer groups according to their main activity. The largest cohort was the (residential and non-residential) property lenders, which accounted for 37 out of the 92 banks analysed. The next two most significant cohorts were the instalment credit/hire purchase (HP) lenders/finance houses and the investment management/treasury groups, which each included 15 banks. The remainder of the sector undertook a diverse range of activities.

Chart 2 shows a histogram of the 92 banks' balance sheet size in 1991 Q2. The smallest bank in the sample had total assets of £1.0 million and the largest had £3.2 billion. The mean and median were £166.4 million and £38.2 million, respectively. To put these figures into perspective, the mean balance sheet size of the banks in the Major British Banking Groups (MBBG) was £11.8 billion at end-1991, with Barclays PLC alone, the largest UK bank at the time, having a balance sheet of £138.1 billion<sup>3</sup>. Both figures dwarf

**Chart 1:**

**Banks classified by peer group in 1991 Q2<sup>(a)</sup>**

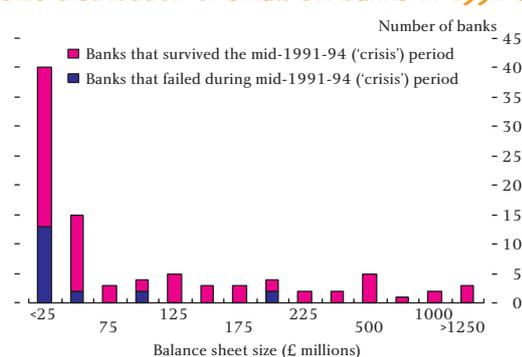


Source: Bank of England.

(a) See text on the definition of failure used for the duration of the 'crisis' period.

**Chart 2:**

**Size distribution of small UK banks in 1991 Q2<sup>(a)</sup>**



Source: Bank of England.

(a) See text on the definition of failure used for the duration of the 'crisis' period.

**2:** The small and medium-sized banks group includes all UK-incorporated banks that were not large commercial or merchant banks. The banks within this catchall category were labelled small and medium-sized because of the scale of their balance sheets relative to the two other sectors.

**3:** Data on the size of Barclays PLC's and Major British Banking Groups' balance sheets are from British Bankers' Association (BBA) (1992). At 1991 Q2, the MBBG comprised the Abbey National Group, the Bank of Scotland Group, the Barclays Group, the Lloyds Group, the Midland Group, the National Westminster Group, the Royal Bank of Scotland Group, the Standard Chartered Group and the TSB Group.

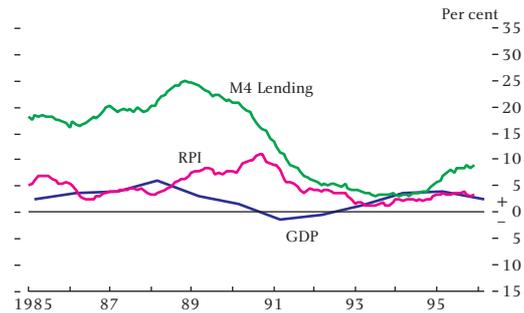
the average size of the individual banks in the small and medium-sized sector. In fact, the *total* assets of the small and medium-sized banks' sector were equivalent to only 11 per cent of Barclays' assets and 3.2 per cent of those of the MBBG sector as a whole. Most of the banks that failed had footings of under £25 million.

### The small banks' crisis

The small banks' crisis unfolded against a background of macroeconomic boom and bust<sup>4</sup>; for the economy as a whole, 'boom and bust' is an instructive metaphor, for some of the small banks it was literally true. The growth in output, credit and asset prices, particularly commercial and residential property, rose sharply reaching a peak in 1988. Subsequently, as monetary policy was tightened, the real economy moved into recession, asset prices fell and the growth in aggregate bank and building society credit declined sharply. Against this background, the fragility of the banking system increased, culminating in the failure of 25 banks – mainly smaller ones – in the first half of the 1990s.

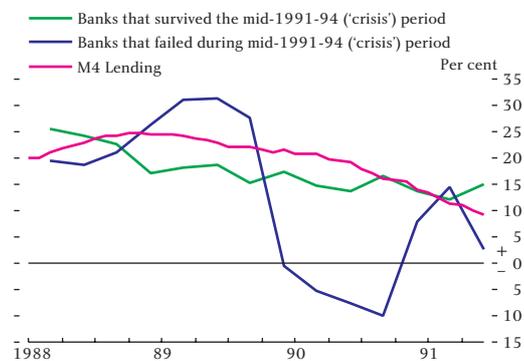
This interaction of boom and bust in the real and financial sectors is often described in terms of a financial accelerator effect<sup>5</sup>. In an economic upturn, credit expands and asset values rise, creating further valuable collateral on which to lend. In a downturn, the process goes into reverse: asset prices and thus the value of collateral decline, credit risk rises, lenders become more cautious, loan-financed spending falls, and the recession may be made worse. Bank behaviour may accentuate this financial accelerator effect. Banks (and other financial intermediaries) have imperfect information about the quality of their borrowers. In consequence, they try to protect against moral hazard and adverse selection by taking collateral, charging higher interest rates for unsecured loans, or channelling funds to borrowers with high net worth. Nonetheless, during boom periods banks may make mistakes through overestimating the quality of their assets and/or the value of collateral taken. Credit assessment can, moreover, be more difficult in a rapidly expanding

**Chart 3:**  
Annual growth in real GDP, banks' and building societies' (M4) lending and retail prices



Sources: Bank of England and ONS.

**Chart 4:**  
Annual growth in lending to the UK non-bank private sector by all banks and building societies (M4) and the small banks<sup>(a)</sup>



Source: Bank of England.

(a) Split into subsequent failures and survivors. See text on the definition of failure used for the duration of the 'crisis' period.

economy because of increases in the number of both new providers and users of credit. This stylised account is not, in fact, a bad picture of the stability problems in the UK in the early 1990s<sup>6</sup>.

At the risk of prejudging the results of the subsequent analysis, Chart 4 shows that the pattern of lending growth of the small banks that went on to fail between mid-1991 and 1994 was much more cyclical in the boom and bust period (1988-1991) than that of either the small banks that survived or of the bank and building society sector as a whole<sup>7</sup>. Even by the standards of the time, the 30 per cent or so growth of the 'failed banks' was very high.

4: Schwartz (1998) discusses the links between financial stability and price stability. She comments "if inflation and price instability prevail, so also will financial instability".

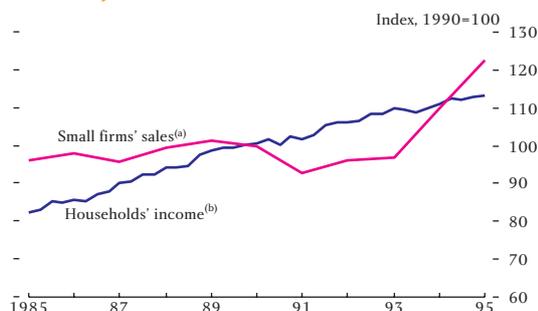
5: See Bernanke and Gertler (1995) and Mishkin (1995).

6: See King (1997).

7: The data in Chart 4 refer to lending to the UK non-bank private sector, whereas the small banks' lending data used in the following analysis also include lending to the overseas non-bank private sector.

By the early 1990s, the small and medium-sized UK banks faced pressure on both sides of their balance sheets<sup>8</sup>. On the assets side, the recession adversely affected the ability of bank customers to service their debts. This was particularly true of customers in the small business and household sectors. Data on small firms' real income are not available, but Chart 5 shows that the real value of total sales, a proxy for income, by small firms (those employing less than a hundred people) fell by 1.4 per cent in 1990 and by 7.1 per cent in 1991. Households' real disposable income continued to rise, but at a much reduced rate: by 3.7 per cent in 1990 and 1.5 per cent in 1991, compared with an average of 4.2 per cent in the second half of the 1980s.

**Chart 5:**  
**Households' income and small businesses' sales (at constant prices)**



Sources: Bank calculations and ONS.

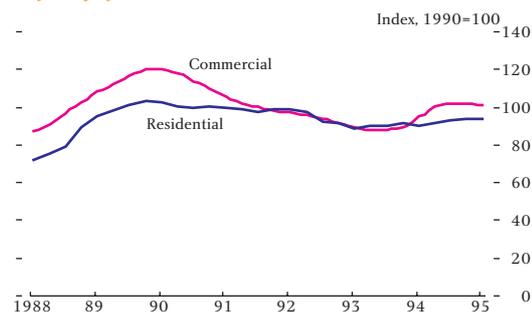
(a) The value of manufacturing firms employing less than a hundred staff's total sales and work done deflated by the GDP deflator.

(b) Households' real disposable income.

The impact of the recession was particularly severe on the property market. As Chart 6 shows, commercial property prices fell between peak and trough by 27 per cent (1989 Q4 and 1993 Q2), whilst residential property prices declined by 14 per cent (1989 Q3 and 1992 Q4). Many of the small banks had traditionally been heavily involved in the property market, both as direct lenders to commercial and residential property companies and by taking property as security for mortgage and consumer lending.

On the liabilities side, the small banks were, as a group, heavily dependent on wholesale deposits from

**Chart 6:**  
**Property prices**



Sources: Bank of England and DETR.

foreign banks, building societies, local authorities and big non-financial corporations, as well as other UK banks. A gradual withdrawal of this type of funding was prompted by the deterioration in the quality of their assets, the failure of British & Commonwealth Merchant Bank plc in the summer of 1990 and of four small banks in late 1990 and early 1991, and difficulties that some foreign bank lenders were experiencing in their home markets. Then, on 5 July 1991, the UK banking system was hit by the announcement that the Bank of England, acting with bank regulators in a number of other jurisdictions, were closing down BCCI due to fraud. This news accelerated the rate at which wholesale deposits were withdrawn from the smaller UK banks. Over the next three years, one quarter of the smaller UK banks would (according to the definition set out below) fail.

### The Bank of England's actions

From the middle of 1991 the Bank<sup>9</sup> kept 40 small banks under particularly close review. The initial criterion for review was reliance on wholesale market funding, but monitoring was quickly extended to banks giving rise to other concerns, particularly exposure to the property sector. In all cases, management was required to provide regular additional information, especially relating to liquidity and cash flow, and to undertake detailed forward planning. The Bank's intensive monitoring included oversight of a re-ordering of their affairs. In some cases, banks achieved this by securing fresh longer-term funding on a commercial basis, by seeking greater reliance on retail funding, or by adjusting their activities to the reduced funding

<sup>8</sup>: This description of the crisis and the supervisory measures the Bank took follows Bank of England (1993) and Bank of England (1994) very closely.

<sup>9</sup>: The Bank of England was the bank supervisor in the UK until 1 June 1998. The regulatory function was transferred to the newly created Financial Services Authority.

available to them. The Bank oversaw the orderly winding down of the affairs of others.

In addition to that action undertaken by the supervisors, the Bank of England established arrangements from the middle of 1991 to provide liquidity support to a few small banks. The decision to intervene was motivated by a concern within the Bank that, although small, closure of these banks would have caused the wholesale markets to tighten further, spreading the liquidity problems to other parts of the UK banking system<sup>10</sup>. Emergency liquidity assistance therefore was aimed at safeguarding the financial system as a whole and hence preventing damage to the wider economy. It is, of course, not possible to be certain what would have happened if support had not been provided, but the Bank believes that its intervention was successful in averting what could have been a much wider systemic disturbance.

The liquidity support was provided with the Government's knowledge but without a Government guarantee. The operation was not without risk to the Bank. It had to make provisions in respect of the indemnities it gave in relation to the small number of banks that received support. These reached a maximum of £115 million in 1993. In 1994, one bank – The National Mortgage Bank PLC – became insolvent. It was acquired by the Bank for £1. This was to facilitate control over the process of realising its assets. It was finally sold on 28 January 2000<sup>11</sup>.

## Research on leading indicators

### Definition of failure

Since the work by Beaver (1966) and Altman (1968) many studies have tried to use balance sheet and other information to predict corporate distress<sup>12</sup>. Most define failure as occurring when a firm's liabilities exceed its assets. This definition is not immediately transferable to the banking industry because bank regulators (at least in the UK) have the power to close a bank if the interests of depositors or potential depositors are threatened even if it still has positive net worth. A definition of bank failure is required, therefore, that incorporates regulatory action.

Regulators' powers are usually governed by legislation, the terms of which vary from country to country. Different national authorities also use slightly different crisis resolution techniques. Studies of bank failure therefore tend to use country specific definitions of what constitutes a bank failure.

In this study, a bank is classified as having failed if it underwent any of the following events between 1 July 1991 and 30 June 1994:

- i) entered administration;
- ii) entered liquidation;
- iii) received liquidity support from the Bank of England;
- iv) had its authorisation revoked by the Bank of England for reasons that could potentially be predicted by the balance sheet and other information used in this study;
- v) voluntarily surrendered its authorisation, except when motivated by corporate restructuring (typically following take-over) or by a strategic review of the benefits of a banking licence (because the entity no longer needed to receive deposits to conduct its consumer credit or lending activity).

The three-year period was chosen because it is when the Bank maintained its heightened scrutiny of the sector; but there is of course some arbitrariness about any particular cut-off point.

### Data sources and types of variables

The balance sheet and other characteristics that were investigated as potential leading indicators of failure were drawn largely from the banks' regular (confidential) statistical returns to the Bank of England. The scope of the returns increased with the size of the bank and the number of activities it undertook. Data are available on small banks for most key items – the liquidity position, balance sheet, P&L, off-balance-sheet items, large depositors and large exposures. The major gaps are information on the sectoral pattern of their lending and the interest rates

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<sup>10</sup>: Further information on the motivation behind the Bank's judgement to provide emergency liquidity assistance was set out by the Governor in a speech in 1993. This is reproduced in Bank of England (1994). For a more recent extensive survey on lender of last resort see Freixas, Giannini, Hoggarth and Soussa (1999).

<sup>11</sup>: See Hoggarth and Soussa (2001) for additional details on the Bank's liquidity support operation.

<sup>12</sup>: See Benito and Vlieghe (2000) for a brief overview of this literature.

on their liabilities and assets. As discussed above, given the coincidence at the time of a cycle in both lending growth and assets prices, data on exposures to the property sector is likely to be a particularly important omission.

These data have been supplemented by non-statistical information available to the bank regulators and by some of their qualitative assessments. These included the peer groups in which banks were categorised, a judgment over whether or not a bank had a strong parent, and the regulatory capital target ratio the regulators set for each bank<sup>13</sup>.

In recent years, considerable research has been undertaken on market participants' ability to judge the soundness of banks. Flannery (1998) argues that data on the financial market's assessment of a bank's condition should be formally integrated into the monitoring and early warning systems used by bank regulators. Unfortunately, it is not possible to test whether some of the more frequently used market indicators would have had predictive power in the small banks' crisis. These banks' equity and debt tended not to be publicly traded. Only one of the 92 banks in the study had a credit rating at the time, so it is also not possible to use ratings as a proxy for the market's assessment.

The definitions of all the variables considered as potential leading indicators of bank failure are given in Box 1. They were selected on the basis that they appeared important in previous similar empirical studies or reflected the prior beliefs of those working on this exercise within the Bank. The characteristics can be categorised into two types. The first aims to measure the potential for a bank to make losses; the second seeks to capture the bank's ability to withstand adverse shocks.

The variables measuring the potential for losses can in turn be split according to the type of risks: credit,

liquidity, concentration and miscellaneous<sup>14</sup>. Credit risk is proxied in three ways. Rapid loan or total balance sheet growth (LG91 and TA91, respectively) may suggest a bank is taking on less creditworthy customers<sup>15</sup>. A high level of provisions as a share of total assets (POA) may suggest the bank has been a poor judge of credit risk in the past and this may continue in the future. A high ratio of risk-weighted assets to unweighted assets (RWTTA) indicates that the bank has a high proportion of risky assets as categorised by the 1988 Basel Accord<sup>16</sup>. All three measures of credit risk would be expected to be positively correlated with failure.

Three variables are proxies for the risk of making losses due to illiquidity. On the assets side, the ratio of (non-marketable) private sector loans to total assets (LOA) should be relevant to a bank's ability, or inability, to realise cash at negligible cost. On the liabilities side, the share of total deposits made up by deposits from other banks (BAD) may indicate the vulnerability of a bank to a wholesale deposit run. Both of these variables should be positively correlated with failure. Liquidity mismatch (STED) is captured by the difference between short-term (up to eight day) assets and liabilities. It should be negatively correlated with failure.

Four proxies were considered to measure risk due to balance sheet concentration. Two are on the assets side of the balance sheet. A high dependence on claims on relatively few individuals or associated customers (LE) increases risk. Likewise, being classified by the bank regulators within the property sector peer group (PROP) was thought to heighten risk. The dependence on one source of income – net interest income (NII) – could also increase the likelihood of losses because it indicates lack of functional diversification. On the liabilities side, a heavy reliance on a few large depositors (DEPC) might increase the likelihood of liquidity problems.

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**13:** The target ratio is set to provide a cushion above the minimum capital requirement ('the trigger ratio') each bank is required to observe. It is set at a level which the bank regulators judge sufficient to prevent an accidental breach of the trigger ratio. If a bank's capital ratio falls below its target, the regulators would open discussions with the institution's management to ensure that the trigger ratio is not breached. In contrast with many other countries, the trigger and target ratios in the UK are bank-specific, and set above the across-the-board 8 per cent Basel minimum.

**14:** The Bank's statistical return on market risk was not introduced until the beginning of 1996, so no proxies for this type of risk are included because of lack of data. As the small and medium-sized banks were not for the most part heavily involved in trading, this seems unlikely to be a substantial loss.

**15:** All the variables measuring the change in a particular indicator (rather than its level) are calculated over a year's time horizon. This is to help isolate the particular point in the cycle in which the variable's behaviour is important. A longer time interval may mask whether the signal occurs in the boom or the recession.

**16:** See Basel Committee on Banking Supervision (1988). Since the risk weights under the current Basel Accord are very broad, the ratio of risk-weighted to unweighted assets should be regarded only as a rough guide to credit risk.

## Box 1: Variable description

This box details the construction of the variables used in the statistical analysis in this paper for the first period considered (1991 Q2). Where available they are constructed in the same way for earlier years.

### Credit Risk

LG91	Growth in loans to the private sector in the year to 1991 Q2.
$\Delta$ LG91/90	Growth in loans to the private sector in the year to the second quarter of 1991 minus the growth in the year to 1990 Q2 (expressed in percentage points).
POA	Specific provisions against bad and doubtful debts and provisions against the value of investments other than trading investments as a percentage of total assets.
RWTTA	Risk-weighted assets expressed as a percentage of total assets.
TA91	Percentage growth in total assets in the year to the second quarter of 1991.
$\Delta$ TA91/90	Growth in total assets in the year to the second quarter of 1991 minus the growth in the year to second quarter of 1990 (expressed in percentage points).

### Liquidity Risk

BAD	The percentage of a bank's deposits placed by other UK banks.
LOA	Loans to the private sector as a proportion of total assets (expressed as a percentage).
STED	Total assets of less than eight days residual maturity minus total liabilities due over the same time horizon. The net figure is then expressed as a percentage of total assets.

### Concentration Risk

DEPC	The size of the ten largest deposits expressed as a percentage of total deposits.
LE	Ten largest exposures as a percentage of total assets.
NII	Net interest income earned over the past year expressed as a percentage of total income earned over the past year.

PROP	A dummy variable that takes the value 1 if the bank was a member of the banking supervisors' first charge residential mortgage lenders and other property secured lenders peer groups. Otherwise it takes the value 0.
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### Miscellaneous Risk

AGE	Number of years the bank had been authorised to accept deposits under the Banking Act 1979.
SIZE	The natural logarithm of the sterling value of the bank's total assets.
TAR	The target ratio the banking supervisors set the bank.

### Ability to Withstand Losses

CAP	Growth in net capital (the numerator of the risk assets ratio) in the year to 1991 Q2.
ITCR	Total income earned over the past year expressed as a percentage of total costs incurred over the past year.
LEV	Total liabilities minus total net capital expressed as a percentage of total net capital.
$\Delta$ LEV	The difference in the level of the leverage ratio between 1991 Q2 and 1990 Q2 (expressed in percentage points).
PAR	A dummy variable that takes the value 1 if the bank was owned by a large parent. Otherwise it takes the value 0.
PROF	Profits earned over the past year expressed as a percentage of total assets.
XRAR	The risk-assets ratio minus the target ratio set by the banking supervisors within the Bank at the time (expressed in percentage points).
$\Delta$ XRAR	The difference in the level of the excess of capital over the regulatory capital requirement (XRAR) between 1991 Q2 and 1990 Q2 (expressed in percentage points).
XRARP	The risk-assets ratio minus the target ratio expressed as a percentage of the target ratio.

Three further miscellaneous variables were employed. First, the length of time a bank has been authorised (AGE) may be a proxy for the experience of the bank's management. Second, bank size (SIZE) may reflect the opportunities for diversification (either by type of business or geographical location of their customers) or the sophistication of management. Finally, the regulators' judgment of a bank's riskiness is proxied by the target capital ratio they set (TAR)<sup>17</sup>.

A number of variables were experimented with to capture a bank's ability to withstand unanticipated losses (regardless of the type of risk exposure from which they originate). A bank's first line of defence is traditionally regarded as current earnings. These are proxied by two variables – revenue as a percentage of costs (ITCR) and profits as a percentage of total assets (PROF). The capital cushion is the second line of defence. This is measured in two ways: the excess capital ratio over the target ratio set by the supervisors (XRAR and XRARP) and a leverage ratio – unweighted assets divided by capital – (LEV), which supervisors in the United States use as a backstop to the Basel risk-weighting framework. A possible third line of defence, the presence of a large parent that may bail out a troubled bank, is also included as a dummy variable (PAR).

Unfortunately, one of the statistical forms used to construct many of the variables was only introduced in 1989 (reflecting the Bank's implementation of the 1988 Basel Accord). This means that it is possible to construct most of the variables for only the two years prior to the start of the crisis period. A cross-sectional study, using data constructed in 1991 Q2, was therefore undertaken. The results suggest that most of the variables that are helpful in predicting failure also showed that the banks that went on to fail were already weak by then. To see whether there are any useful longer leading indicators of failure, the analysis was repeated using variables constructed for 1990 Q2, and back to 1988, the height of the boom, for a few variables where data were available (illiquidity mismatch, the share of assets that can easily be turned into cash, loan/asset growth, size and the share of total deposits from banks).

### Results using data in 1991 Q2

A preliminary investigation of the data was undertaken by comparing the median values in

1991 Q2 of each variable for the group of survivor banks and for those that subsequently failed. These are reported in Table 2. Column 5 shows the results of a non-parametric test evaluating the hypothesis that the two groups' medians are equal against the alternative that they differ. A positive number indicates that more than half of the survivor banks are above the two groups' common median (and by implication that less than half the failed banks were). A negative number suggests that the opposite is true.

It is evident from Table 2 that it is possible to reject the assumption of equal medians at the 90 per cent confidence level or above for seven of the variables. Virtually all of these indicators show that, on the eve of BCCI's closure, the condition of those banks that subsequently went on to fail had already begun to deteriorate relative to those that remained in business. The failed banks had made more provisions as a proportion of total assets (POA): their median level was 4.6 per cent against 1.4 per cent for the survivors. Their median profit as a percentage of total assets (PROF) was 0 per cent compared with 0.7 per cent for the survivors. The failed banks' capital – the numerator of the risk assets ratio – fell in the year to 1991 Q2 (CAP), while for the survivors it rose (-1.1 per cent against 7.7 per cent).

It is also possible to reject the null hypothesis of a common median for the two groups' loan growth in the year to 1991 Q2 (LG91) and, similarly, of a common median for the rate of change of loan and asset growth between 1990 Q2 and 1991 Q2 ( $\Delta LG_{91/90}$  and  $\Delta TA_{91/90}$ ). These data indicate that balance sheet growth was both *lower* and *fell* more rapidly for the failures than the survivors.

However, the non-parametric test of the equality of the two groups of banks' medians is a univariate test. It therefore does not hold constant the other characteristics of the two groups of banks. Nor does it provide information on their relative importance in predicting bank failure. For that, logit regression analysis was undertaken.

Problems arise in regression analysis if the explanatory variables are not independent of one another. For this study, multiple measures of credit, liquidity and concentration risk and the bank's ability to absorb losses have been constructed. More than one measure

<sup>17</sup>: For confidentiality reasons, Table 2 excludes the target ratios that the banking regulators set the banks.

**Table 2: Median values of explanatory variables for the failed and survivor banks (1991 Q2)**

	All	Survivors	Failures	Test statistic <sup>(a)</sup>
Col (1)	(2)	(3)	(4)	(5)
<b>Measures of credit risk</b>				
LG91	7.1	10.8	2.1	1.80*
ΔLG91/90	-5.6	0.2	-15.1	3.35***
POA	1.7	1.4	4.6	-2.32**
RWTTA	71.8	71.5	76.6	-0.77
TA91	6.5	9.8	-2.2	1.29
ΔTA91/90	-5.5	-3.2	-13.2	1.80*
<b>Measures of liquidity risk</b>				
BAD	4.7	1.4	11.1	-0.26
LOA	94.2	93.2	96.4	-1.29
STED	1.0	1.0	1.9	-0.26
<b>Measures of balance sheet concentration</b>				
DEPC	50.8	51.4	49.5	0.26
LE <sup>(b)</sup>	31.9	28.6	47.9	-1.65
NII	83.9	81.3	89.3	-1.29
<b>Measure of general risk</b>				
SIZE <sup>(c)</sup>	38.2	44.0	17.3	2.32**
<b>Measures of banks' ability to withstand losses</b>				
CAP	5.4	7.7	-1.1	2.83***
ITCR	186.4	184.4	210.6	-0.26
LEV	425.2	443.8	367.4	1.29
ΔLEV	0.2	-0.1	1.7	-0.47
PROF	0.6	0.7	0.0	2.32**
XRAR	10.6	11.2	8.7	0.77
ΔXRAR	-0.1	0.0	-0.3	0.26
XRARP	63.3	69.4	47.4	0.77

Source: Bank calculations.

(a) Where \*\*\*, \*\* and \* in Table 2 indicate significance using the t-distribution at the 99 per cent, 95 per cent and 90 per cent confidence interval.

(b) Constructed using just the 67 banks for which this information is available.

(c) In this table figures for size variable (SIZE) are in £ millions, but elsewhere in this article it is constructed as explained in Box 1.

of each type of risk or of the bank's current income and capital cannot be used simultaneously in a regression analysis, as they are designed to quantify

the same thing and therefore should not be independent. The choice between these variables was made on the basis of a model selection criterion (which trades off how well the estimated equation fits the sample data against the number of variables it uses). Where this produced ambiguity, judgment was imposed on which variable had the least overlap with the others (informed partly by simple correlations) and was most likely to boost the accuracy of the within-sample fit for the failed banks.

The regressions were initially estimated using 84 of the 92 banks available. Eight banks were 'held back' to see how the model performed out of sample. In direct proportion to the sample as a whole, these included six banks that continued in business and two that failed. The selection of the six and two banks respectively, within the survivor and failure groups, was random.

The general specification of the regression based on 1991 Q2 is shown in Regression 1 in Table 3. The parsimonious form is shown in Regression 2. Loan growth in the year to 1991 Q2 (LG91) is the statistically most important short-term leading indicator of bank failure in Regression 2. The sign on the coefficient is negative, suggesting that in the early 1990s, small banks with lower annual loan growth were more likely to fail in the subsequent three year period. This may reflect supply-side factors: for example, the weakened banks may have been writing off past loans, reallocating their staff resources away from sales and marketing towards nursing existing customers, or facing difficulties in attracting deposits. Some support for the latter possibility comes from the median growth rate in deposits of the two groups of banks: the failed banks' deposits increased by just 1.1 per cent in the year to 1991 Q2, while the survivors' deposits rose by almost 10 per cent. However, slow loan growth of the failing banks is unlikely to be explained by a capital constraint<sup>18</sup>: as shown in Table 2, their median risk-assets ratio was 8.7 percentage points above the supervisors' target ratio (XRAR). There is also no evidence of failing banks substituting away from assets with high risk weights (under the 1988 Basel Accord capital framework) into lower weighted ones. In fact, the converse is true: unweighted assets fell by more (2.2 per cent) in the year to 1991 Q2 than did risk-weighted assets (1.0 per cent).

<sup>18</sup>: See Bank of England (1991) for the Bank's written evidence to the Treasury and Civil Service Committee on whether more generally there was a credit crunch in the UK recession at the time.

**Table 3: Regression results based on 1991 Q2 data<sup>(a)(b)</sup>**

	Regression 1	Regression 2
CONSTANT	-7.5165 <i>(-1.5816)</i> **	-7.0476 <i>(-2.0455)</i> **
AGE	0.2248 <i>(1.0277)</i>	0.2379 <i>(1.0953)</i>
DEPC	-0.0105 <i>(-0.7244)</i>	
LG91	-0.0635 <i>(-2.9811)</i> **	-0.0606 <i>(-3.0259)</i> ***
SIZE	0.0465 <i>(0.1618)</i>	
NII	0.0708 <i>(2.1817)</i> **	0.0644 <i>(2.2390)</i> **
PROP	0.6236 <i>(0.8055)</i>	
STED	-0.0353 <i>(-2.2373)</i> **	-0.0303 <i>(-2.1100)</i> **
LEV	-0.0034 <i>(-2.2525)</i> **	-0.0030 <i>(-2.3554)</i> **
PAR	-1.5474 <i>(-1.4663)</i>	-1.4738 <i>(-1.6690)</i>
PROF	-0.4015 <i>(-2.4883)</i> ***	-0.3868 <i>(-2.5003)</i> ***
Log-likelihood	-25.7309	-26.3500
Akaike information criteria	-36.7309	-34.3500
Schwarz Bayesian criterion	-50.1004	-44.0733
Pseudo R <sup>2</sup>	0.3918	0.3772

Source: Bank calculations.

(a) T statistics appear in italics in parenthesis below the coefficient.

(b) Where \*\*\*, \*\* and \* indicate statistical significance at the 99 per cent, 95 per cent and 90 per cent confidence interval.

Low loan growth may also have reflected demand-side factors. Borrowers from the banks that went on to fail may have been hurt more by the recession than the customers of survivor banks. This, in turn, may have

reflected inadequate screening by the banks of potential borrowers in the past.

Using the estimated coefficients shown in Regression 2, it is possible to calculate the marginal impact on the probability of failure of a unit change in the value of each of the continuous explanatory variables. For ease of comparison these figures have been manipulated to show what scale of movement would be necessary in each of the variables to increase the likelihood of failure by 1 per cent. The results are shown in Table 4. It is evident from these calculations that the likelihood of failure was 1 per cent higher for every 3.2 percentage point decline in annual loan growth.

**Table 4: What would increase the likelihood of failure by 1 per cent and the medians of the failed and survivor banks**

Indicator	Median of the two groups		
	Movement	Failures	Survivors
Loan growth in the year to 1991 Q2 (LG91)	-3.2	2.1	10.8
Dependence on net interest income (NII)	3.0	89.3	81.3
Liquidity mismatch (STED)	-6.5	1.9	1.0
Leverage ratio (LEV)	-66.1	367.4	443.8
Profits as a percentage of total assets (PROF)	-0.5	0.0	0.7

Source: Bank calculations.

Bank failure is also found to be positively related to dependence on net interest income (NII). This may reflect the reduction in risk gained from undertaking activities that earn uncorrelated income streams. In addition, the earnings stream from traditional lending activity may have been more volatile than other types of income<sup>19</sup>. Either way, hindsight suggests that a management strategy of diversifying into different types of business to earn fees, commission or trading income may have been more prudent.

The other measure of risk found to be statistically significant is the liquidity mismatch between short-term assets and liabilities (STED). As expected, the coefficient suggests that the more short-term liabilities exceed short-term assets, the greater the likelihood of

<sup>19</sup>: See Denney, Staikouras and Wood (2000) for an investigation into the financial stability implications of banks' increasing reliance on non-interest income.

failure. In quantitative terms, however, a large increase in the share of short-term net assets as a proportion of total assets (6.5 percentage points) is required to lower the probability of failure by 1 per cent.

The other four variables that attempt to capture risks – length of authorisation (AGE), deposit concentration (DEPC), size (SIZE) and the exposure-to-property dummy (PROP) – were all found to be statistically insignificant. Given the importance attached to property lending by the bank supervisors at the time, the insignificance of this variable is somewhat surprising. It may reflect problems over the variable's construction: the use of a dummy does not allow differentiation between the extent of banks' exposures to the property sector within the property peer group, nor does the variable distinguish whether a bank's exposures were to residential or commercial property. Chart 6 suggests that the absence of data on the exposure of small and medium-sized banks to commercial property could be a considerable loss<sup>20</sup>.

Two out of the three variables that attempted to measure a bank's overall ability to resist shocks are statistically significant. The other is borderline. The sign of the coefficient on the profitability variable (PROF) is in line with expectations: lower profitability is associated with a higher probability of failure. In quantitative terms, Regression 2 suggests the likelihood of failure is 1 per cent lower for every 0.5 percentage point increase in the return on assets.

At first sight the coefficient on the leverage ratio (LEV) is counter-intuitive and contradicts the findings in the majority of other studies (see for example, Estrella, Park and Peristiani (2000) for evidence on US banks). It is negatively signed, suggesting that lower rather than higher leverage is associated with failure. The explanation does not appear to lie in the bank regulators forcing the weakened banks to hold high capital in relation to assets – the inverse of leverage. There was little difference in the actual risk-asset ratios of the failed and survivor banks. To the extent that the private sector had sufficient information to monitor the small and medium-sized banks' leverage ratios, it might reflect market discipline. If the banks that subsequently failed were

already perceived by the market as being weak, they may have been required to hold high levels of capital before potential counterparties would lend to them. Alternatively, an insufficient number of counterparties may have been willing to deal with them (or in the desired volume), making them unable to expand their balance sheet and raise their leverage.

Other researchers, for example, Thompson (1991) have also found capital variables to be statistically significant, but counter-intuitively signed in predicting bank failure over a short time horizon (but not longer). They have attempted to justify the result in two ways. First, it may reflect attempts by banks beginning to experience difficulties to improve cosmetically their capital position by selling assets on which they have capital gains and deferring the sale of assets on which they have capital losses. Second, it may reflect strong banks being more aggressive in recognising and making provisions and writing off problem loans than their weaker counterparts; or, conversely, weak banks being slow in doing so, so that assets are effectively overvalued in accounts and capital adequacy flattered by capital ratios<sup>21</sup>. Both these explanations, and also the market discipline one discussed above, rely on the premise that the banks that went on to fail were already fundamentally weak.

The large parent dummy borders on statistical significance at the 90 per cent confidence interval. The sign of the coefficient is as expected, suggesting that small and medium-sized banks were more likely to fail if they were not owned by large corporates. Those that had large parents may have benefited from actual parental support or, at least, avoided depositor withdrawals because of an expectation of parental support. Other researchers, for example Belongia and Gilbert (1990), have also found that the presence of a parent – in their case a bank holding company – reduces the likelihood of bank failure.

The coefficients estimated in Regression 2 can be combined with the values of the explanatory variables to construct a 'failure potential' index for each bank. This takes a value between zero and one, where the extremes correspond to survival and failure with certainty, respectively. By selecting a cut-off point

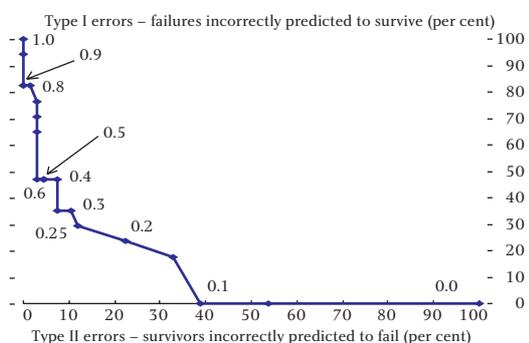
**20:** In the early 1990s, banks with total assets of less than £100 million were not required to complete the statistical return on the industrial composition of their exposures to UK residents. This return included information on exposures to the property sector. At the time, bank regulators would have been able to request management accounts information, which filled the gap. Any such information is not readily available to the author.

**21:** See the article by Jackson and Lodge in the previous edition of this *Review* for a discussion of the financial stability implications of the banking industry's use of historical cost versus fair value accounting.

below which a bank is classified as a survivor and above which it is classified as a failure, the index can be used to evaluate the accuracy of Regression 2.

In this type of analysis, predictive performance is usually evaluated in terms of Type I and Type II errors. A Type I error occurs when a hypothesis is mistakenly rejected when in fact it is true; a Type II error occurs when a hypothesis is accepted when in fact it is false. In the current context, therefore, a Type I error occurs when an erroneous prediction of bank survival is made and a Type II error is when a bank is falsely predicted to fail. Chart 7 shows the performance of Regression 2 in terms of the two types of errors. The size of each type of error alters with changes in the cut-off point to determine whether a bank is classified as a survivor or a failure. At one extreme (at a cut-off point of 1) all banks are classified as survivors, so Type I errors are at 100 per cent and Type II errors at 0 per cent; and at the other (a cut-off point of 0) all banks are classified as failures, so Type I errors are at 0 per cent and Type II errors are at 100 per cent.

**Chart 7:**  
**Type I and II errors of Regression 2 over various cut-off points**



Source: Bank calculations.

Overall, the model performs well. At a cut-off point of 0.25 it predicts 12 out of the 17 (71 per cent) failures and 59 of the 67 (88 per cent) survivor banks on which the regression was estimated<sup>22</sup>. This equates to Type I and Type II errors of 29 per cent and 12 per cent, respectively. At this cut-off point it correctly predicts the destiny of the six withheld banks that survived and the two withheld banks that failed. The

within-sample error rates are similar to those found in previous studies.

While the performance of Regression 2 is encouraging, it is not particularly helpful from a policy perspective. Most of the statistically significant leading indicators of bank failure in the small and medium-sized bank sector in mid-1991 discussed in this section – namely, low loan growth, low profitability, low short-term assets relative to liabilities and, arguably, low leverage – show that by the time of BCCI's closure the banks that went onto fail were already showing signs of fragility. They confirm the results found in the univariate tests. While they may be helpful in identifying subsequent failures, these indicators cannot be used by regulators or central banks to take pre-emptive policy actions to avoid bank or banking system weakness in the first place. In order to find indicators of future failure before banks actually weakened, data from an earlier (pre-recession) period were analysed.

#### Econometric results for 1990 Q2 and before

Regressions 3 and 4 in Table 5 show the general and parsimonious forms respectively of the model estimated on data constructed at 1990 Q2 or earlier for the few variables for which this was possible. The most statistically significant variable from the earlier period regression is loan growth in the year to 1988 Q2 – the peak of both the GDP and lending growth cycles in the previous boom. Unlike the analogous variable in the 1991 Q2 regressions, its coefficient is positively signed, suggesting that banks that failed in the subsequent recession had higher loan growth at the height of the boom than their competitors that survived<sup>23</sup>.

Table 6 shows the median rate of growth of loans of the survivor and future failures groups during the closing stages of the late 1980s boom and beginning of the early 1990s recession. It is evident that the failed banks' median loan growth was greater, even if slowing, than that of the survivors in the year to 1989 Q2 and 1990 Q2. Both of these other two years were tried in turn in the regression analysis, but the 1988 loan growth variable dominated. The banks with

<sup>22</sup>: This cut-off point produced the second lowest sum of the percentage of Type I and Type II errors. It was preferred to the global minimum because the latter had a high level of Type II errors. See the article by Bell and Pain in this *Review* for a discussion of the trade off policymakers face in selecting a cut-off point in this type of model. They suggest policymakers must weigh up the relative costs of a surprise failure (the consequence of a Type I error) versus the resource and other costs of unnecessary intensification of supervision and/or preventative action (the consequence of a Type II error).

<sup>23</sup>: Office of the Comptroller of the Currency (1988) also finds an overly aggressive or growth-minded strategy (relative to their circumstances) prevalent in national banks that went on to fail in the United States.

**Table 5: Regression results based on data at 1990 Q2 or before<sup>(a)(b)</sup>**

	Regression 3	Regression 4
CONSTANT	-4.9298 <i>(-1.2968)</i>	-2.9159 <i>(-1.0678)</i>
AGE	0.4027 <i>(1.7802)*</i>	0.3157 <i>(1.5746)</i>
DEPC	0.0245 <i>(1.6389)</i>	0.0194 <i>(1.4665)</i>
LG88	0.2883 <i>(2.7228)***</i>	0.2837 <i>(3.0908)***</i>
SIZE	-0.3328 <i>(-1.0808)</i>	-0.3194 <i>(-1.7037)*</i>
NII	0.1223 <i>(0.6913)</i>	
PROP	0.6200 <i>(0.9159)</i>	
STED	-0.0073 <i>(-0.7776)</i>	
LEV	-0.0000 <i>(-0.0568)</i>	
PAR	-0.3650 <i>(-0.3659)</i>	
PROF	-0.0511 <i>(-0.3300)</i>	
Log-likelihood	-31.1530	-32.3463
Akaike information criteria	-42.1530	-37.3463
Schwarz Bayesian criterion	-55.5225	-43.4234
Pseudo R <sup>2</sup>	0.2637	0.2355

Source: Bank calculations.

(a) T statistics appear in italics in parenthesis below the coefficient.

(b) Where \*\*\*, \*\* and \* indicate statistical significance at the 99 per cent, 95 per cent and 90 per cent confidence interval respectively.

the fastest loan growth in this year – at the height of the boom – were particularly likely to fail in the subsequent downturn. This can be seen from Table 7. In 1988 almost 40 per cent of banks within the highest loan growth quartile went on to fail compared with 17 per cent or less of banks in the lower growth quartiles. However, as economic growth declined, so

**Table 6: The median rates of annual loan growth (per cent) for the survivor and failed banks 1988 Q2-1991 Q2**

	1988 Q2	1989 Q2	1990 Q2	1991 Q2
Survivors	14.1	18.3	11.0	10.8
Failures	28.8	25.5	17.0	2.1

Source: Bank of England.

did the loan growth of the failed banks relative to that of the survivors. By mid-1991 not a single bank within the then highest loan growth quartile went on to fail.

**Table 7: The share (per cent) of future bank failures in each loan growth quartile 1988 Q2-1991 Q2**

	percentage of banks in each quartile that would fail (between 1991 Q2-94 Q2)			
Loan growth by quartile	1988 Q2	1989 Q2	1990 Q2	1991 Q2
Quartile 1 – lowest	17.4	17.4	13.0	26.1
Quartile 2	13.0	17.4	13.0	30.4
Quartile 3	13.0	13.0	43.5	26.1
Quartile 4 – highest	39.1	34.8	13.0	0.0

Source: Bank of England.

The change in sign of the loan growth variable at different parts of the cycle (and the corresponding movement of the concentration of future failures between loan growth quartiles) may well be linked. Over-expansion in the boom phase by selecting poor credit risks may have caused the subsequent loan write-offs, or a customer base that fared particularly badly (and hence had low demand for loans) in the ensuing recession. This explanation is consistent with the life cycle of a bank failure view of Reidhill and O'Keefe (1997) from the Federal Deposit Insurance Corporation (FDIC) in the United States. In the first stage, there is rapid loan growth, concentrations may emerge, underwriting standards may weaken, and it may be financed by more volatile funding sources. In the second stage, loan quality problems begin, profits start to decline and inadequate provision levels emerge. In the final stage, the deterioration in asset quality becomes a serious problem, and loan losses and write-offs reach high levels. The bank makes substantial steps to cut its expenses and assets are sold off. In some cases, these measures may allow the bank to survive; in others it will fail.

Size also seems to be important in the earlier period regression. Smaller banks within the small and medium-sized bank sector tended to fail more often than larger ones. This is consistent with the more general picture that failures in the post-BCCI period were concentrated in that sector. It may reflect their lower opportunities for diversification (either by business type or by location of their customers), the abilities of management, or their peripheral position in the market. It is puzzling, however, that the size variable was not statistically significant in the later 1991 Q2 regression.

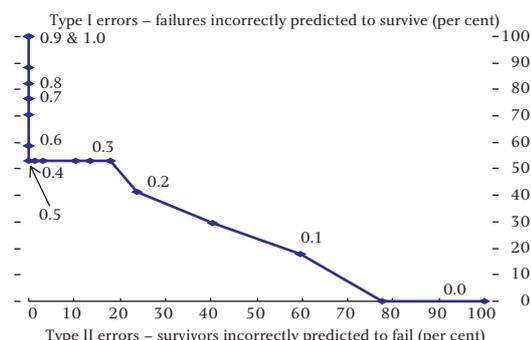
Two other variables – length of authorisation (AGE) and deposit concentration (DEPC) – are almost statistically significant. It is interesting that the sign on the coefficient of AGE is positive, suggesting that the longer a bank had held its banking licence the more likely it was to fail. This runs contrary to the original rationale for including the variable – as a proxy for the experience of the management – and suggests that the interactions involved are not well-specified. One possible, albeit speculative, explanation may be that the authorisation criteria used by the bank regulators became more rigorous over time.

Chart 8 shows the accuracy of Regression 4 in classifying the banks on which it was estimated as survivors or failures across the spectrum of cut-off points. At the preferred cut-off point of 0.5, Regression 4 correctly predicts half – eight out of the 17 – of the within-sample failures and all of the survivors<sup>24</sup>. Out of sample, it accurately predicts the outcome for the six banks that survived but does not predict the two that failed. At the preferred cut-off points, Regression 4 performs less well than Regression 2. This should not come as a surprise: as the interval between the measurement of the explanatory variables and the timing of the crisis (or failure) increases, a deterioration in predictive performance is a common finding in the literature.

### Comparison with large banks

The objective of this study was to develop leading indicators of small bank failure. It focuses on the late 1980s – early 1990s because it was during this period that small bank failures in the UK became relatively widespread. For those interested in the crisis and the UK banking industry at the time, it is of interest to

**Chart 8:**  
Type I and II errors of Regression 4 over various cut-off points



Source: Bank calculations.

see how the indicators that appear relevant for small banks perform in relation to the larger UK banks. It should be noted, however, that it would be surprising to find a simple read-across from the results for small banks to larger ones, given their different scale, scope and product mixes.

Table 8 shows the median value of each leading indicator that was found to be significant for small banks, computed for the group of large UK banks (the Major British Banking Groups (MBBG)) at the time. The most obvious difference is the scale of the MBBG banks' balance sheets: their median size is £56 billion

**Table 8: MBBG banks, failed and survivor group medians for the variables found statistically significant<sup>(a)</sup>**

	Survivors	Failures	MBBG
<i>Variables found statistically significant in Regression 2 (1991 Q2)</i>			
LG91	10.8	2.1	1.4
NII	81.3	89.3	59.4
STED	1.0	1.9	-43.2
LEV	443.8	367.4	1351.0
PROF	0.7	0.0	0.4
<i>Variables found statistically significant in Regression 4 (1990 Q2 and earlier)</i>			
L88	14.1	28.8	22.4
SIZE <sup>(b)</sup>	46.5	15.0	56041.4

Sources: Bank of England and BBA.

(a) Includes some estimates for MBBG where information is unavailable.

(b) In this table figures for size variable (SIZE) are in £ millions, but elsewhere in this article it is constructed as explained in Box 1.

<sup>24</sup>: This cut-off point was selected because it minimises the sum of Type I and Type II errors.

relative to the small survivor and failure banks' medians of £46.5 million and £15.0 million, respectively. The main British banks also had far higher leverage, lower dependence on net interest income (reflecting the wider range of business activities), and appear far less liquid (reflecting retail deposits at call or short notice). There does not appear to be much difference in their loan growth during the year to 1991 Q2. The larger banks' return on assets is half way between those of the small banks that subsequently went on to fail and those of the survivors.

Therefore, the characteristics of the small and medium-sized banks that failed in the early 1990s, distinguishing them from other UK banks, including the large ones, were that they tended to be very small, experienced rapid growth in the previous boom and tended to exhibit low profits, low leverage, low liquidity, and a high dependence on net interest income.

### Conclusion

It is important to distil lessons from the crisis that beset the UK's small and medium-sized banking sector in the early 1990s. An informal characterisation of those small banks experiencing problems was that they had expanded too rapidly, had badly concentrated loan exposures (particularly to the property sector), and were overdependent on fragile sources of wholesale market funding.

Some of the lessons are, therefore, about the importance to financial stability of the monetary authorities providing a stable macro-economic environment. Others – those addressed in the research summarised here – concern the value of examining developments in subsectors of the banking industry, rather than just looking at firms atomistically. It is hard to find robust relationships between characteristics of banks' business, balance sheets and income and their subsequent failure. Moreover, information on the characteristics of smaller banks is limited. In particular, the unavailability of data on exposures to the property sector is a drawback that affected the research. Nevertheless, in this particular episode it seems that a high dependence on net interest income, low profitability, low leverage, low short-term assets relative to liabilities and low loan growth were good *short-term* leading indicators of failure. Most of these indicators show that the banks that went on to fail were already weak by mid-1991, and so an early-warning system based on them would not obviously have contributed to preventing the crisis. Going back further in time, rapid loan growth in the previous boom was found to be a good *longer-term* indicator of failure. Unlike the survivors, banks that subsequently failed exhibited a particularly pronounced boom and bust cycle in lending growth. That is, then, something to look out for – a familiar lesson, but important nonetheless.

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# Fair value accounting – an industry view

Paul Chisnall, Director, British Bankers' Association

In the June edition of *Financial Stability Review*, Patricia Jackson and David Lodge set out their views on fair value accounting. The banking industry was pleased to see this article suggest that there may be advantage in exploring fair value disclosure before contemplating a change in the way in which the primary financial statements themselves are prepared. It welcomes the opportunity to provide an industry view on the issues raised.

**THE BANKING INDUSTRY** has been in a debate with accounting standard setters on the accounting treatment of financial instruments since the early 1990s. This has spanned many key issues, such as offset, discounting and disclosure, but the prime issue has been whether banks should measure assets and liabilities in the banking book at fair value in their published financial statements.

The issue will again come to a head when the international Joint Working Group of Standard Setters (JWG) publishes its 'draft standard' on 'Accounting for Financial Instruments' in December 2000<sup>1</sup>. This is expected to propose that all financial instruments held by banks, including loans and investment securities, be measured at fair value, with gains and losses taken immediately through income.

This article will begin by outlining the issues surrounding the fair value debate and explain the reasons why the banking industry remains opposed to the measurement proposals. It will show that concern also exists amongst banking supervisors and within the academic and user communities.

It will conclude that better progress would be made if the standard setters abandoned their radical agenda and instead worked with the banking industry to deliver widely recognised and achievable improvements in the information provided by banks to the marketplace.

## An overview of the JWG proposals

The JWG believes that fair value is the most appropriate measure for financial instruments and that all changes in fair value should be reported as income in the period in which the change takes place. It considers that fair value measurement is needed because of conceptual and practical problems associated with measuring items in the trading book at fair value and items in the banking book on an historical cost basis.

The draft standard to be published by the JWG will propose radical changes to the way in which the primary financial statements are prepared. It is concerned with measurement and not just disclosure. Under the JWG proposals, the primary financial statements would include estimated fair values of loans and other non-marketable assets. This would be on the basis of a comparison of the yield obtained under the original transaction with the yield that would be obtained on a new transaction of a similar type. Any difference in value between the existing transaction and the current equivalent would be recognised immediately.

The proposals therefore are not just about the calculation of fair values through a net present valuation of future cash flows, but involve a recalibration of the yield from existing transactions according to the yield that would be obtained from a

<sup>1</sup>: The Joint Working Group of Standard Setters comprises representatives of the accounting standard setting bodies represented on the G4+1, ie the United States, Canada, Australia, New Zealand and the United Kingdom, plus Germany, France, the Nordic Federation and Japan. The Board meeting in Tokyo, 16-20 October 2000, of the International Accounting Standards Committee (IASC) discussed the 'draft standard' on 'Accounting for Financial Instruments' prepared by the JWG and approved its issuance subject to completion of the work without major changes to the proposals. The draft standard is expected to be published by all members of the JWG by 31 December 2000. Comments are to be invited from all interested parties, preferably by 30 June 2001, but they will be considered if received no later than 30 September 2001.

similar transaction under current market conditions. To illustrate, if a bank held a portfolio of mortgage loans that yielded base +2 per cent, but current market conditions pointed towards business typically being transacted at base +1 per cent, the requirement would be for banks to recognise an immediate profit equivalent to the difference in the income flows that would arise.

Fair value is regarded as conceptually superior. It is seen as reflecting the market's assessment of current economic conditions, though this assumes that the fair value of a financial instrument is determined in open, competitive markets. The fair value of a financial instrument represents the present value of its expected cash flows discounted at the current market rate of return, and it is considered to reflect all available information up to the measurement date. Accounting on this basis would reduce the anomalies of the existing mixed accounting approach and the need for complex and subjective hedge accounting.

The JWG considers that the "case for the superior relevance of fair value measurement is supported by a growing body of market-based research"<sup>2</sup>. It believes that academic literature shows that fair value information about loans, securities and long-term debt provides significant explanatory power of share prices and returns beyond that provided by related historical-cost values, and that fair value information improves the ability to forecast violations of bank regulatory capital requirements. It acknowledges that fair value accounting increases the volatility of earnings, but considers this to be justified and believes that it will have no bearing on investment decisions.

### The case against fair value measurement

The banking industry, however, takes the view that modified historical cost provides a better basis on which to measure banking book performance in the primary financial statements. This results from concern about:

- the effect on the banking industry's ability to act as long-term lenders to industry and commerce and the potential destabilisation of the sector's financial foundations; and
- problems associated with the proposals when viewed from the perspective of key accounting

concepts and the many practical considerations that remain outstanding.

Once these have been addressed, we will look at the extent to which the JWG proposals carry the support of banking supervisors and examine the standard setters' claim that academic research and user surveys support their measurement initiative.

### Financial stability and the role of banks as the providers of long-term finance

Under the JWG proposals, a bank's profits from its core operational activities of lending and taking deposits would not be calculated by reference to whether payments were made as contracted and a margin achieved over the cost of funding, but by reference to an economic model based on notional opportunity cost. While this may be of interest – and it is recognised that banks use economic information within their management processes – it does not fit within the existing accounting regime and would effectively set bank accounting on a footing different from that which applies to other industrial sectors. Where, for example, is the suggestion that industrial performance be measured by reference to the change in the opportunity cost of business transacted yesterday in comparison to business transacted today?

The standard setters have often said that the banking industry is opposed to their proposals on the grounds of the volatility in reported earnings that the proposals would generate. This is true, but the point is that the volatility generated would bear no relationship to the fundamentals of the business objective of transactions entered into within the banking book. The primary objective of retail banking is to develop a portfolio of transactions at a margin that over time maintains and grows the customer base while creating an income that exceeds the cost of both funding and capital. It is driven principally by longer-term decisions about credit quality and concentration and revolves around the fostering of customer relationships. Transactions are entered into over the longer term and value to the bank is achieved over the life of the contract and not by reference to short-term changes, though naturally these are monitored and have a bearing on management decisions.

<sup>2</sup>: Paragraph 2.6, JWG paper 'Financial Instruments: Issues Relating to Banks', August 1999.

Exposure to interest rate changes are managed separately. While this is a vital activity for any bank, decisions about the extent to which the exposure should be hedged and the most effective means of achieving the hedging sought are made in their own right on an enterprise-wide basis. Banks at present view this activity separately from the underlying transaction and any gains or losses as a result of ineffective hedging or a decision to run an open position within the bank's predefined limits are not seen as having a bearing on the performance of lending operations. Interest rate changes will, of course, feed in to credit decisions, such as the quality of the book and exposures to particular sectors. By requiring measurement on a fair value basis, however, credit and interest rate factors would become inextricably entwined and short-term movements would inevitably have a bearing on decisions about where to position loan portfolios, which are currently taken on a longer-term, strategic basis.

The overall effect would be to weaken the position of banks as the providers of long-term finance to industry and commerce, with the main losers being those sectors where credit ratings are volatile over the economic cycle. The result could be a flight to quality that would have a detrimental effect on lending to higher-risk sectors, including small and medium-sized enterprises. There would also be pressure on banks to hold a greater proportion of their assets in high-quality bonds, given the stability that their returns would bring to reported performance. These proposals, therefore, have the potential to generate a substantial restructuring of bank portfolios and the adoption of a much narrower and shorter-term focus on lending decisions.

Profits and losses generated on the proposed measurement basis would be equally problematic. Profits would generate an expectation of distribution to shareholders and the payment of tax, but would be based on theoretical economic values rather than actual cash flows, forcing banks to adopt a new approach to liquidity management. Losses would directly impinge on the financial stability of the banks. The overall effect would be a downgrading of the sector and an overall loss of confidence in the financial system as a whole. The large banks, in particular, would suffer from their market downgrading, while small community banks and those

in developing and restructuring economies may simply fall under the financial pressure and increased risk that the approach would bring.

The accounting standard setters are, of course, correct to say that if banks hedged all of their credit risk and interest-rate risk, then the effect of their proposals on volatility would be neutral. This implies, however, a perfection in the scope and depth of markets and modelling techniques that only they perceive to exist.

Economic models advise – but do not determine – business decisions taken within banking. They play an important part in management, and have a bearing on management decisions, but are read with a full understanding of their limitations and biases. They also take the form of sensitivity analyses, showing the consequence of what would happen if the market moved in certain ways, and to require precise balance sheet entries to be drawn from them would imply a spurious accuracy unrecognisable from the data. They are not the basis on which any financial or non-financial institution reports performance to shareholders. Basing the accounts of banks on theoretical economic values rather than actual cash flows without substantial research and testing would involve risk of a magnitude that accounting standard setters should not be willing to take.

### The accounting policy case against fair value

The fair value proposals can be viewed in the context of the key qualitative characteristics of financial reporting established by the IASC's 'Framework for the Preparation and Presentation of Financial Statements': relevance; reliability; understandability; and comparability<sup>3</sup>.

### Relevance

Relevance is described as information having relevance to the decision-making needs of users and there is an expectation that relevant information will have either predictive or confirmatory value. It is recognised that value can be represented on different bases, such as historical cost, replacement cost or net realisable value, and that supporting information may need to be given.

Customer loans are generally held to maturity or an agreed contractual date without any variation in the

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<sup>3</sup>: The same qualitative characteristics were given in the UK Accounting Standards Board's 'Statement of Principles for Financial Reporting'.

original contractual terms of the loan. Accounting for loans on an historical cost basis, therefore, better reflects the economic substance of the transactions, the actual cash flows and the fact that income is earned over the period of the loan. It is the primary basis on which loan portfolios are managed and future lending decisions taken and provides a solid platform for analysing performance against expectation.

Changes in the credit standing of customers and the effect of interest rate changes on the overall financial standing of the bank are clearly of prime importance to the running of a bank. But understanding their effect is not best achieved through recognition in the balance sheet and profit and loss account headings for the different categories of financial instrument. The primary statements at present give users clear information about whether or not repayment is being made as contracted, while information relating to the credit quality of the book and interest rate information are given separately in a form that best suits the nature of the information being conveyed. Loan portfolios are managed with the objective of securing a steady margin over the longer term; and gains and losses on the portfolio are generated through payment or non-payment, not through changes in the terms on which new transactions could be struck.

Fair values take us away from the earnings process as they bear little relationship to contracted future cash flows. Gains and losses would be recognised in accordance with short-term market movements and not when income has been earned or a loss incurred. The resulting information would largely be theoretical as a large commercial bank could not realise directly the difference between the carrying value and the fair value of its loan book. Users of accounts would not therefore be given a better insight into the management of the business.

### **Reliability**

Reliability of information is to be determined on the basis of faithful representation of the economic reality rather than the legal form of transactions, and should be prudent, complete and free from bias.

While active and liquid markets may exist for many financial instruments, principally debt securities, equities and certain derivatives, there is no market of any substance for loans and deposits. Securitisation

remains underdeveloped outside the United States. In 1998, for example, loans traded on the secondary European markets totalled less than US\$30 billion out of an estimated US\$4,500 billion of total outstanding lending. While the use of credit derivatives is growing, imperfections remain in their pricing, not all are readily tradable and the value of the risk hedged remains immaterial in comparison with the loan market. Vast quantities of assets and liabilities, therefore, would need to be estimated with little or no reference to market rates and significant assumptions would need to be made.

It is further understood that the standard setters are proposing that no account be taken of the size of holdings relative to the market. Hence, if there is evidence of market value from the sale of a small loan portfolio – say \$10 million – banks would be required to apply the valuation that this implied across their entire loan portfolio. This fails to take account of rudimentary economics and the outcome would be a massive overstatement of the value of loan portfolios. On the other hand, if fair values for loans normally held to maturity are calculated net of liquidation costs, the value of the loan portfolio will substantially understate the present value of the cash flows that can be expected to be realised from the portfolio.

The current account and deposit base represent a core source of funds for many retail and universal banks. They are not traded on any market, and inherent in their fair value measurement is the difficulty of estimating their typical maturity. This is an essential component if the fair value measurement of assets and liabilities is to have any asymmetry or the information about liabilities is in itself to be of any value to the bank in its asset and liability management. The proposed approach from the JWG, however, is to ignore the value of the use of these funds to the bank on a behavioural basis in favour of adopting the legal maturity of customer accounts and the assumption that no new funds will be paid into the accounts. This falls short of the standard setters' own reliability criteria and would seem incompatible with the UK Financial Reporting Standard 5 'Reporting the Substance of Transactions'.

The fair value measurement of own debt would mean that a deterioration in a bank's credit rating would result in an accounting profit reflecting the fall in the discounted value of its liabilities. That no workable solution to this anomaly has been found emphasises

the fundamental flaws in the JWG proposals. Banking supervisors in particular are known to be troubled by the notion of a bank realising income from its own financial distress or expense as a result of an improvement in its credit standing.

Full fair value measurement is perceived to be necessary because of the subjectivity caused by the mixed measurement approach and problems associated with similar instruments being measured on two different bases. The division between trading and non-trading activity of banks, however, is clearly understood, is fully documented and has proven operable and capable of audit throughout the 1990s. By contrast, the fair value measurement of the banking book is dependent upon the estimation of value in the absence of market information and involves assumptions about liquidity, credit standing, collateral and customer behaviour. It is difficult to see how it can be described as being more objective than the current measurement base.

### **Understandability**

Few would disagree that information provided in the financial statements should be readily understandable to users with a reasonable knowledge of business and economic activities and accounting and with a willingness to study the information with diligence.

The existing mixed-measurement approach is fully understood by professional users who have developed extensive financial management tools to analyse performance using the historical cost data given for loan portfolios. Loan portfolios, investment securities and trading books are all judged according to their business purpose and supporting information about gains and losses from sales within the banking book and sensitivity analyses are factored into the overall assessment of a bank's performance.

Users – and management – are also interested in net interest income and key ratios such as interest yield, spread and margin. Net interest income is the difference between interest received from interest-earning assets and interest paid on interest-bearing liabilities, including free and low-cost funds. These performance indicators are calculated using historical cost data reflecting the amounts or rates actually received and paid and fully tie into the earnings process. While banks are likely to conclude that these figures would still need to be given on an historical cost basis, their relegation to supporting

disclosure based on an alternative value system would over time debase their worth.

### **Comparability**

Users must also be placed in a position to compare the financial statements of an enterprise through time and with other enterprises in order to evaluate their relative performance and changes in financial position. For this to be achieved, similar events and states of affairs should be represented in a similar manner. But the need for comparability should not be confused with absolute uniformity and an enterprise should not place conformity above the qualitative characteristics of relevance and reliability.

While the measurement of financial instruments in the trading book at fair value and the measurement of financial instruments in the banking book at historical cost create an element of complexity, the valuation bases are appropriate to the substance of the transactions in question. Valuations are made in a consistent manner and there is a high degree of comparability within and between institutions. Such is the nature of the subjectivity involved in the calculation of fair values in the banking book, however, that comparability between financial institutions on the information that could reasonably be expected to be given in the financial statements would be rendered impossible.

Given that requiring banks to fair-value their loans and deposits would effectively place them on a different measurement basis from non-financial institutions; cross-sector comparisons of performance across their mainstream operations would also no longer be possible.

### **The position of banking supervisors**

When the Basel Committee on Banking Supervision reported to G7 finance ministers on International Accounting Standards (IASs) earlier this year, it related the concern expressed by the banking industry over the proposed fair value measurement of the banking book. It concluded that further research was needed in order to determine whether fair value disclosure could meet investors' needs and for a view to be taken on "whether further steps towards fair value accounting in the primary financial statements are actually necessary".

Similar views were expressed in the response by the US Federal Reserve Board to the US Financial

“There is uncertainty as to the benefits of fair value accounting and there is a lack of guidance in determining fair values. Moreover, banking books and trading books are managed in significantly different ways. As a result, the Committee does not believe that the time is right to prescribe full fair value accounting in the primary financial statements for all financial assets and liabilities.”

**Paragraph 47, Basel Committee on Banking Supervision ‘Report to G7 Finance Ministers and Central Bank Governors on International Accounting Standards’, April 2000**

“Where a material proportion of the balance sheet is stated at fair value based on the results of models or other estimates, there is the potential for either unintentional or intentional bias. In this context, reported fair values potentially could be self-serving appraisals by management. Firms, as a result, could have latitude to significantly manage earnings and capital by making seemingly slight changes to valuation procedures. Our experience as a supervisor evaluating the risk management systems of financial institutions indicates that fair value models require a number of assumptions and that minor changes in them can have substantial effects on their product.

For these reasons we do not view fair value accounting in the primary financial statements as inherently superior to historical cost information (including risk disclosures) at this time.”

**Letter from Governor Laurence H Meyer, US Federal Reserve Board, to Timothy Lucas, US Financial Accounting Standards Board, dated 26 May 2000.**

“In considering what the right answer is, we need to be clear about the question being addressed. Whether we use historical cost or fair value, are we looking to measure a bank’s profit or loss, or are we trying to put a value on its balance sheet? In applying fair values across the board, a number of other questions arise – are we in fact trying to measure economic profit? If so, this is a huge change in accounting, which will require a significant shift in the way users look at accounts. Do investors and depositors realise this? Will they understand this? Are fair values equally meaningful for trading and banking books? Can you distribute economic profit? What is the link between economic profit and cash flows? How do you measure capital adequacy on a fair value basis?”

**Article by David Swanney, UK Financial Services Authority, in the December 1999 edition of the *IASC Insight***

Accounting Standards Board (FASB) preliminary views paper ‘Reporting Financial Instruments and Certain Related Assets and Liabilities at Fair Value’.

A supporting staff paper, ‘Commercial Loan Fair Values: The Use of Market Prices and Valuation Models’, outlines key pricing issues that would need to be resolved before the fair value of loans for which there is no active market could sensibly be determined. It raises significant doubts about whether the values obtained from the extrapolation of market prices or modelling using corporate bond prices can reach the level of reliability expected of figures given in the balance sheet and profit and loss account.

David Swanney, UK Financial Services Authority (FSA)<sup>4</sup>, highlighted many of the unanswered questions surrounding the fair value measurement proposals in the December 1999 edition of *IASC Insight*.

The Patricia Jackson and David Lodge article in the June edition of the Bank’s *Financial Stability Review* also concluded that there may be advantage in adopting fair value disclosure before contemplating a shift in the basis used for the preparation of the accounts themselves. This was on the basis of the many complex issues that clearly need further exploration and discussion between accounting standard setters, the banks and the regulatory authorities.

It is further revealing that fair value measurement as developed by the accounting standard setters has played no part in the major initiative by the Basel Committee to revise the 1988 Capital Accord<sup>5</sup>. Central to this is the internal ratings-based approach to credit risk. The internal ratings-based approach, the objective of which is to bring regulatory capital closer to economic capital, has two essential components: the assignment of each loan or exposure to an

<sup>4</sup>: David Swanney has since left the FSA to become the Head of Compliance for the Royal Bank of Scotland.

<sup>5</sup>: See remarks by William J McDonough, President and Chief Executive Officer of the Federal Reserve Bank of New York, on ‘The Review of the Capital Accord’ to the Eleventh International Conference of Banking Supervision, 20-21 September 2000, for an update on the revision of the 1988 Capital Accord ([www.bis.com](http://www.bis.com)).

internal grade reflecting the probable default associated with each borrower; and the use of risk weights that correspond to different estimated probabilities of default to derive a bank's regulatory capital requirements. While the new capital regime will require consideration of both measurement and disclosure issues, the essential point is that this approach to supervision, and the financial management underpinning it, is founded on risk analysis and not fair value.

### Academic material and user surveys

In its response to the standard setters' bank-specific issues paper (see footnote 2), the banking industry included an in-depth analysis of academic and user research material available on fair value accounting<sup>6</sup>. It commented that in many instances "the JWG has unreasonably extrapolated the research to financial instruments other than those that were the subject of the research, has failed to reflect doubts expressed by 'pro' fair value authors and has not reflected the views of those that see no case for fair value measurement". It also observed that the JWG had not explored whether the research findings merited fair value disclosure rather than measurement.

The banking industry's analysis of the academic material cited by the standard setters drew the following conclusions:

- On the question of whether fair value provides a better reflection of the economic substance of the transactions within the banking book, there were studies that found that investors perceived volatility in historical cost earnings to be a better measure of economic risk than volatility in fair value earnings<sup>7</sup>.

- While some studies found that fair value estimates of loans, securities and long-term debt provided significant explanatory power for bank share prices, others found no such relationship<sup>8</sup>.
- The findings supporting a correlation between fair values and share price were principally limited to investment securities, and even then there was evidence pointing towards correlation applying only to the fair value of securities traded in active markets<sup>9</sup>.

User group survey material available is equally unconvincing:

- Research conducted by Sirota Consulting on behalf of the US FASB in 1998 revealed no clear consensus in favour of full fair value measurement. Only a minority of participants were judged to be knowledgeable about the issue. Among the knowledgeable minority, views were evenly divided between those who favoured fair value measurement and those who did not think that such a major change was warranted<sup>10</sup>.
- The American Institute of Certified Public Accountants, in 1994, found that users did not want fair value measurement, but instead would retain the mixed accounting model because it provided a stable and consistent benchmark that was highly useful for evaluating a business and was reliable<sup>11</sup>.

These findings are compatible with the findings of two surveys conducted earlier by KPMG.

### Conclusion: a better approach to policymaking?

This article has outlined the principal reasons why the banking industry is opposed to measuring banking assets and liabilities on a fair value basis as

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6: The response to the August 1999 JWG paper 'Financial Instruments – Issues Relating to Banks' was made by an international Joint Working Group of Banking Associations (JWGBA) and can be found on the British Bankers' Association's website at [www.bba.org.uk/media](http://www.bba.org.uk/media). The JWGBA comprises the banking associations of the United States, Canada, Australia, Japan and the European Union, with the Europeans represented collectively by the Fédération Bancaire and the British, Dutch, French and German associations.

7: Barth, Landsman and Whalen, for example, in 'How Does Fair Value Accounting for Investment Securities Affect Earnings Volatility, Regulatory Capital and Value of Contractual Cash Flows?' *Bank Accounting and Finance* 1995/96, winter, pp 17-25 conclude that their findings "are consistent with investors perceiving volatility in historical cost earnings to be a better measure of economic risk than volatility in fair-value earnings".

8: Eccher, Ramesh and Thiagarajan 'Fair Value Disclosures by Bank Holding Companies' *Journal of Accounting and Economics* 1996, 22, pp 79-117 concludes that "fair value disclosures for financial instruments other than securities are value-relative only in limited settings"; and Nelson 'Fair Value Accounting for Commercial Banks: an Empirical Analysis of SFAS No.107' *The Accounting Review* 1996, vol 71, No 2, pp 161-182 finds that "only the reported values of investment securities have incremental explanatory power relative to book value".

9: Petroni and Whalen 'Fair Values of Equity and Debt Securities and Share Prices of Property-Liability Insurers' *Journal of Risk and Insurance* 1995, vol 62, No 4, pp 719-737 concludes that fair values of only "certain categories of investments, such as equities and US Treasury securities, which are more likely to be traded in active markets, are valuation relevant".

10: Sirota Consulting, 'Investment Community Interest in Reporting the Fair Values of Financial Instruments in Financial Statements', 3 June 1998.

11: The American Institute of Certified Public Accountants 'Improving Business Reporting – A Customer Focus: Meeting the Information Needs of Investors and Creditors'.

proposed by the JWG. This includes its assessment of the potential consequences for financial stability and the detrimental effect on the provision of long-term finance to industry and commerce. It also relates to whether the fair value measurement of the banking book is compatible with fundamental accounting principles. It has questioned whether the use of economic models for the preparation of the statutory accounts can be justified and has suggested that it would be inappropriate for the accounting standard setters to introduce rules that would effectively place the banking industry under a different accounting regime from that which applies to other sectors. These concerns are shared by banking supervisors, academics and users.

It is envisaged that the JWG's draft standard will fail to command the support of the banking industry. If this proves to be the case, surely the time will have come for the JWG to abandon its radical agenda in favour of finding and implementing changes to bank reporting that leading institutions agree constitute the provision of better information to the marketplace. This, for example, could include an investigation into the use made of the long-standing US fair value disclosures and a review of the extent to which the disclosure requirements of IAS 32 'Financial Instruments: Disclosure and Presentation' are reasonable and can be expected to meet user needs. It could also include an assessment of whether IAS 39 'Financial Instruments: Recognition and Measurement' constituted a more realistic axis for the harmonisation of the measurement of financial instruments<sup>12</sup>.

In the first instance this task could be charged to the steering committee established recently to review IAS 30 'Disclosures in the Financial Statements of Banks and Similar Financial Institutions'. The steering committee has the task of bringing presentation and disclosure requirements applied to banks under international accounting standards into line with industry developments over the past ten years and will address the many disclosure issues raised in recommendations made by the European Commission<sup>13</sup> and the Basel Committee on Banking Supervision<sup>14</sup>.

Why not go one step further and ask the steering committee to consult widely on fair value related issues, whether measurement- or disclosure-based? This would enable fair value issues to be discussed within the context of developments already taking place in bank financial management and the supervisory regime and permit them to be considered as part of a coherent, forward-looking programme.

What is needed is a fresh approach in which accounting is reviewed not on the assumption that we must inexorably move towards fair value measurement but in which the objective is the delivery of widely recognised and achievable improvements in financial reporting across the industry. This surely would be a more constructive start to the decade than further prolonging the debate about the merits or otherwise of measuring the banking book on a fair value basis.

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**12:** International Accounting Standard 39 'Financial instruments: recognition and measurement', December 1998. IAS 39 is a partial measurement standard under which all derivatives and any items they hedge are measured at fair value. For those banks reporting under IAS it applies to financial years beginning on or after 1 January 2001.

**13:** European Commission recommendation of 23 June 2000 'concerning disclosure of information on financial instruments and other items complementing the disclosure required according to Council Directive 86/635/EEC on the annual accounts and consolidated accounts of banks and other financial institutions' (C(2000) 1372).

**14:** These include the Basel Committee on Banking Supervision reports 'Sound Practices for Loan Accounting and Disclosure', July 1999, 'A New Capital Adequacy Framework: Pillar 3 – Market Discipline', January 2000, 'Best Practices for Credit Risk Disclosure', September 2000, and papers expected to be issued shortly.

# Crisis prevention and resolution:

## two aspects of financial stability

David Clementi, Deputy Governor, Financial Stability, Bank of England

In this speech, delivered at The South Bank University Centre for Monetary and Financial Economics on 6 September 2000, the Deputy Governor focused on the Bank's second core purpose of maintaining the stability of the financial system. In particular he discussed surveillance and two issues currently under debate. The first relates, in the context of the revision of the Basel Accord, to the aggregate capital in the banking system and the optimal level of bank capital. The second concerns the international financial architecture and the respective roles of the private and official sector in dealing with liquidity crises.

**WHEN I WAS** invited to give the inaugural lecture at the Centre for Monetary and Financial Economics, I was pleased to accept. It is obviously an honour to be asked to inaugurate any academic institute but supporting the foundation of a centre dedicated to the pursuit of monetary and financial stability is, for a central banker, a particular pleasure! After all, monetary and financial stability and the interaction of the financial system with monetary policy are at the heart of the Bank's mission. The first of the Bank's core purposes is maintaining the integrity and value of the currency or, in other words, monetary stability; the second is maintaining the stability of the financial system.

I intend to focus my remarks on this second core purpose. Financial stability has always been an integral concern for central banks. We have been reminded of its importance by the events of recent years. The Asian Crisis in particular set in train a programme of international work and discussions, looking at ways to prevent a recurrence and to handle one if it did. One concrete result was the creation of the Financial Stability Forum, which meets semi-annually, bringing together central banks, finance ministries and regulators to discuss issues of common concern and to develop policies for controlling risks to the international financial system.

The work broadly falls into three categories: crisis prevention, surveillance and crisis resolution. It is my

intention today to concentrate on crisis prevention and crisis resolution and to discuss in some detail two issues currently under debate. The first relates, in the context of the revision of the Basel Accord, to the aggregate capital in the banking system and the optimal level of bank capital. The second concerns the international financial architecture and the respective roles of the private and official sector in dealing with liquidity crises.

But before I turn to these I would like to say something about surveillance. This responsibility is shared in the United Kingdom between the Bank, Financial Services Authority (FSA) and Her Majesty's Treasury (HMT). Following the creation of FSA, the respective roles of the three parties were set out in a Memorandum of Understanding (MoU) between them. While HMT is responsible for the structure of financial legislation and the FSA is responsible for the regulation of individual firms, the Bank is responsible for the stability of the financial system as a whole. To this end, the Bank dedicates significant time and resources to tracking developments in the global economy and financial markets with a view to identifying potential threats to financial stability. Major developments are discussed each month in the Bank's Financial Stability Committee. Within the Bank, the Financial Stability Committee occupies a similar position in relation to financial stability as the Monetary Policy Committee (MPC) does for monetary stability. Bank staff present papers to the Financial

Stability Committee evaluating the overall conjunctural position and reviewing issues of specific concern. The staff assessment of financial stability is shared with the Treasury and FSA and discussed with them in the Standing Committee, set up under the MoU, that meets each month to monitor financial stability and to consider issues of common concern. The objective is to identify sources of instability before problems emerge, to be in a position to take preventative action or to respond quickly in the event of trouble.

The Bank sets out to articulate publicly its financial stability role and to communicate current concerns by the publication semi-annually of the *Financial Stability Review*. Each edition includes an overview of financial stability providing an assessment of current threats to the system, ranging from imbalances in the major industrialised economies or debt structures in Emerging Market Economies, to sectoral issues such as equity market volatility or gearing in the telecoms industry. While other commentators may talk of economic miracles, you can rely on central banks to find disaster waiting in the wings! But if surveillance feeds off central bankers' capacity to worry, then crisis prevention and crisis resolution, working on rules to minimise the risk or the cost of a financial crisis, may be the only prospect for us to get a decent night's sleep.

### **Crisis prevention: bank capital requirements**

I would like to discuss one particular weapon in the crisis prevention armoury, which is bank capital. This is, of course, a very topical subject at the moment, with the revision by the Basel Committee on Banking Supervision of the 1988 Capital Accord.

### **Importance of capital**

Why does bank capital have a crucial role in crisis prevention? This question has two aspects: first, the importance of capital itself; and second, the special role that banks play in the economic system. Capital has a vital two-fold role. First, capital – or rather equity capital – acts as a buffer against insolvency. It therefore helps to protect the system and limit calls on the safety net. And second, equity capital helps to align the objectives of the firm's owners with the objectives of the authorities. Where the owners of firms invest only pinpoint capital, or see their investment erode to the point where the firm is only marginally solvent, owners have an incentive to 'gamble for resurrection', because with limited

liability, taking on extra risk has substantial potential upside but no extra downside for owners. But with a higher cushion of capital, owners do have something to lose.

That said, we should not overstate the role of capital in ensuring the health of the banking system. If other fundamentals are shaky – such as the macroeconomic environment, the legal system, or the framework for asset valuation and auditing – capital is likely to produce only limited comfort. And capital adequacy is of course only one aspect of prudential regulation, with other aspects of risk management such as liquidity management and systems and controls also being vitally important.

The Basel Committee has now of course explicitly recognised that the formal regulatory minimum capital framework is only one pillar in the edifice of bank soundness. It has to be complemented by supervisors individually reviewing the capital adequacy of banks in the light of a wide range of risk factors – the second pillar of the proposed new Accord – and by market discipline on banks, the third pillar.

On the question of why we focus on banks, it would be difficult to overstate the importance of a stable banking system to economic health and growth. Banks play a crucial role in intermediating savings and credit and they are at the heart of the payments system. Most firms in most economies remain heavily reliant on banks for finance, and even in economies where a significant number of firms can turn to the capital markets for finance, banks retain important roles as providers of payment facilities, short-term credit, and backup liquidity. In less advanced economies, their role is even more dominant, to the extent that a number of full-blown macroeconomic crises have had their roots in weak banking systems.

### **Changes to the Basel Accord**

As I have said, the capital framework for banks is currently under review by the Basel Committee. It is worth reminding ourselves what this framework consists of. First, it sets out a method for measuring the riskiness of assets. Second, it sets out a definition of capital. And third, it lays down a minimum ratio between capital, the numerator, and risk assets, the denominator, namely that capital should be at least 8 per cent of risk-adjusted assets, with at least 4 per cent of this consisting of Tier 1 capital.

### What changes will the new Accord make to these elements?

The work has to date been heavily focused on the first element of the framework, the method for measuring risk. There will be substantial changes here, with the aim of introducing more risk sensitivity to the existing crude measures and to widen the coverage of the measures beyond just credit risk and market risk which was addressed in the previous review of the Accord. The direction of the changes was laid out in the Committee's consultative paper of June last year and I do not intend to go into a description here.

On the second aspect, the Committee has stated that 'With respect to the definition of regulatory capital, the Committee will maintain at this stage the existing rules set out in the 1988 Accord'. In other words, they will not at this stage be revising their definition of capital. Just to remind you, this definition of capital broadly divided capital into two tiers, of which Tier 1 mainly consists of shareholders' equity and reserves and Tier 2 of certain subordinated debt instruments and an element of general provisions. There have been some modifications to the definition since 1988, for instance to introduce another layer of less permanent capital to back short-term trading risks, and more recently to accommodate some more innovative types of issues which can be aligned with Tier 1 for capital purposes (but with debt for tax purposes – an outcome which I believe is technically described as 'having one's cake and eating it!').

It would of course be intellectually more satisfying to be reviewing the whole framework together, but the Committee's decision not to revisit this definition at this time is, I believe, a defensible pragmatic one: modernising the denominator is proving quite difficult and contentious enough without involving the numerator as well. That said, there is a discussion which needs to take place at some point as to whether the definition has achieved the right composition of elements and emphasis on those elements.

### How much capital does the system need?

It is on the third aspect of the framework that I mainly wish to offer some thoughts today, that is, on the level of capital that should come out of the framework. Here again, the Committee has signalled a 'no change' or at least a 'no change in aggregate' intention, by saying that 'The Committee believes that the new framework should at least maintain the overall level of capital currently in the banking system'.

We should of course be under no illusion that the ratios chosen in 1988 were arrived through a scientific process. If I may digress briefly into anecdote, I recall that Bill McDonough once related that he had asked his staff why, under the market risk amendment to the Capital Accord, it had been decided to apply a three-times multiplier to the outcome of Value at Risk models. Why three times? The answer came back that three times was selected because "two times was too low and four times was too high". I imagine that the process of selecting 4 per cent minimum equity was very similar to this.

The selection of a capital ratio ought, ideally, to depend upon answers to the following questions: What is the risk we are trying to limit? What is a good measure of that risk? What residual level of risk are we willing to tolerate? And how do we fix a capital level so as to achieve that residual level? These questions were not explicitly addressed back in 1988, although possibly we can infer some of the implicit answers from the regime that was established. However, although neither the 1988 Accord's measure of risk nor its selection of the minimum capital ratio may have been scientifically derived, the Committee's statement that we will at least maintain the overall level of capital in the system indicates that, *ex post*, the authorities are reasonably happy with what the 1988 Accord achieved.

But what exactly is meant by this statement? And how do we go about achieving the intended outcome? Is it, indeed, a reasonable outcome to strive for? I will try to address these questions.

One way of thinking about the 1988 Accord is that, aimed principally at internationally active G10 banks, and using crude measures of risk that assumed some sort of average portfolio and profile of risk for such banks, it set a 'confidence level' for the soundness of individual banks and hence the system. Looked at in this light, the Committee's statement means that the authorities do not intend to tolerate a different – ie lower – level of confidence following the introduction of the new Accord. In other words, under the new regime, the average internationally active G10 bank will not be more likely to fail than it would be under the old regime.

This seems a fairly sensible way to view the relationship of the old Accord with the new version. It leaves plenty of scope to see redistribution of

required capital, from less-than-averagely risky banks to more risky ones. It also leaves scope for overall capital to reduce over time, if better risk measurement or other techniques lead to a reduction in the risk taken.

That said, looking at the appropriate level of capital in this way still means that we have to be able to measure the current confidence level for G10 bank insolvency which is established by the existing Accord. This is not an entirely straightforward task. One starting point could be the ratings of G10 banks. The median rating of banks, taking the entire rated G10 population of more than 300 banks, is A1 on the Moody's scale, or A+ on the Standard and Poor's scale. This would indicate a near-invisible insolvency probability for such banks over a one year horizon. However, this very small insolvency probability does reflect two factors which ideally we would wish to discount. First, the ratings reflect the bank's actual capital level which will in most cases be significantly above the regulatory minimum. And second, in some cases the rating also reflects the agency's expectation that public support would be forthcoming for the bank, which of course we would wish to strip out. A more accurate measure of the confidence level established by the Basel 8 per cent would be the 'standalone' ratings produced by some agencies, for those banks whose capital is at or close to the Basel minimum. Even on this basis, nearly all such banks are rated above investment grade. The message therefore from this view of the matter is that under the new Accord we should be targeting a minimum level of regulatory capital for our G10 internationally active banks that is at least consistent with an investment grade rating.

An alternative way of assessing the regulatory soundness standard would be on a 'bottom up' basis, that is by modelling the probability of default arising from a typical credit portfolio if the bank held only the Basel minimum capital. The advent of credit risk modelling techniques such as CreditMetrics allow such an exercise to be attempted. Any results under this sort of approach need to be treated with a fair amount of caution, given the number of assumptions involved. The work we have done at the Bank, experimenting with these models and using different parameters, at least supports the proposition that G10 international banks (the target constituency for the Accord) should have capital on the basis of a one-year default probability that is consistent with an investment grade rating.

Assuming that we can somehow identify the current confidence level implicit in the existing Capital Accord, we may, as I suggested above, nevertheless want to debate the question of whether the Committee would be right in aiming to replicate this under the new Accord. Is this a reasonable objective? Or are we being too conservative?

Clearly there are types of banking exposures for which too much capital is being demanded, such as lending to very high-quality corporates. This has led to some exposures being moved outside the banking system, through disintermediation or regulatory arbitrage. This problem is one of the main drivers behind the Basel Committee's current review of risk measures. However, there are equally transactions for which the Basel minimum is severely inadequate, such as lending to some Organisation for Economic Co-operation and Development countries. But the question is really whether on average the regulatory requirement produces the right level of protection.

Given the Bank of England's general concern for systemic risk, we would tend to evaluate this question in terms of whether the existing cushion of capital has given the right level of protection to the system, ie have we established the right level of tolerance towards banking crises. Individual bank failures do not prove inadequacy of the framework – although a complete absence of bank failures would suggest severe overprotectionism.

It is very difficult to answer this question definitively, given that bank failures and banking crises tend to have their roots in a number of different causes, not just inadequate capital. It is difficult to say therefore how much difference extra capital would have made, or how many more crises would have resulted had the regulatory capital demand been lower. Nevertheless the frequency of crises, even in developed countries since the Basel Accord was implemented, is not so low as to make us feel that the regulatory demand for capital is overstated. Using IMF data on banking crises, we find that during the 1990s four out of eleven G10 countries have suffered a banking crisis – a statistic which I do not find particularly comforting. And, although developed countries tend to escape the twin plague of a banking crisis combined with a currency crisis, we should not suppose that this rather high incidence of crisis in developed countries is mitigated by the costs of the so called crises being noticeably low. I hesitate to put precise numbers on

costs, because they do vary quite considerably. However, as Bank of England research which is to be presented later to this conference indicates, both the fiscal and welfare costs on all the measures used are very significant indeed. On some measures, in fact, the output costs of banking crises in developed countries tend to be higher than in emerging markets, largely because the length of crises is longer in developed countries. Overall, therefore, in the light of past experience, I think we would be taking an unjustified risk if we deliberately set out to lower the existing regulatory demand for capital.

### **Crisis management and payments standstills**

I want to turn now from crisis prevention to crisis resolution and from domestic banking to more general international liquidity crises. While the banking system was a source of instability in many countries during the Asian crisis, a more immediate problem was the liquidity crisis triggered by the sudden outflow of capital from the region. It is the free movement of capital that I would like to discuss and, in such a regime, the need for arrangements that would deal with a liquidity crisis where developing countries get into payment difficulties.

### **The international capital market**

Global capital flows have exploded since the 1970s. Between 1970 and 1996, real GDP in the G7 economies more than doubled. Over the same period, world trade volumes rose by roughly twice this amount. But since 1970, real gross private capital flows have risen by a factor of more than eight – double the growth in world trade and four times the growth in world income.

Rising capital flows have delivered huge benefits to the developing countries. Capital liberalisation, like trade liberalisation, has facilitated ‘catch-up’ in the levels of income of these countries. It delivers a permanent, and potentially huge, welfare gain. The experience of the Asian tigers from the 1970s onwards, and before that of Germany and Japan during the 1950s and 1960s, is testimony to that.

But large-scale capital flows also bring risks. Capital flows are not just large, but volatile too. The financial crises in Mexico in 1994, across south-east Asia in 1997, in Russia in 1998 and in Brazil last year are the most recent and visible examples. But the incidence of financial crisis has in fact been rising since the early 1980s. And the cost of financial crises are

considerable. In the stricken south-east Asian countries, capital flow reversals and output losses were anywhere between 5 per cent and 20 per cent of GDP. In many of these cases, there has been encouraging evidence of a V-shaped recovery in output and asset prices following crisis. But the depth of the V is clear evidence of the potential cost of volatile capital movements.

Capital markets have of course been prone to ‘panics, manias and crashes’ for as long as they have existed. It would be naïve to think we can ever entirely prevent crises – and indeed it may be undesirable to attempt to do so. But it is realistic to think that the incidence and severity of crisis can be mitigated through appropriate public policy actions. This is the grandly-titled ‘new international financial architecture’ about which you have no doubt heard.

I want to discuss some of the efforts of the official sector in redesigning the international architecture – achievements to date and, importantly, challenges for the future. While a lot has been achieved, much remains to be done. I will also suggest where I think the official community’s future efforts might best be directed.

### **Dealing with financial crisis**

The first priority of the official community must of course be crisis prevention. And on this front good progress has been made. For example, we now have a substantial array of codes and standards of best practice covering public policy issues: transparency in macroeconomic policies; core principles for the supervision of banks, insurance companies and securities firms (including the changes to the Basel Accord which I have just discussed); principles for corporate governance, insolvency and market integrity; and standards for data, auditing and accounting. Implementation of these codes of best practice is now the key – ensuring that crisis-prevention principles are put firmly into practice, in both developed and emerging economies. The IMF has a key role to play in this implementation process, through their assessments of compliance with standards and transparency about these assessments.

But even with preventative measures in place, liquidity crises will still occur from time to time. Creditors may sometimes choose to flee simply for fear of other creditors doing so before them. A

country can face a liquidity 'run' in much the same way as a bank. And these types of co-ordination failure are difficult to resolve with standard macroeconomic policy tools, like monetary policy.

So what policy alternatives are available? One means of resolving this rush for the exits is for the IMF to provide emergency liquidity support in potentially unlimited amounts – a classic international lender of last resort. But virtually no-one envisages the IMF (or anyone else) playing such a role. As a practical matter, the IMF simply lacks the resources. Its usable resources are currently less than US\$150 billion. The external debt of the developing countries is well over US\$2 trillion. So the IMF's ability to fill financing gaps is already heavily circumscribed and will become more so over time.

Even with the resources, it is very doubtful whether unlimited IMF lending would be desirable. More likely, it would simply stoke up moral hazard problems for the future, potentially increasing the incidence of crisis and the corresponding cost for taxpayers. So an international lender of last resort appears both impractical and undesirable.

This recognition that it is neither practical nor desirable to see the IMF in a role of Lender of Last Resort has prompted considerable thinking about the nature of private sector involvement in crisis resolution and the modalities of sovereign payments suspensions or standstills. Payments suspensions are in some ways the obverse of recognising the limits on IMF lending. And, reflecting this, sovereign standstills litter history over the past two centuries: in Latin America in the 1820s and again in the 1870s; among the majority of sovereign debtors in the 1930s; and in Latin America once again in the 1980s.

All too often in the past, however, sovereign standstills have also been a recipe for chaos and confusion. The recent sovereign defaults in Russia, Indonesia and Ecuador are good cases in point. But looking back over history, it is clear that messy and protracted sovereign standstills are very much the rule rather than the exception. Historical experience with sovereign standstills probably looks quite a lot like corporate experience before insolvency rules were put in place, with the work-out process inefficient and inequitable. I will return to that corporate bankruptcy analogy later on.

Against this backdrop, the key issues facing the official community seem to me to be twofold. First, how do we establish a more coherent framework for crisis management, that recognises and reconciles the countervailing forces of large and rising capital flows on the one hand, and small and limited official lending on the other? Second, given these constraints, is it possible within that framework to establish a role for standstills that are efficient, equitable and expeditious? I discuss each in turn.

### A framework for crisis management

The Cologne Summit statement by G7 finance ministers and central banks in June 1999 was a step towards establishing a framework for international crisis management. It listed the 'principles' and 'tools' underpinning this framework – if you like, the ingredients. It did not, however, provide a recipe for combining these ingredients. The official community's framework for crisis management remains a discretionary, 'case-by-case' one.

This approach has benefits. Crises clearly differ in form and severity, which calls for flexibility in the official sector's approach to dealing with them. But discretion also carries some costs. For private creditors, it adds to uncertainty when framing their lending plans. The IMF's latest Capital Markets Report states that the private sector is "highly uncertain, if not outright confused about the official community's approach to achieving its goals".

Discretion also has costs for the official community. It risks 'gaming' by the private sector, with the official sector providing more money *ex post* than would have been optimal *ex ante*. By altering official and private sector behaviour in this way, a discretionary approach to crisis management potentially increases both the cost and the incidence of crisis.

Are there feasible, rules-based alternatives? One simple means of establishing an official 'line-in-the-sand' would be to place an explicit cap on IMF lending. No rule is of course inviolable. But publicly-stated constraints are likely to have greater credibility. This would reduce uncertainty among private creditors. And it would drive home the point that 'bail in' by private creditors would need to be greater, the larger a country's financing needs, which provides the right set of incentives from a moral hazard perspective.

### Payments standstills as a crisis management tool

This limited pool of IMF lending would need to be complemented with other crisis management tools. Voluntary rollover agreements with creditors – the like of which were put in place in Korea and Brazil recently – would be an important part of that crisis management tool kit. So too would voluntary bond restructurings, as have recently been undertaken in Pakistan, Ukraine and Ecuador. An ongoing dialogue between country debtors and their private creditors – what the Institute for International Finance call ‘Country Clubs’ – would facilitate both of these voluntary tools for crisis resolution.

Involuntary payments suspensions also deserve consideration as part of the official sector’s tool kit, however. As a crisis management tool, they may be beneficial in certain situations. Where a country is vulnerable to short-term capital movements, standstills could serve as a potentially important circuit-breaker. They might be an efficient means of forestalling ‘runs’ on a country because they prevent pessimistic creditor expectations becoming self-fulfilling. More generally, whether capital is short-term or not, they could serve as an important incentive device. Having standstills as a credible backstop might in some circumstances increase incentives for debtors and creditors to seek voluntary resolutions to crisis sooner.

Through both of these mechanisms, standstills might help resolve co-ordination failures among creditors, and hence forestall liquidity crisis.

How do we ensure that standstills are efficient and equitable? The decision to default must be principally for the debtor. But the official sector can alter debtor incentives in important ways. One incentive device would be for the IMF to support standstills by agreeing to lend through their duration – what the IMF call ‘lending-into-arrears’ – provided the standstill process, once entered into, is orderly and speedy. If standstills were a structured part of the IMF’s ex-ante crisis management framework, this would increase the chances of the standstill process itself proving *ex post* efficient. There is also encouraging work being done by the private sector on drawing up best practice guidelines for sovereign debt workouts.

Some have argued that articulating a clearer role for standstills may perversely alter debtor incentives, by weakening the presumption that debtors should pay

their debts in full and on time. But an orderly standstills process should support, not supplant, market forces and market disciplines. Corporate bankruptcy law grew up as it became clear that market forces delivered losers as well as winners and that some orderly means were needed for dealing with the losers. In this way, bankruptcy law supports the market mechanism.

The situation is no different in a sovereign context. A well-articulated framework for dealing with sovereign liquidity problems should reduce the inefficiencies and inequities of the current unstructured approach to standstills. It would support the international capital market mechanism. It would be no more likely to induce debtors to default than bankruptcy law is to induce corporate debtors to default. In neither case is default a soft option.

We would of course hope and expect sovereign standstills to be the exception rather than the rule. But it is better to plan for all contingencies, and to articulate these plans, than have international public policy made on the hoof. In this respect, crisis fighting shares many similarities with fire fighting. Fire prevention is ideal, but will never entirely prevent fires occurring. So it makes sense to have a fire-fighting plan, which everyone understands and abides by, to minimise the damage when fires do occur.

### Would standstills work?

The issue of whether standstills should form a part of the official sector’s toolkit of responses remains under active debate. A number of arguments against the use of standstills have been made by policymakers, academics and the private sector. Let me try and articulate some of the concerns.

First, would standstills risk cutting off capital flows to the emerging markets – if you like, killing the goose that lays the golden egg? History offers some clues here. For example, there appears to be no evidence from the 1930s’ experience of defaulting countries having fared worse than non-defaulting countries in terms of subsequent output growth. And looking across a broader sweep of history, some empirical evidence has failed to find any discernibly negative long term effect of a country’s prior debt-servicing record on the terms or volume of its borrowing.

That is not to say that default is costless, certainly in the short to medium term. The loss of access to

capital markets and the time and effort involved with restoring credibility with creditors is, quite correctly, a strong deterrent for any country contemplating default.

Historical evidence may in any case be uninformative about investor behaviour in the future under a more structured framework for international crisis resolution. If this framework helped resolve the collective action problem among creditors, it ought to benefit creditors as well as debtors. Indeed, by reducing the risk to creditors in this way, standstills should be mutually beneficial to both parties. If that is the case, there is no reason to believe that, in a world of structured standstills, there is much risk of the golden-egg-laying goose being cooked.

Second, might the prospect of standstills prompt a pre-emptive rush for the exits? In a world of structured standstills, there is perhaps some risk of skittish investors rushing for the exits sooner. Indeed, these investors may choose not to enter emerging markets in the first place – standstills would pre-empt the inflow rather than precipitating the outflow. But the behaviour of longer-term investors needs also to be weighed. They would stand to gain from country runs being forestalled. Their incentives to flee are thereby diminished. The net effect might be some change in the composition of the developing countries' capital stock, with fewer fleet-of-foot, skittish investors and a greater number of longer-term, sticky investors. This change in capital stock ought to be advantageous from the welfare perspective.

Third, might standstills worsen contagion between markets, the like of which we saw following Russia's debt moratorium in 1998? Contagion appears to be a fact of life in a world of cross-border capital flows. The question is: would articulating a role for structured standstills worsen contagion? It is not clear that more coherent crisis-management framework would increase the incidence of standstills; it might reduce their cost. And to the extent that contagion is sourced in investor uncertainty, it might to some extent be mitigated by the proposals I have outlined.

So, to summarise, there are good reasons to think that a world of structured standstills might alter investor behaviour and the international flows of funds. It is difficult, however, to believe that these changes would

be damaging to the international capital market mechanism – indeed, some would clearly improve its functioning. Sovereign defaults will continue to occur periodically. But the official sector could possibly mitigate their cost by establishing a coherent framework for crisis management, with payment suspensions as one of the tools.

None of this is at all to suggest that the issue of standstills – in or outside the Bank of England – is fully articulated and concluded. It is a difficult area requiring contributions from all sides and the intellectual argument is on-going. Finding the right balance between rules and discretion, in this area as in so many, remains a key issue for policymakers. There is work to be done on the modalities of how standstills might operate in different crisis cases. What is the role of the IMF in the standstill process? Does the process need to be underpinned by statute or would non-statutory principles suffice? And when might a standstill require capital controls to guard against leakage?

The Bank is currently working on some of these issues, practical and conceptual. I would encourage those among you with an interest in international public policy to help us in addressing them, joining the growing number of, in particular, US academics who are exploring this topic. It is very much a live debate and I have no doubt these issue will be discussed at length, at and around the World Bank and IMF Annual Meetings in Prague later this month.

### Conclusion

I have now talked myself – quite literally – to a standstill. I hope, in describing two current issues in the policy debate, I have been able to convey something of the Bank's role in financial stability and the importance of current work in this area. I am encouraged to see how many aspects of financial and monetary stability are included in the programme for this conference. I wish you well with it and the future of the Centre itself and I hope the Centre and the Bank will maintain a close relationship.

# International standards and codes

Alastair Clark<sup>1</sup>, Executive Director, Financial Stability, and John Drage, International Finance Division, Bank of England

The international community, through the International Monetary Fund (IMF), the World Bank and various standard-setting bodies, has embarked on a programme of developing standards and codes covering a number of areas of economic and financial policy. It has called on the IMF, with the assistance of the World Bank, to oversee and co-ordinate the assessment of countries' progress in implementing these standards. Countries are being encouraged to allow publication of the assessments, with the intention that they should be available to private sector firms, as a contribution to their risk management processes. While full implementation is likely to take many years, standards should help to improve policy making and establish more resilient domestic financial systems, which should in turn reinforce the stability of the international financial system.

**THE ELIMINATION** of financial crises is no doubt an unrealistic goal – financial markets have been prone to “manias, panics and crashes”<sup>2</sup> for as long as they have existed – but the emerging market crises of the last few years have prompted a wide-ranging debate about how to reduce their frequency and severity<sup>3</sup>. Significant progress has been made in a number of areas including: strengthening supervision and regulation; the adoption of appropriate policies on exchange rates; the need to monitor and manage liquidity, including especially short-term foreign currency exposures; the importance of prudent government debt management; and the development and implementation of international standards and codes. The purpose of standards and codes is to raise the quality and transparency of economic and financial policy in some key areas at the national level, thereby increasing the stability of the international financial system as a whole.

Standards and codes, in one form or another, have shaped the environment for international economic and financial relations for a long time. Examples over

recent years include *Principles for the Supervision of Banks' Foreign Establishments* (the Basel Concordat), agreed by the Basel Committee on Banking Supervision in 1983<sup>4</sup>, and a framework for *International Convergence of Capital Measurement and Capital Standards* (the Basel Capital Accord) published in 1988. But the latest crises in a number of emerging market countries have provided an impetus to develop standards on a broader front – for example addressing the transparency of fiscal, monetary and financial policies<sup>5</sup> and corporate governance.

In the past, how standards have been implemented has been largely at the discretion of individual countries. But after the recent crises more centralised arrangements are being developed to monitor countries' progress towards adopting and implementing standards. The production of standards is not, of course, an end in itself; neither are they legally enforceable or binding. But, they should be helpful as a benchmark of good practice and as a tool to help build sound financial systems.

<sup>1</sup>: Alastair Clark was a member of the Financial Stability Forum Task Force on Implementation of Standards and is also a member of the follow-up Group. This article reflects his remarks at a conference on the Role of Regulation in a Global Context, organised by the City University Business School and the University of London, on 13 July 2000.

<sup>2</sup>: Manias, panics and crashes: a history of financial crises by Charles P. Kindleberger 1978 (3rd edition Macmillan 1996: ISBN 033367040X 0471161713)

<sup>3</sup>: This debate, which is often rather grandly referred to as reforming the “international financial architecture”, also encompasses the question how best to manage crises when they do occur: see for example pages 154 to 161 of this edition of the *Financial Stability Review*.

<sup>4</sup>: The Concordat sets out principles governing the supervision of banks' foreign establishments by home and host banking supervisory authorities. It deals exclusively with their responsibilities for monitoring the prudential conduct and soundness of banks' foreign establishments.

<sup>5</sup>: The article in the June 1999 *FSR* outlined the main features of the Code of Good Practices on Transparency in Monetary and Financial Policies which was then under development. It was subsequently approved by the Board of the IMF and endorsed by the Interim Committee – now the International Monetary and Financial Committee – of the IMF in September 1999.

## Why the increased emphasis now on standards and codes?

For a number of reasons the collective interest in a country's compliance with internationally-recognised standards and codes has increased in recent years.

First, the effects of **globalisation**. National economies are increasingly interlinked, so that problems in one can have rapid and significant knock-on effects in others. Put in a slightly different way, as countries seek to integrate themselves more closely into the global economy, the externalities associated with their conduct of national economic and financial policies increase. Other members of the "club" may understandably look for reassurance that everyone is playing by broadly the same rules or at least is not exposing the club as a whole to unreasonable risks.

Second, the implications of **greatly expanded international capital flows**. Over the past 15 years, according to the Bank for International Settlements, the outstanding stock of cross-border bank lending has risen from just over \$2 trillion to over \$10 trillion<sup>6</sup>. There has probably been even faster growth in other kinds of cross-border financial claims. This compares with an increase in nominal world GDP by a factor of about 2<sup>1/2</sup> and in nominal world trade by a factor of about 3. The extent now of these financial interlinkages means that the transmission of shocks is likely to be quicker, and possibly more damaging, than would arise purely from trade effects.

Third, an **increased emphasis on private markets**. While the value of capital flows to emerging markets has risen sharply, there has at the same time been a decisive shift in the source of these flows from the public to the private sector. In 1999 private sector flows accounted for more than 80 per cent of the total, compared with under 50 per cent at the start of the decade<sup>7</sup>. This has highlighted the importance of factors contributing to the efficient functioning of

private markets, including especially the availability of accurate and timely information.

Fourth, **experience from recent crises**. The concern about knock-on effects is not simply theoretical: over the past twenty years there have been several examples of problems affecting sizeable economies which have threatened wider systemic damage. From Mexico in 1982, through the other Latin American debt crises of the 1980s, to Mexico again in 1994 and 1995, and then the East Asian debt problems of 1997 and 1998, to Russia in 1998 and Brazil in 1999 – all have called for intervention by the international financial institutions and/or by national authorities in order to contain the potential contagion. While many factors contributed to these crises – and there is a growing literature on this subject<sup>8</sup> – in most of the countries concerned there were areas where both policy itself, and transparency about the policy-making process, fell short of recognised good practice. In addition, features of the financial infrastructure – for example the regulatory regime – left the financial system excessively vulnerable. Often there was simply not enough reliable information available for lenders and borrowers to make a proper assessment of risk. The crises also highlighted a number of areas where, at present, there is no widely accepted good practice. While the position differed from country to country, there was nevertheless sufficient commonality of experience to allow some general lessons to be drawn. Recent work on standards and codes can be seen partly as a response.

### Classifying and Prioritising

The Financial Stability Forum<sup>9</sup> (FSF) has helpfully drawn together, in its Compendium, the various economic and financial standards that are now internationally accepted as relevant to sound, stable and well-functioning financial systems. See their website at [www.fsforum.org/Standards/Home.html](http://www.fsforum.org/Standards/Home.html). The Compendium provides a gateway to the various websites where the texts of 69 standards, plus their supporting documents and assessment

6: [www.bis.org/publ/qcvs001/anx1](http://www.bis.org/publ/qcvs001/anx1)

7: Total net resource flows to developing countries amounted to \$98.5bn in 1990, of which \$42.6bn was private and \$55.9bn official. The comparative figures for 1999 were total \$290.7bn of which \$238.8bn private and \$52.0bn official. Net resource flows peaked in 1997 (prior to the Asian crisis) at \$343.7bn with the private sector accounting for \$303.9bn (88% of the total). Source: World Bank Global Development Finance 2000.

8: See Nouriel Roubini's Global Macroeconomic and Financial Policy Site at [www.stern.nyu.edu/globalmacro](http://www.stern.nyu.edu/globalmacro) for an extensive listing of the available literature.

9: The FSF was convened in April 1999 to promote international financial stability through information exchange and international co-operation in financial supervision and surveillance. It brings together national authorities responsible for financial stability in significant international financial centres, international financial institutions, sector-specific international groupings of regulators and supervisors, and committees of central bank experts. The FSF seeks to co-ordinate the efforts of these various bodies in order to promote international financial stability, improve the functioning of markets, and reduce systemic risk.

methodologies, can be found. The Compendium can be accessed by subject area, by date, or by the bodies that have developed standards.

Standards and codes can be classified in a number of different ways. In terms of subject matter, there are three main areas: macroeconomic fundamentals; institutional and market infrastructure; and financial regulation and supervision. But standards can also be divided up in other ways:

- between those which are **sectoral** in scope (eg standards relating to banking supervision) and those which are **functional** (eg standards relating to corporate governance or accounting);
- between those which set benchmarks for the **substance of policy** and those which focus on the **transparency of policy** (ie the public availability of information about policy objectives, operational techniques, etc);
- between standards which take the form of **broad principles** (eg the Basel Committee's *Core Principles for Effective Banking Supervision*), those which spell out in more detail the **practical application** of principles (eg the Basel Committee's *Sound Practices for Loan Accounting*) and those which set out **detailed methodologies** (eg the IMF's *Special Data Dissemination Standard*); and finally
- between those which have received formal international endorsement and those which have not.

These classifications are not, however, mutually exclusive. For example the *Core Principles for Systemically Important Payment Systems*<sup>10</sup> are sectoral but provide both broad principles and some detail on application.

The number of standards referenced in the FSF Compendium indicates that it would be a tall order to try to make progress on implementation uniformly across the whole range of standards and codes. There is an obvious need for prioritisation. But prioritisation is not straightforward because different standards have different priorities for

different countries, and moreover these priorities are likely to change over time. In some cases there is also a sequencing implicit in the standards themselves. For example, establishing a proper accounting framework for the measurement of asset values and capital is a precondition for effective banking supervision.

It has nevertheless been possible to identify a smaller group, of twelve, **key standards**<sup>11</sup>. They are key in the sense that meeting them would make a significant contribution to the robustness of a country's financial system and therefore to both national and international financial stability (see Box for a list of these 12 key standards and the organisation in the lead for each of them). Some, like accounting, are important for all countries regardless of their level of development or degree of integration with the world's financial markets. Others are more important for countries – both developed and emerging – that are either already engaged in the world's financial markets, or are seeking greater integration with the global economy. At the individual country level, in terms of making the best possible use of what may often be scarce professional resources, there is a need to prioritise amongst the standards (and even amongst different elements of a standard), and between the implementation of standards and other key reforms.

### Adoption and Implementation

Developing standards, on its own, serves little purpose unless those standards are adopted and implemented by national authorities. The official community has an important role to play in facilitating implementation (eg through the provision of technical assistance) and in monitoring progress, which in turn can provide useful encouragement for the effective implementation of standards. While no institution has an operational remit which runs across all the areas involved, it is now widely accepted that the IMF comes closest and it has been asked to co-ordinate monitoring arrangements<sup>12</sup>. In this it is working closely with the World Bank. As the IMF itself aptly describes it, it will maintain a “loose leaf binder” into which reviews and assessments of progress can

<sup>10</sup>: This code was the subject of an article in the June 2000 *Financial Stability Review*, pages 126-135.

<sup>11</sup>: See the March 2000 report of the FSF Task Force on Implementation of Standards on the FSF Website ([www.fsforum.org/Reports/RepIOS.html](http://www.fsforum.org/Reports/RepIOS.html))

<sup>12</sup>: At its meeting on 24 September 2000 in Prague, the International Monetary and Financial Committee stated that it was “encouraged by the experience so far in preparing Reports on the Observance of Standards and Codes” and noted “their crucial role in helping countries to improve economic policies, identifying priorities for institutional and structural reform, and in promoting the flow of important information to markets”. The full text of the IMFC communiqué can be found at [www.imf.org/external/np/cm/2000/092400.htm](http://www.imf.org/external/np/cm/2000/092400.htm).

## Standards for sound financial systems designated as key by the FSF<sup>(a)</sup>

	Issued By
<b>Macroeconomic Fundamentals</b>	
Code of Good Practices on Transparency in Monetary and Financial Policies	IMF
Code of Good Practices in Fiscal Transparency	IMF
Special Data Dissemination Standard/General Data Dissemination System <sup>(b)</sup>	IMF
<b>Institutional and Market Infrastructure</b>	
Insolvency <sup>(c)</sup>	World Bank
Principles of Corporate Governance	OECD
International Accounting Standards (IAS) <sup>(d)</sup>	IASC <sup>(e)</sup>
International Standards on Auditing (ISA) <sup>(d)</sup>	IFAC <sup>(e)</sup>
Core Principles for Systemically Important Payment Systems	CPSS
The Forty Recommendations of the Financial Action Task Force	FATF
<b>Financial Regulation and Supervision</b>	
Core Principles for Effective Banking Supervision	BCBS
Objectives and Principles of Securities Regulation	IOSCO
Insurance Supervisory Principles	IAIS

(a) While the key standards are categorised here by policy area, some of them are relevant to more than one area.

(b) Economies with access to international capital markets are encouraged to subscribe to the more stringent SDDS and all other economies are encouraged to adopt the GDDS.

(c) The World Bank is co-ordinating a broad-based effort, involving relevant institutions and legal experts, to develop a set of principles and guidelines on insolvency regimes. The United Nations Commission on International Trade Law (UNCITRAL), which adopted the Model Law on Cross-Border Insolvency in 1997, will help facilitate implementation.

(d) The IAS and ISA are used in some jurisdictions but are not endorsed by all jurisdictions. The IAS are currently being reviewed by the BCBS, IAIS and IOSCO.

(e) The International Accounting Standards Committee (IASC) and International Federation of Accountants (IFAC) are distinct from other standard-setting bodies in that they are private sector bodies.

be slotted. This translates into the so-called **ROSC** process – the **Reports on the Observance of Standards and Codes** (an assessment of the extent of compliance by a country with a particular code is referred to as a “module”, and modules are inserted into the binder for a country as and when they are completed). The IMF is in the lead in conducting assessments in respect of the Data Dissemination Standards and the Codes on Fiscal and Monetary, and Financial Policy, Transparency, while the World Bank leads on the Accounting, Auditing, Corporate Governance and Insolvency Standards. Assessing compliance with the codes on Banking Supervision, Securities Regulation, Insurance Supervision and Payment Systems is a shared responsibility normally undertaken as part of the **Financial Sector Assessment Programme (FSAP)**.

The FSAP is a programme developed jointly by the IMF and the World Bank to help countries enhance their resilience to crises in the financial sector. It was started in May 1999 as a one-year pilot involving 12 countries and was subsequently extended to cover another 24 countries in the period from May 2000 to April 2001. A comprehensive review of the programme is to be carried out before the end of 2000. FSAP assessments – in which experts from standard setting bodies, national supervisory agencies and central banks also participate – are intended to identify strengths, vulnerabilities and risks in the financial system to determine how key risks and vulnerabilities are being managed, to establish the sector’s developmental and technical assistance needs, and to help prioritise policy actions. In order to do this, a range of tools and techniques are used,

including stress tests and analyses of macroprudential indicators, as well as reviews of how far relevant financial sector standards are being observed. The issues addressed in each FSAP are guided by country-specific circumstances and the country's own reform priorities. The FSAP, like the ROSC process, is an additional element in the crisis prevention armoury. Both have also brought about some significant changes in the way the two Bretton Woods institutions interact both with their member countries and with each other.

In addition to the ROSC/FSAP assessment processes, the IMF has recently started publishing quarterly reports on the progress being made by the 47 countries which currently subscribe to the *Special Data Dissemination Standard (SDDS)*<sup>13</sup>. Under the SDDS, countries commit to publish 17 different categories of key macro-economic and financial data. The standard prescribes not only the coverage, but also the frequency and timeliness with which data are to be disseminated<sup>14</sup>. Both the quarterly progress reports and information on the standard itself can be found on the IMF's Dissemination Standards Bulletin Board ([dsbb.imf.org](http://dsbb.imf.org)). Judging by the large number of 'hits' on this site (between 400,000 and 700,000 per month) it has become a valuable source of timely information on where to find key macroeconomic data. This is confirmed by informal discussions which the Bank of England has held with a number of private sector country analysts and risk managers.

At present countries are being encouraged to volunteer for ROSC and FSAP assessments and it remains at the country's discretion whether the resulting ROSCs are published. If, however, standards are to play a role in helping potential investors and the rating agencies to assess and price risk, then publication of assessments of compliance is essential. By the end of November over 50 modules in respect of assessments conducted in 18 countries had been posted on the IMF Website at [www.imf.org/external/np/rosoc/index.htm](http://www.imf.org/external/np/rosoc/index.htm).

One crucial factor in the implementation of standards will be the extent of political commitment to the exercise. It is therefore encouraging that the finance ministers and central bank governors of the G20 countries<sup>15</sup> have publicly expressed their commitment to both the ROSC and FSAP processes. At their October 2000 meeting in Montreal they reaffirmed a commitment made at their December 1999 meeting in Berlin to undertake the completion of ROSCs and FSAPs for their own countries<sup>16</sup>. The Chancellor of the Exchequer has indicated that the UK would be prepared to undertake such an assessment late next year, once all the necessary legislation and other preparations for the implementation of the Financial Services and Markets Act have been completed.

The ability of many countries to implement standards and codes will be constrained by their technical capacity. Well-designed and targeted technical assistance and training will be necessary before some can make significant progress. There are also limits on the capacity of the international financial institutions and/or standard setters to monitor implementation. In turning the standards and codes programme into reality, these resource issues will need to be addressed – which in practice probably means that regulators, central banks and governments in the more developed economies will need to be prepared to commit staff and other resources in support of the implementation process.

### **Incentives to encourage the adoption and implementation of standards**

Another important but contentious aspect of implementation is the question of incentives. Why should a country commit itself to observe internationally agreed standards and codes? The general incentive, if the standards and codes are well formulated, should be that it will improve national economic performance. But there is an issue whether, beyond that, there are specific incentives which the private sector or the public sector might provide. One approach is to look at the question from the point of

<sup>13</sup>: The SDDS was established in 1996 to guide countries that have, or that might seek, access to international capital markets in the dissemination of economic and financial data to the public.

<sup>14</sup>: The latest quarterly report on compliance with the standard shows that 33 of the 47 countries meet the specifications for the coverage, frequency and timeliness of the data and for the dissemination of advance release calendars.

<sup>15</sup>: The G20 is a forum which brings together major developed economies and major emerging markets. The members are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom and the United States, as well as the European Union, the IMF and the World Bank.

<sup>16</sup>: The full texts of the News Releases issued at the conclusion of these meetings can be found at [www.fin.gc.ca/g20/indexe.html](http://www.fin.gc.ca/g20/indexe.html)

view of the identification, measurement and management of risk.

#### *Market Incentives*

Private lenders and investors might be expected to take into account compliance with relevant standards and codes if they believe that it affects the credit risks they are running; and then to reflect it in differentiated credit ratings, borrowing spreads or asset allocations.

Earlier this year a sub-group of the Financial Stability Forum<sup>17</sup> conducted an informal consultation with participants from more than 100 financial institutions in 11 countries<sup>18</sup> to gauge their familiarity with international standards and codes. The consultation also sought views on whether information about the implementation of key standards and codes was a useful contribution to firms' risk management processes. The group found that familiarity with the 12 key standards – and with the ROSC process – was rather limited, but that sovereign risk analysts in rating agencies and banks tended to be more familiar than institutional investors and fund managers.

This limited awareness is not surprising as several of the key standards have only been developed recently and indeed some are still in the final stages of gaining general acceptance (e.g. the World Bank's *Principles and Guidelines for Sound Insolvency Systems*<sup>19</sup>). At present, few market participants are sufficiently familiar with ROSCs to use them directly in risk assessments, still less in pricing and allocation decisions. There remains therefore a need to raise the level of knowledge and understanding, while pressing ahead with finalising the standards and extending the coverage of ROSCs.

The IMF and the World Bank are now engaged in a major programme of out-reach with this objective in mind. They are also eager to hear views from private sector analysts and risk managers about how they think ROSC modules could most usefully be structured so as to feed into the risk assessment process. Awareness of internationally agreed standards and codes, and of the assessment process,

is likely to grow among investors and lenders as more assessments are completed and placed in the public domain. All that said, market practitioners still find it difficult to integrate the qualitative information in ROSCs into their (quantitative) risk assessment systems.

Better information is, however, only half the story. It is also essential that lenders and investors make proper use of that information. The evidence to date on this is patchy. Greater awareness may be part of the answer. But beyond that, there is an important challenge to find incentives which can be applied to lenders and investors so as to encourage them to pursue improved risk management practices making use of all the available information.

#### *Official Incentives*

Identifying, measuring and managing risk are also important issues for public sector lenders. It would be inconsistent if, while encouraging the private sector to take note of a country's compliance with standards and codes, the public sector did not. But the public sector also needs to have in mind "systemic" externalities ie that the failure of a country to meet its obligations may threaten the financial system generally and require intervention to contain the consequential systemic damage. The public sector may therefore feel a need to develop incentives of its own to encourage implementation.

The following are among the incentives identified by the FSF group looking at implementation issues:

- encourage regulated institutions to take account of information on observance of standards and codes in their risk assessments of counterparties located in other jurisdictions;
- give greater consideration to a foreign jurisdiction's observance of certain standards when making market access decisions;
- issue advisory notices urging caution in dealing with counterparties located in jurisdictions which have material gaps in their observance of standards;

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<sup>17</sup>: The Report of the Follow-Up Group on Incentives to Foster Implementation of Standards (August 2000) can be viewed at [www.fsforum.org/Reports/ReplnFoS.html](http://www.fsforum.org/Reports/ReplnFoS.html)

<sup>18</sup>: Argentina, Australia, Canada, France, Germany, Hong Kong, Italy, Japan, Sweden, the UK and the US.

<sup>19</sup>: See [www1.worldbank.org/legal/insolvency\\_ini/overview.htm](http://www1.worldbank.org/legal/insolvency_ini/overview.htm)

- encourage disclosure of information on observance of standards in bond prospectuses for international sovereign bond issues;
- link the provision of technical assistance to a commitment to meet internationally agreed standards.

In addition, it has been suggested that the IMF, the World Bank and the various Regional Development Banks should take account of progress in implementing standards when determining eligibility for finance; and indeed the IMF has already acknowledged this link in determining eligibility for its Contingent Credit Line<sup>20</sup>.

At present, however, serious reservations remain, both in principle and at the technical level, about linking public sector policy actions to compliance with codes and standards. There is likely to be further discussion on this issue in future. But in an international financial system increasingly dominated by private

capital flows, it is arguably the behaviour of the private sector which will be critical in persuading countries that they should strive to adopt international good practice

### Conclusion

The process of adopting and implementing standards and codes continues and it may be several years before some countries are able to register significant progress. Nevertheless, sticking to the task and expanding the programme of assessment, combined with transparency about implementation, should over time make a significant contribution to strengthening national financial systems and increasing their resilience to shocks. In addition, if the private sector increasingly comes to incorporate compliance with standards into its risk assessment processes, the development and implementation of standards will be a factor which acts through both the demand and the supply sides of financial markets to increase the robustness of the international financial system.

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<sup>20</sup>: One of the criteria for access to the CCL is “taking into account the extent of the member’s adherence to relevant internationally-accepted standards; in particular, the member would have subscribed to the Special Data Dissemination Standard and be judged to be making satisfactory progress towards meeting its requirements”. The full text of the Executive Board decision of 23 April 1999 can be viewed at [www.imf.org/external/np/sec/pr/1999/pr9914.htm](http://www.imf.org/external/np/sec/pr/1999/pr9914.htm) In a speech on 15 November 2000 First Deputy Managing Director Stanley Fischer noted that, in addition to the SDDS, the Codes on Fiscal Transparency, on Transparency in Monetary and Financial Policies and the Basel Committee’s Core Principles for Banking Supervision, were currently the relevant standards for judging progress in the context of CCL eligibility.

# The Bank of England's oversight of payment systems

It is best international practice for a central bank to set out publicly its payment system objectives and to disclose its role and major policies with respect to payment systems. Accordingly, in November 2000, the Bank of England issued a paper on its oversight of payment systems which is reproduced in its entirety here.

## Introduction

1 **PAYMENT SYSTEMS** are a vital part of the economic and financial infrastructure. Their efficient functioning, allowing transactions to be completed safely and on time, makes a key contribution to overall economic performance. But payment systems can also involve significant exposures and risks for members, and can be a channel for the transmission of disturbances from one part of the economy or financial system to another. This 'systemic risk' is an important reason for the close interest which central banks have always taken in the design and operation of payment systems<sup>1</sup>.

2 The Bank's general responsibilities in this area were set out most recently in the Memorandum of Understanding agreed in October 1997 between HM Treasury, the Bank and the Financial Services Authority (FSA). The role is recognised in the statutory information gateway which allows the FSA to disclose supervisory information to enable the Bank to discharge its functions as a monetary authority or as overseer of payment systems. More recently, following the implementation in the United Kingdom in December 1999 of the European Union's Settlement Finality Directive, the Bank has become the designating authority for payment systems. In the light of these developments, and of changes in the payments environment more generally, the Bank believes it would be helpful to explain publicly and more fully the nature of its role in this area. That is the purpose of this paper. The Bank envisages that it will give an account of the way in which it has carried out its role each year at the time of its Annual Report.

3 The Bank's oversight of payment systems is an integral part of its wider responsibilities for monetary and financial stability. The focus of the Bank's oversight work is to identify potential risks posed by the design and operation of payment systems and to take steps to eliminate or control them. One such step is to provide the Bank's own sterling liabilities as a risk-free settlement asset.

4 This paper is organised as follows. Paragraphs 5–17 give some background on payment systems in the United Kingdom and the risks involved; paragraphs 18–22 set out the Bank's interests in payment systems and the objectives of its oversight; paragraphs 23–36 summarise the oversight role in practice; paragraphs 37–38 discuss co-operation with other UK authorities; paragraphs 39–41 consider the international perspective and paragraph 42 sets out how the Bank proposes to report on its work in this area.

## Background

### Payment systems

5 A payment system is an arrangement which allows the users to transfer 'money'. What constitutes money has long been a central question of monetary theory; its use and definition has varied over time and from country to country. In practice, in most developed countries at present, 'money' is regarded as cash (ie notes and coins issued by the central bank or government) and claims against credit institutions in the form of deposits. In the end, however, what is acceptable as 'money' is a matter of behaviour and the boundary could move.

<sup>1</sup>: For example, in the 1989 Ernest Sykes Memorial Lecture, the then Governor of the Bank of England, Robin Leigh-Pemberton, set out a number of broad principles and objectives for the development of payment systems, which led on to the introduction in the United Kingdom of Real-Time Gross Settlement.

6 One classic function of money is as a medium of exchange. The use of bank deposits to make payments has become increasingly important in developed countries. To make a payment the payer must issue an instruction, typically to the bank where the 'money' to be transferred is held. The instruction may be in the form of a paper-based instrument, eg a cheque, or an electronic instruction, eg using a plastic card.

7 At the core of such payment activities are the arrangements that facilitate fund transfers between the members (those intermediaries which connect directly to the system or to each other). It is these arrangements which constitute a 'payment system'. Payment systems therefore consist of the networks which link members, the switches for routing messages, and rules and procedures for the use of this infrastructure. More specifically, a payment system requires:

- agreed technical standards for, and methods of transmitting, payment messages between members (ie agreement on the infrastructure to be used);
- an agreed means of settling claims amongst members, normally a 'settlement asset', sometimes central bank money; and
- a set of common operating procedures and rules (on participation, charging, etc).

Payment systems are essential to the provision of payment services to end-users. But the end-user's relationship is usually with a payment system member rather than with the payment system itself.

8 The United Kingdom has a range of payment systems. Their relative sizes are shown in Box 1. In addition, a large number of transactions, mostly for low values, are settled in cash.

### Box 1: Major UK payment systems

#### Volumes and values (daily averages, 1999)

<i>Payment systems</i>	<b>Volume (ooos of transactions)</b>	<b>Value (£mn)</b>
CHAPS Sterling	79	177,000
CHAPS Euro	6	49,000
BACS	12,300	7,000
Cheque and Credit Clearing	8,300	5,700
Debit Cards	13,800	570
Visa Credit and Charge	3,400	190
MasterCard/Europay	1,900	110
LINK	2,900	100
<i>Embedded payment systems</i>		
Gilts	8	133,000
Equities	170	38,000
Money market instruments	1	9,300

Sources: APACS, CREST, LINK.

**CHAPS** is the United Kingdom's main high-value payment system, in sterling and euro. It is probably most visible to the general public through its use in making same-day payments for house purchases.

**BACS** is an automated clearing house providing predominantly retail payment services that include direct debit, standing order and direct credit (eg salary payments).

The **Cheque and Credit Clearing** enables instructions given in paper form, by cheque or bank giro credit, to be exchanged between banks and settled.

**Visa, MasterCard/Europay** and **Switch** are the main providers of credit and debit card systems in the United Kingdom. Other smaller systems not included in the table are the credit and charge card systems of American Express and Diners Club.

**LINK** provides a mechanism connecting the automated teller machines (cashpoints) of its members.

A further category of payment systems are those which are 'embedded' within a settlement system. The main examples in the United Kingdom relate to **CREST**, the settlement system which handles settlement of UK equities, corporate bonds, gilts and money market instruments. Taken together, the payments systems embedded in CREST settle a greater value of payments each day than CHAPS Sterling.

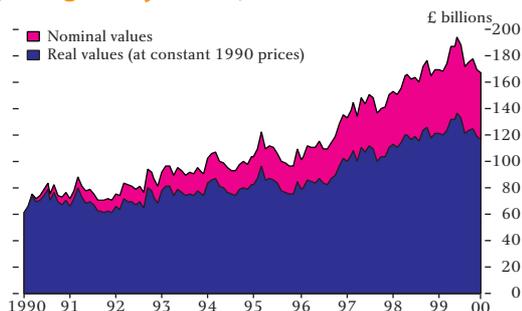
## Why payment systems are important

9 Safe and efficient payment systems are essential to the working of financial markets and the economy more generally.

- Payment systems allow safe and timely completion of transactions. Companies use them when they buy or sell goods and services; individuals rely on them to receive salaries and for retail purchases; and Government depends on them to receive taxes and pay benefits.
- Payment systems allow the customers of one bank to make payments to the customers of other banks. These interconnections mean that, in choosing a bank with which to hold their money balances, users can focus on the credit standing of the bank, the cost and quality of the services it offers and the terms of access. They need not worry about whether the people and institutions from whom they receive or to whom they make payments use the same bank.
- Efficient payment systems are vital to the functioning of financial markets. They are used to settle the money side of transactions in money market instruments, bonds, equities, derivatives, foreign exchange and so on. Financial market participants rely on the timely receipt of funds by their banks so that, for example, they can settle subsequent, linked transactions. Central banks use payment systems in their monetary policy operations.

10 The volume and value of payments through UK payments systems has increased considerably in recent years. In 1999, the value was over £100 trillion, more than one hundred times UK gross domestic product. Looked at another way, an amount

**Chart 1:**  
**Values passing through CHAPS Sterling**  
**(average daily values)**



Sources: ONS and APACS.

equivalent to about half of GDP flows through UK payment systems every business day. Chart 1 shows a tripling during the 1990s in the nominal value, and a doubling in the real value, of payments through CHAPS Sterling, the United Kingdom's main high-value payment system.

## Payment systems and public policy

11 Payment systems give rise to public policy issues in three main areas.

12 The **first** relates to the structure of payments systems, their relationship with their members and the implications for the stability of the financial system as a whole. This area, and the Bank's interest in it, is described in greater detail in the next section. A **second** area is a concern for the efficiency and effectiveness of the United Kingdom's financial sector both domestically, in serving the needs of the UK economy, and internationally, in terms of the attractions of the United Kingdom as a place to do financial business. Working with market participants, the Bank aims to promote improvements in the UK payment and settlement infrastructure for the benefit of members and end-users. The Bank generally seeks to support market-led development but may, where necessary, take a more active part in catalysing market initiatives or assume an operational role. Examples include the Bank's part in moving the CHAPS Sterling system to Real-Time Gross Settlement and in developing CHAPS Euro; and the Bank's leadership of the project which established the CREST equity settlement system, the Central Gilts Office and the Central Moneymarkets Office (the last two are now part of CREST). The **third** area is competition policy, where, as with other significant components of the economic infrastructure, there is a public policy interest in ensuring that a competitive environment exists and that any competitive abuses are curbed. Competition issues are the primary responsibility of the competition authorities, not the Bank. In August 2000 the Government, in its response to Don Cruickshank's report on *Competition in UK Banking* ('the Cruickshank Report'), confirmed its intention to introduce legislation to foster competition in the payments business and to consult on specific proposals. The Bank will continue to co-operate fully with the relevant competition authorities.

## Payment systems and financial stability

13 Payment systems can expose their members to financial risks. If members (explicitly or implicitly)

give their customers credit for incoming payments before final settlement has occurred, they incur credit exposures to the other members of the system. And if the incoming payment arrives late, they are exposed to liquidity risk because of the delay.

14 Payment systems may transmit disturbances because problems in one member are likely to have direct and rapid effects on other members. The risk of such a domino-like spread of financial problems, extending perhaps beyond the system itself to users, is an example of **systemic risk**. Moreover, payment systems may themselves be a source of systemic risk as an operational failure or malfunction could lead to unexpected financial exposures for members.

15 Systemic risk is likely to be significant only in relation to payment systems transferring amounts which are large in relation to the balance sheets and capital resources of at least some of the members; in practice, this usually means systems used to settle wholesale financial market transactions in money, foreign exchange and securities. These transactions also tend to have time-critical settlement deadlines because they typically form part of a chain of transactions.

16 Even if the amounts transferred through a payment system are too small to give rise to systemic risk in the sense described above, the operational failure or malfunction of a system could still cause widespread disruption, especially if there is no ready alternative means of making payments. The economics of payment systems mean that there will often be a limited choice of systems for making particular types of payment, giving members little scope to manage any risk by choosing safer systems or diversifying across multiple systems. Markets have not typically remained divided amongst several, unconnected, payment systems. In these circumstances, the failure of a system used extensively, for example, to make salary payments, could leave large numbers of individuals with unexpected overdrafts and/or lack of liquid funds. This **system-wide risk** could arise in relation to any widely-used payment system.

17 Risks in payment systems need to be identified, measured, monitored and controlled. The public policy interest in reducing risk may be greater than the sum of the individual interests of members. Even if the

members are keen to reduce risk in a system, they may be unable to make the necessary changes because of difficulties in co-ordinating action among themselves.

### The Bank's oversight role

18 Oversight of payment systems is a key element in the Bank's responsibility for the stability of the financial system as a whole. As the values moving through payment systems have increased, their robustness and risk management have become issues of increasing importance. The Bank's oversight role relates closely to its operational role as the provider of the settlement asset (central bank money) to some payment systems and as the ultimate provider of liquidity to the banking system and to the economy more widely. The Bank:

- is the settlement bank for the CHAPS Sterling, CHAPS Euro, and the CREST payment mechanisms, as well as for the predominantly retail systems BACS, Cheque and Credit Clearing and LINK. It also operates part of the CHAPS Sterling and CHAPS Euro systems, as well as the link between CHAPS Euro and the pan-European TARGET system;
- provides intra-day liquidity to members of CHAPS Sterling and CHAPS Euro by way of reverse repo against eligible securities; and
- is also itself a member of a number of UK payment systems, as banker to the UK government and, on a relatively small scale, to its other customers.

The Bank intends to publish separately a statement of its policy on the provision of settlement facilities to payment systems and their members.

19 The Memorandum of Understanding (MoU) between HM Treasury, the Bank and the FSA<sup>2</sup>, agreed in October 1997, reflects the Bank's particular interest in payment systems as part of its financial stability role. The MoU sets out the Bank's responsibility:

'...for the overall stability of the financial system as a whole which will involve:

- i. ...
- ii. financial system infrastructure, in particular payment systems at home and abroad. As the bankers' bank, the Bank will stand at the heart of the system. It will fall to the Bank to advise

<sup>2</sup>: Available on the Bank of England website at [www.bankofengland.co.uk](http://www.bankofengland.co.uk).

the Chancellor, and answer for its advice, on any major problem inherent in the payments systems. The Bank will also be closely involved in developing and improving the infrastructure, and strengthening the system to help reduce systemic risk.

20 Under the Financial Markets and Insolvency (Settlement Finality) Regulations 1999, the Bank has a statutory power, set out in more detail below, to 'designate' UK payment systems so that their rules take precedence over normal insolvency law if a member becomes subject to insolvency proceedings.

### **The objectives of oversight**

21 The Bank's main objective in overseeing payment systems is to ensure that sufficient weight is given to risk reduction and management in their design and operation. But there must also be regard to efficiency – for example whether a system processes payments in a timely and reliable way, at reasonable cost. Designing and operating an extremely safe system would be self-defeating if it were so inefficient or expensive that no-one was prepared to use it and payment traffic went to other, less safe, alternatives.

22 While, however, the Bank has an interest in promoting efficient payment systems, formal oversight of the competitive environment for systems, their members and their users is a matter for the competition authorities.

### **The Bank's oversight in practice**

23 The Bank's principal focus is on payment systems based in, or with significant activity in, the United Kingdom. But it also has an interest in foreign systems used by firms operating in the United Kingdom and in the adoption more generally of good practice in systems used by wholesale financial markets around the world, given that dislocation in them could affect London's markets.

24 The intensity of the Bank's oversight is proportionate to its assessment of the systemic or system-wide risks posed by a system. Because the primary focus is systemic risk, the Bank's oversight concentrates on systems which process payments that are individually or cumulatively large and/or where the members do, or can, incur substantial involuntary exposures to one another in carrying out their payment activities. It is also concerned with systems

where problems could have system-wide consequences, even if the values involved do not give rise to major systemic risks.

25 This work is led by the Financial Stability area of the Bank in its Market Infrastructure Division. The team seeks to use all information available to the Bank directly, including through its provision of settlement services, and indirectly through exchanges with other relevant authorities in the United Kingdom and abroad. These include in particular the FSA (notably in respect of individual members of payment systems and of exchanges, clearing houses and securities settlement systems) and other central banks with similar oversight activities.

### **Analysis of risks**

26 The principles to be used in assessing the safety and efficiency of payment systems and in conducting oversight have recently been reviewed and codified in a report published by the Bank for International Settlements ('Core Principles for Systemically Important Payment Systems'). Central banks around the world, including the Bank of England, have adopted these principles as a guide for their own oversight activities. They are set out in Annex 1.

27 Oversight involves a concern with all of these different elements of risk (see Box 2). They need to be identified and, where possible, quantified and understood by payment system operators, members and the public. Oversight, as well as a concern for system design, therefore involves assessing the legal framework within which a system operates and its rules, operating procedures and operating environment, reviewing proposals for changes in rules or operating procedures, monitoring changes in the scale or nature of the payments processed, and changes to a system's and members' management procedures.

28 Where necessary or desirable the Bank may itself propose changes to the rules, design or operation of a system, or to the environment in which it operates (eg the legal framework), in order to eliminate, reduce or better manage risks. A central aim is to achieve prompt final settlement in order to minimise the duration of financial exposures between members, especially when the amounts involved are large. This was the motive, for example, for a change, introduced in 1996, to the design of CHAPS, the United Kingdom's high-value payment system. Before the

## Box 2: Risks in payment systems

Risks in payment systems take a variety of forms and are usually categorised as follows:

### **Credit risk**

The risk that a counterparty will not meet an obligation for full value, either when due or at any time thereafter.

### **Liquidity risk**

The risk that a counterparty will not settle an obligation for full value when due, but at some time thereafter.

### **Operational risk**

The risk that hardware or software problems, or human error, or malicious attack will cause a system to break down or malfunction giving rise to financial exposures and possible losses.

### **Legal risk**

The risk that unexpected interpretation of the law or legal uncertainty will leave the payment system or members with unforeseen financial exposures and possible losses.

change, CHAPS settled on a deferred net basis under which banks exchanged payment messages during the day but settled the accumulated amounts on a multilateral net basis only at the end of the day. Until shortly before the change there were no mechanisms to monitor or contain the exposures that members ran on each other. Real-Time Gross Settlement (RTGS) allows payments between CHAPS member banks to be made in real time across accounts at the Bank of England, so that the banks receive notification of incoming payments if, and only if, final settlement has occurred. Both CHAPS Sterling and CHAPS Euro, which began operations in 1999, now work on this basis.

29 A further central aim of the Bank is to achieve simultaneous exchange of value in systems used to settle financial market transactions, especially again where the amounts involved are large. Examples are the payment systems used for the settlement of wholesale foreign exchange transactions and wholesale securities transactions. The objective is to ensure that one side receives value if and only if the other side does. In the foreign exchange market, this is known as 'payment versus payment' (PvP) and in securities markets as 'delivery versus payment' (DvP). There are initiatives in hand to achieve PvP in the foreign exchange market through the private sector Continuous Linked Settlement (CLS) project, and to achieve DvP in central bank money in CREST in a way which avoids intraday exposures between settlement banks.

30 What oversight involves in practice must necessarily change to reflect changes in the pattern

of payment flows through different payment systems and changes in the environment in which systems operate. For example, the increasing dependence of the whole financial sector, including payment systems, on information technology and telecommunications networks gives rise to an increased exposure to hardware and software failure. Overseers are, in consequence, taking an increased interest in this source of operational risk. The Bank recently worked with other authorities to ensure that all UK payment systems had made adequate preparations for the Year 2000 date change and reported regularly on the results of its enquiries. The work on Year 2000 has encouraged a wider debate amongst operators of market infrastructure, including payment systems, about the different kinds of operational risks and the adequacy of plans to provide continuity of operations and to respond more generally to actual or potential disruption.

31 The Bank does not monitor day-to-day operational aspects of payment systems or seek to resolve day-to-day operational problems (except where the Bank is itself operationally involved). Nor is the Bank responsible for relations between banks and others providing payment services and their customers. Primary responsibility for the reliable functioning of payment systems lies with system operators and system members. The Bank's aim is to establish that operators have taken reasonable steps to ensure the robustness of their systems.

32 Reducing operational risk means addressing technical reliability and redundancy, back-up facilities and contingency plans, security measures and

internal controls. Oversight is intended to ensure that system operators recognise these issues and address them. It also aims to identify common dependencies – for example, common reliance on a particular technology which might constitute a single point of failure for several different systems.

33 An example of this last point arises from the increasing reliance on outsourcing for parts of the payment system infrastructure (eg provision of a secure telecommunications network). Despite the advantages of outsourcing, it carries its own risks; there may, for example, be several payment systems, in the United Kingdom and/or overseas, which use the same supplier with an associated concentration of risk. The Bank has an interest in any concentration in the use of third party infrastructure suppliers by UK payment systems. A case in point is SWIFT, the Belgian-based international co-operative which provides network services to many payment systems and their members worldwide, including CHAPS Euro and CREST in the United Kingdom. The Bank participates in the joint oversight work conducted by the G10 central banks, led by the National Bank of Belgium which has specific powers to oversee SWIFT.

34 Systemic risk can also arise from legal uncertainty or unexpected legal judgments. For example, if the recipient of a payment is required to return funds to the payer because a court judges that the payment is not final, the recipient may have a financial exposure. Oversight involves working with government and other interested bodies (such as the Financial Law Panel) to identify any legal ambiguities and, where possible, initiating changes to UK or EU law in order to remove them. One example of reducing such legal uncertainty has been the implementation of the Settlement Finality Directive.

### **The Bank's role under the Financial Markets and Insolvency (Settlement Finality) Regulations 1999**

35 These Regulations, which derive from the EU's Settlement Finality Directive, give the Bank and the FSA formal responsibilities to designate systems which can then benefit from the legal protections given by the Directive. The Bank and FSA must have regard to systemic risk in all cases when determining whether or not to make a designation order. The FSA designates recognised clearing houses and settlement systems. The Bank designates payment systems and,

under the Regulations, advises the FSA in cases where a payment system is 'embedded' within, for example, a recognised settlement system that has applied to the FSA for designation.

36 Under the Regulations, the Bank must assess an applicant against a set of criteria. These include that the applicant must have adequate financial resources, appropriate default arrangements, rules which make clear certain key aspects of the system (including definition of the point of entry of a payment transfer order into the system and the point after which it cannot be revoked), and must have adequate arrangements for monitoring and enforcing compliance with its rules. In May 2000, the Bank designated the CHAPS Sterling and CHAPS Euro systems under these Regulations.

### **Co-operation and co-ordination with other UK authorities**

37 Payment systems do not work in isolation. Members and users are affected by the operations of a payment system; likewise, a payment system is affected by the activities and risk management policies and practices of its members and their customers. The FSA has responsibility for regulating individual banks, including their participation in payment systems. To gain an overall picture, the Bank and the FSA need to share information about the main payment system members. The MoU requires that 'the FSA and the Bank will establish information sharing arrangements, to ensure that all information which is or may be relevant to the discharge of their respective responsibilities will be shared fully and freely. Each will seek to provide the other with relevant information as requested'.

38 In addition, the Bank liaises with the other domestic authorities that have a direct interest in, or a potential impact on, payment systems. As noted above, the Government intends to introduce legislation to establish a new competition regime for payment systems. Close collaboration and effective information sharing between the Bank, HM Treasury and the competition authorities will continue to be necessary. This liaison is important also to ensure that actions taken by one of these parties do not cut across the objectives of the others.

### **International perspective**

39 Almost all central banks oversee their national payment systems. Co-operation is particularly well

developed amongst the central banks of the G10 countries and the central banks of the European Union. The degree of formality of the central bank's oversight role varies from country to country and there have been a number of changes in recent years. Several central banks have recently published statements of, or relating to, their oversight role. In particular, the European Central Bank (ECB) has recently published a statement<sup>3</sup> setting out the payment system oversight framework followed by the euro-area national central banks and the ECB. Furthermore, central banks and financial regulators have increasingly been inclined to formalise arrangements for co-operation and exchange of information in this area. For example, in 1994, the ECB's predecessor, the European Monetary Institute, co-ordinated the development by all EU central banks and financial regulation authorities of an agreement on information sharing; and the ECB has recently been co-ordinating the production of a revised and extended agreement.

40 In addition, there has been increased international emphasis on the need for transparency in oversight arrangements. In September 1999, the International Monetary Fund's Interim Committee of the Board (now the International Monetary and Finance Committee) adopted a 'Code of Good Practices on Transparency in Monetary and Financial Policies: Declaration of Principles'<sup>4</sup>. Among other things, this code identifies desirable transparency practices for central banks in their conduct of financial policies, including their oversight of payment systems. One of the recommendations is that "the role of oversight agencies with regard to payment systems should be publicly disclosed".

41 In May 1998, the Committee on Payment and Settlement Systems of the G10 central banks

established a Task Force on Payment Systems Principles and Practices. This group (under the chairmanship of John Trundle, Head of the Bank's Market Infrastructure Division) considered what principles should govern the design and operation of payment systems in all countries, with the aim of developing a wide international consensus on such principles. The first part of the group's report<sup>5</sup> lists ten core principles and four responsibilities of central banks in applying the core principles. The first responsibility is that 'the central bank should define clearly its payment system objectives and should disclose publicly its role and major policies with respect to systemically important payment systems'. The BIS published in July 2000 a second part of the report giving examples of ways of implementing the principles and discussing the detailed issues which need to be addressed.

#### How we report on our work

42 The Bank will report each year on its payment systems oversight activities at the time of its Annual Report. These reports will provide a brief summary of the Bank's work over the previous year, in particular commenting on any changes in UK payment systems and on the Bank's assessment of the consequences for risk. From time to time, the Bank also publishes detailed analyses of structural and risk issues related to payment and settlement systems in its *Financial Stability Review* and its *Quarterly Bulletin*.

#### Further information

43 Some Bank publications on payment systems topics are listed in Annex 2. Further information on the Bank's oversight activities in the payment systems area and on their relationship to the Bank's overall financial stability role is available on the Bank's website, [www.bankofengland.co.uk](http://www.bankofengland.co.uk).

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3: 'Role of the Eurosystem in the field of payment systems oversight', June 2000. It is available on the ECB website at [www.ecb.int](http://www.ecb.int).

4: This can be found at [www.imf.org/external/np/mae/mft/index.htm](http://www.imf.org/external/np/mae/mft/index.htm). In July 2000, the Executive Board of the IMF approved a Supporting Document to this Code: this can be found at the same web address.

5: 'Core Principles for Systemically Important Payment Systems: Report of the Task Force on Payment Systems Principles and Practices'. 'Part 1 – The Core Principles' was published for consultation in December 1999 and revised in July 2000. 'Part 2 – Implementing the Core Principles' was published for consultation in July 2000. Both parts are available on the BIS website at [www.bis.org/publ/cpss34e.htm](http://www.bis.org/publ/cpss34e.htm). A summary is attached as Annex 1.

## Annex 1

### Summary of the G10 report on Core Principles for systemically important payment systems

*Public policy objectives:* safety and efficiency in systemically important payment systems

*Core Principles for systemically important payment systems*

- I. The system should have a well-founded legal basis under all relevant jurisdictions.
- II. The system's rules and procedures should enable participants to have a clear understanding of the system's impact on each of the financial risks they incur through participation in it.
- III. The system should have clearly defined procedures for the management of credit risks and liquidity risks, which specify the respective responsibilities of the system operator and the participants and which provide appropriate incentives to manage and contain those risks.
- IV.\* The system should provide prompt final settlement on the day of value, preferably during the day and at a minimum at the end of the day.
- V.\* A system in which multilateral netting takes place should, at a minimum, be capable of ensuring the timely completion of daily settlements in the event of an inability to settle by the participant with the largest single settlement obligation.
- VI. Assets used for settlement should preferably be a claim on the central bank; where other assets are used, they should carry little or no credit risk and little or no liquidity risk.
- VII. The system should ensure a high degree of security and operational reliability and should have

contingency arrangements for timely completion of daily processing.

VIII. The system should provide a means of making payments which is practical for its users and efficient for the economy.

IX. The system should have objective and publicly disclosed criteria for participation, which permit fair and open access.

X. The system's governance arrangements should be effective, accountable and transparent.

\* Systems should seek to exceed the minima included in these two Core Principles.

*Responsibilities of the central bank in applying the Core Principles*

- A. The central bank should define clearly its payment system objectives and should disclose publicly its role and major policies with respect to systemically important payment systems.
- B. The central bank should ensure that the systems it operates comply with the Core Principles.
- C. The central bank should oversee compliance with the Core Principles by systems it does not operate and it should have the ability to carry out this oversight.
- D. The central bank, in promoting payment system safety and efficiency through the Core Principles, should cooperate with other central banks and with any other relevant domestic or foreign authorities.

## Annex 2

### Bank of England publications on payment systems topics<sup>6</sup>

Bank of England (1989) 'Payment and Settlement Systems Risks and Efficiency: A Discussion Paper', London, November

Bank of England (1994) 'The Development of a UK Real-Time Gross Settlement System' *Bank of England Quarterly Bulletin*, May

Fry, Kilato, Roger, Senderowicz, Sheppard, Solis and Trundle (1999) 'Payment Systems in Global Perspective', Routledge

Fry, M (1999) 'Risk, Cost and Liquidity in Alternative Payment Systems' *Bank of England Quarterly Bulletin*, February

George, E (1990) 'Perspectives on Payment Systems'. Speech given at Group of Thirty Conference on Clearing and Settlement Systems in the World's Securities Markets, 14 March

George, E (1996) 'Payment and Settlement Strategy'. Paper presented to the City Promotion Panel, London, 3 July, printed in *Bank of England Quarterly Bulletin*, August

George, E (1996) 'Risk Reduction in Payment and Settlement Systems: Gilbert Lecture', Speech given on 22 October, printed in *Bank of England Quarterly Bulletin*, November

Hills, R and Rule, D (1999) 'Counterparty Credit Risk in Wholesale Payment and Settlement Systems', *Financial Stability Review*, November

Leigh-Pemberton, R (1989) 'Challenges Facing the Sterling Wholesale Payment Systems: Ernest Sykes Memorial Lecture', *Bank of England Quarterly Bulletin*, August

Leigh-Pemberton, R (1992) 'Developments in Wholesale Payment Systems'. Speech given at 12th Payment Systems International Conference, 6 October, printed in *Bank of England Quarterly Bulletin*, November

Quinn, B (1993) 'The UK Approach to Controlling Risk in Large-value Payment Systems'. Speech at the SIBOS Conference, Geneva, 8 September, printed in *Bank of England Quarterly Bulletin*, November

Sawyer, D and Trundle, J (2000) 'Core Principles for Systemically Important Payment Systems', *Financial Stability Review*, June

Sheppard, D (1996) 'Handbooks in Central Banking No 8: Payment Systems' issued by the Bank of England Centre for Central Banking Studies, May

Sheppard, D (1999) 'Payment Systems in Global Perspective' (Summary of Fry et al (1999)) *Financial Stability Review*, June

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<sup>6</sup>: Many of these and other relevant publications are available on the Bank's website at [www.bankofengland.co.uk](http://www.bankofengland.co.uk)

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