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Markets and operations (pages 5–24)

Sterling wholesale markets: developments in 2000 (pages 25-34) Sterling wholesale markets grew by 5% in 2000, less quickly than in 1999. The money, corporate bond and swap markets continued to expand, whereas the amount of gilt-edged stock outstanding was broadly unchanged. Liquidity in sterling markets stabilised during the year; in some markets turnover and liquidity increased. Government cash management transferred to the UK Debt Management Office; the Bank of England's open market operations continued as before.

This article reviews developments in international and domestic financial markets,

drawing on information from the Bank of England's market contacts, and describes

the Bank's market operations in the period 1 October 2000 to 9 February 2001.

Reports

(pages 35-90)

The Kohn report on MPC procedures. Report to the non-executive Directors of the Court of the Bank of England on monetary policy processes and the work of Monetary Analysis, prepared by Donald L Kohn on 18 October 2000.

Bank capital standards: the new Basel Accord (by Patricia Jackson of the Bank's Financial Industry and Regulation Division). The 1988 Basel Accord was a major milestone in the history of bank regulation, setting capital standards for most significant banks worldwide—it has now been adopted by more than 100 countries. After two years of deliberation, the Basel Committee on Banking Supervision has set out far-reaching proposals for revising the original Accord to align the minimum capital requirements more closely with the actual risks faced by banks.

The financing of technology-based small firms: a review of the literature. This review assesses the academic literature of recent years on the financing issues faced by technology-based small firms (TBSFs). It was produced as part of the latest report on these firms by the Bank's Domestic Finance Division, published last month. This report finds that, while there may still be market weaknesses in the provision of relatively small amounts of risk capital to TBSFs at the start-up and early stages, these appear to be less than four or five years ago, and to impact on TBSFs less than was the case then. Peter Brierley, Head of Domestic Finance Division, explains why the literature suggests that market imperfections in the provision of finance to small companies may apply with particular force to the start-up and early-stage financing of TBSFs, but concludes that there is little compelling evidence of a major market failure.

Measuring interest accruals on tradable debt securities in economic and financial statistics (by Chris Wright of the Bank's Monetary and Financial Statistics Division). The following article examines a current international debate which could affect the way in which some important macroeconomic statistics are measured. The article is based on a longer paper, commissioned last year by the International Monetary Fund as a contribution to the evolution of international statistical standards. The views expressed here are those of the author and do not necessarily reflect those of either the Bank or the IMF.

Research and analysis

(pages 91–124)

Research work published by the Bank is intended to contribute to debate, and does not necessarily reflect the views of the Bank or of MPC members.

Saving, wealth and consumption (by Melissa Davey of the Bank's Structural Economic Analysis Division). The UK household saving ratio has recently fallen to its lowest level since 1988. A key influence has been the large increase in the value of wealth, which is likely to have reduced households' incentive to save. This article discusses the various forms of household saving and their determinants, and discusses the interactions between saving, wealth and consumption.

Mortgage equity withdrawal and consumption (by Melissa Davey of the Bank's Structural Economic Analysis Division). Mortgage equity withdrawal is borrowing that is secured on the housing stock but not invested in it, so it represents additional funds available for reinvestment or to finance consumption spending. Mortgage equity withdrawal was an important source of finance in the 1980s. But it fell back sharply in the 1990s, and remained negative for much of the decade. This article discusses the motivation for and the effects of mortgage equity withdrawal, using evidence from a recent consumer survey carried out for the Bank of England and the Council of Mortgage Lenders.

The information in UK company profit warnings (by Andrew Clare of the Bank's Monetary Instruments and Markets Division). This article examines the information content of trading statements issued by UK companies between 1994 and 2000. These statements are released by companies quoted on the London Stock Exchange when they have information that is relevant to their share price. The article concludes that trading statements indicating that earnings will be lower than expected by the market—so-called 'profit warnings'—are particularly informative, as shown by the impact of trading statements on their associated stock prices. There is also preliminary evidence to suggest that the incidence of profit warnings may be a useful leading indicator of UK economic activity.

Interpreting movements in high-yield corporate bond market spreads (by Neil Cooper, Robert Hillman and Damien Lynch of the Bank's Monetary Instruments and Markets Division). Spreads of corporate bond yields over risk-free rates are often used as a leading indicator of macroeconomic conditions. The large widening of spreads within the US high-yield bond market during the second half of 2000 might be a precursor of a downturn in the US economy. This article describes work done at the Bank during the last two months of last year that attempted to interpret these movements and assess their implications for the US economy.

Markets and operations

This article reviews developments in international and domestic financial markets, drawing on information from the Bank of England's market contacts, and describes the Bank's market operations in the period 1 October 2000 to 9 February 2001.

- Short-term interest rate expectations fell sharply in all the major economies, posting the largest falls since the second half of 1998. Market participants now expect the next changes in US, UK and euro-area official interest rates to be reductions.
- The European Central Bank raised its refinancing rate by 25 basis points at the beginning of October and then left it unchanged for the rest of the review period. By contrast, the Federal Open Market Committee reduced its target rate by 100 basis points in two steps during January. In February, the Bank of England cut its official rate by 25 basis points and the Bank of Japan reduced its discount rate by 15 basis points.
- Uncertainty about the outlook for short-term interest rates increased significantly in the United States but remained relatively low in the United Kingdom and the euro area.
- Government bond yield curves shifted down, with short-dated yields declining by more than long-dated yields.
- Market sentiment towards the euro and the yen changed markedly during the period, with the former appreciating against the other major currencies and the latter depreciating strongly.
- World equity markets weakened further during the period and the volatility of equity prices increased, particularly in the United States.

Chart 1 US interest rates



Source: Bloomberg

International markets

Short-term interest rates

In the United States, the Federal Open Market Committee (FOMC) left its target interest rate unchanged following its October, November and December meetings. But the Federal funds rate was then reduced by 100 basis points in January. A 50 basis point reduction was announced after a teleconference on 3 January (not the date of a scheduled FOMC meeting); this was followed by a further 50 basis point reduction at the FOMC's scheduled 31 January meeting, taking the official rate to 5.5% (see Chart 1).

US interest rate expectations declined gradually in October and November, and then fell more rapidly in December and early January (see Chart 2). Yields implied by eurodollar futures contracts expiring in 2001 were around 140 to 160 basis points

⁽a) Three-month interest rates implied by eurodollar futures contracts at the dates specified. From February 2001 onwards, the x-axis relates to contract expiry dates.

Chart 2 Cumulative changes in expectations of three-month interest rates^(a)



Source: Bloomberg

⁽a) As indicated by changes in rates implied by futures contracts maturing in June 2001.





⁽a) Means of survey samples.

Table AForecasts for consumer price inflation in 2001

Per cent; percentage points in italics

	October	January	Change
United States	2.7	2.7	0
Euro area	2.0	2.0	0
United Kingdom	2.3	2.2	-0.1
Japan	-0.1	-0.3	-0.2

Source: Consensus Economics.

lower by the end of the period. These changes were larger than the declines in short-term money market rates that accompanied the financial market upheaval around the time of Russia's debt default and the collapse of Long Term Capital Management in autumn 1998. The main reason for the downward movements in rate expectations in 2000 Q4 was a series of activity indicators that were much weaker than had been projected by commentators. In addition, market participants also remained closely focused on official policy statements.

US national accounts figures for the third quarter were released on 27 October. They indicated that the quarterly growth rate of GDP had slowed to 0.7% in Q3, 0.2 percentage points below the market's central expectation, and down from 1.4% growth in Q2. This set the tone for most of the US activity releases in the rest of Q4. In particular, short-term interest rate expectations fell sharply in December after weaker-than-expected retail sales, industrial production and consumer confidence data, larger-than-expected increases in jobless claims, and the weakest National Association of Purchasing Managers' (NAPM) index in ten years. These data led to downward revisions to forecasts of US growth (see Chart 3). The mean projection derived from Consensus Economics' January survey of forecasters was for GDP growth in 2001 to be 2.6%, 1 percentage point lower than reported in the October survey. Concerns about the slowdown were further exacerbated by the release of the Q4 national accounts data on 31 January; quarterly GDP growth was reported to have slowed to 0.3%, well below the median market expectation of 0.6%.

In contrast to the sharp slowdown in activity, US price data released during the period were generally in line with market expectations. There was also no change to the mean forecast reported by Consensus Economics for inflation in 2001 (see Table A). On a few occasions, however, short-term interest rate expectations did fall in response to declines in the price of oil. In the third quarter, concern over the adverse impact on demand of higher oil prices had been seen as a significant factor in explaining the fall in interest rate expectations; less attention had been paid to the direct impact of higher oil prices on consumer price inflation. By contrast, market participants generally paid little attention to the impact on activity arising from lower oil prices in Q4; when they did comment on oil, it was largely to note that price falls would help to ensure that US consumer price inflation would remain low in 2001.

As noted above, interest rate expectations also fell in reaction to official policy statements and FOMC decisions. The FOMC's 19 December announcement that it had changed its monetary

stance from a tightening bias to an easing bias was not fully anticipated by market participants, and the timing of the 3 January decision to reduce the Federal funds rate was even less expected. These announcements led the March 2001 eurodollar futures yield to decline by 12 and 23 basis points respectively. While the rate implied by the March futures contract fell by only 2 basis points after the FOMC's 31 January action, the decision seemed to bring forward market expectations about the timing of further cuts; rates implied by longer-dated futures contracts fell by around 6 to 14 basis points on the day. On 9 February, Federal funds futures contracts implied an expectation that the FOMC's target rate would be reduced to around $4^3/4\%$ by September 2001.

The European Central Bank (ECB) raised its refinancing rate by 25 basis points on 4 October, to 4.75%, and left it unchanged thereafter (see Chart 4). The decisions to maintain the official rate constant in the following four months were widely anticipated by market participants and had little impact on euro-area money market rates.

While the ECB's refinancing rate remained stable, euro-area short-term interest rate expectations declined quite significantly during the period. Yields implied by euribor futures contracts fell by around 75 to 90 basis points for contracts expiring in June and December 2001 (see Charts 2 and 4). This appears to have been related more to international developments than to weaker-than-expected euro-area activity or inflation. While consumer and business confidence indicators for the euro-area countries fell slightly during the period, they generally remained at quite buoyant levels. Furthermore, weaker-than-expected euro-area activity indicators released during the period were broadly offset by stronger-than-expected ones. For example, German industrial production data for August and December came in significantly above market expectations, while the data for September and October were weaker than expected and the November figure was in line with market forecasts. A similarly mixed pattern was evident in the French and Italian indicators. Consequently, projections for euro-area GDP growth in 2001 were revised down only slightly during the period and forecasts for inflation were unchanged (see Chart 3 and Table A).

The influence of international developments on movements in euribor futures rates can be seen in Chart 2. Euribor yields decreased broadly in parallel with eurodollar and short sterling futures rates between October and mid-December. However, US interest rate expectations fell much more rapidly than euribor yields in late December and early January. This is likely to have reflected the much smaller downward revisions to most projections for euro-area growth in 2001.

Chart 4 Euro-area interest rates



Source: Bloomberg.

⁽a) Three-month interest rates implied by euribor futures contracts at the dates specified. From February 2001 onwards, the x-axis relates to contract expiry dates.

Chart 5 Japanese interest rates



Source: Bloomberg

Chart 6 Interest rate uncertainty(a)



interest rate futures contracts; five-day moving averages

Consumer price inflation in the euro area fell to 2.6% in December, down from 2.9% in November. With December's core inflation figure at 1.5%, declining oil prices in Q4, evidence of weakening US demand, and the appreciation of the euro, market participants became increasingly convinced that the upside risks to inflation were small, and that consequently short-term interest rates in the euro area might have peaked. On 9 February, euribor futures implied an expectation that the ECB would reduce its refinancing rate to somewhere between $4^{1}/_{4}$ % and $4^{1}/_{2}$ % by the second half of 2001.

Forecasts of Japanese growth in 2001 were revised down only slightly during the period. Nevertheless, short-term interest rate expectations also declined in Japan; euroyen futures yields fell by around 15 to 60 basis points for contracts expiring in 2001 and 2002 (see Chart 5). But movements in euroyen futures yields were not strongly correlated with changes in eurodollar, short sterling, or euribor futures contracts in Q4 (see Chart 2). Domestic considerations were therefore the main influence on Japanese short-term interest rates. In particular, market participants reacted negatively to worse-than-expected corporate profit announcements, signs of increases in bankruptcy rates, and declines in Japanese equity prices, as well as the weaker-than-expected industrial production and household spending data released in November and December. A number of the economic indicators released during the period led market commentators to suggest that Japanese consumption was unlikely to increase in the near future, leaving the economy reliant on business investment and net exports as the main sources of growth.

In January, short-term interest rate expectations were also affected by speculation that the Bank of Japan (BoJ) might return to its zero interest rate policy. The BoJ left its official overnight call rate unchanged at 0.25% throughout the period. However, at its policy board meeting on 9 February, the BoJ announced several measures to enhance its liquidity provision over the financial year-end. The official discount rate was reduced by 15 basis points to 0.35%; a standby lending facility at the official discount rate was introduced; and the BoJ indicated that it would begin to make outright purchases of Treasury bills in March.

Implied volatilities derived from options on eurodollar futures contracts increased markedly in late December and early January, following the FOMC's unexpected rate cut on 3 January and the weaker-than-expected NAPM data (see Chart 6). Although the degree of uncertainty surrounding the prospects for US monetary policy fell back later in January, it remained high by recent historical standards. In contrast, uncertainty about the short-term outlook for euro and sterling-denominated interest rates increased by a much smaller

⁽a) Three-month interest rates implied by euroyen futures contracts at the dates specified. From February 2001 onwards, the x-axis relates to contract expiry dates.

Chart 7 Ten-year government bond yields(a)



(a) Zero-coupon spot yields derived from the Bank's VRP curve-fitting technique. For further details on this technique, see Anderson and Sleath, Bank of England Quarterly Bulletin, November 1999.



Chart 9

Twenty-year minus two-year government bond yield spreads^(a)



⁽a) Derived using the Bank's VRP curve-fitting technique.

extent and then returned to relatively low levels by mid-January. Similarly, uncertainty about the future course of Japanese monetary policy remained relatively low.

Long-term interest rates

Over the period, declining expectations about US economic growth led to a decrease in government bond and interest rate swap yields at all maturities in the major fixed-income markets, as expectations for future short-term interest rates were revised downwards (see Chart 7). US Treasury yields fell substantially at all maturities, and more so at short than at long maturities, causing the yield curve to steepen (see Charts 8 and 9). Between 29 September and 9 February, yields fell by around 130, 70 and 50 basis points at the 2, 10 and 20-year maturities respectively. Yields were little changed until the last week of November, and then declined sharply through until the end of the first week of January (see Chart 10).

As noted previously, forecasts of US inflation in 2001 were unchanged over the period (see Table A). This suggests that much of the fall in nominal Treasury yields was related to a sharp fall in real interest rates. However, other considerations relating to the supply of, and demand for, Treasury securities may also have been influential. In particular, the decline in equity prices may have led to portfolio shifts out of equities and into government bonds. This is likely to have reflected both the observed declines in equity prices and downward revisions to expectations of future returns from holding equities. As Table B shows, daily returns of the S&P 500 index and changes in Treasury yields were positively correlated during the review period, as equity and bond prices tended to move in opposite directions.

Hedging of mortgage prepayment risk by investors in mortgage-backed securities was also said to have led to greater demand for Treasuries during the period. Fixed-rate home mortgages with penalty-free prepayment options are common in the United States. These mortgages are often pooled and traded as mortgage-backed securities (MBS). As interest rates for new mortgages fall, it becomes increasingly advantageous for home-owners to exercise their option of prepaying all or part of their mortgage, either out of other savings or by remortgaging at a lower fixed rate. This early repayment of the loan principal forces investors in MBS to reinvest their capital at lower yields, decreasing the return on their portfolio. Between October and January, the duration of Merrill Lynch's Mortgage Master index, which can be seen as a proxy for the MBS market, declined by about 1 year (see Chart 11). Ideally, MBS investors would like to buy other options with offsetting characteristics to hedge against this prepayment risk. But such contracts are not always readily available at acceptable prices.

Chart 10 US Treasury yields^(a)



(a) Zero-coupon spot yields derived using the Bank's VRI curve-fitting technique.

Table B Correlations between equities and government bonds^(a)

Coefficient

	US Treasuries with S&P 500		German B with DAX	unds
	2 years	10 years	2 years	10 years
2000 Q1 Q2 Q3	0.24 0.35 -0.11	0.12 0.29 -0.17	-0.05 0.01 0.00	-0.01 -0.02 -0.17
Oct. 2000 to Jan. 2001	0.25	0.38	0.34	0.31

Sources: Bloomberg and Bank of England

(a) Correlations between daily returns on the identified equity indices and daily yield changes in government bond yields of 2 and 10-year maturities.

Chart 11 Duration of dollar-denominated MBS portfolios^(a)



Source: Bloomberg

Consequently, MBS investors often adopt an alternative hedging strategy of buying US Treasuries or receiving fixed-income payments in the interest rate swap market. Significant amounts of such transactions are said to have taken place in Q4, putting downward pressure on yields. Most of this hedging activity was said to have taken place at maturities between 5 and 10 years and was mainly undertaken in December because of the sharp fall in mortgage rates during the month.

US swap spreads narrowed in December and January, falling by around 20 basis points at the 10-year maturity for the period as a whole (see Chart 12). The strategy of hedging mortgage prepayment risk by MBS investors was said to have put more downward pressure on swap rates than on Treasury yields, thereby helping to narrow swap spreads.

On the supply side, US government budget surpluses have led to lower-than-expected issuance of long-dated Treasuries and to a program of buy-backs of long-dated bonds. In Q4, \$7.75 billion was bought back by the US Treasury between these maturities, \$0.5 billion more than in Q3. Acting in the opposite direction, market commentators also noted that the new administration was planning to implement wide-ranging tax cuts, potentially reducing future budget surpluses and the need for Treasury buy-backs. Despite these plans for tax cuts, forecasts for the US government's budget surplus in fiscal year 2000/01 were revised upwards during the period, according to surveys by Consensus Economics. This suggests an increase in the scarcity premium priced into long-maturity government bonds and helps to explain part of the fall in long-dated US Treasury yields between October and January.

The Bund yield curve also shifted down and steepened over the period, but by less than for comparable US Treasury stocks. Bund yields fell by around 65, 45 and 25 basis points at the 2, 10, and 20-year maturities respectively (see Chart 13). As with US Treasuries, Bund yields were broadly stable until the last week of November, and then declined sharply in December and early January. Short-maturity Bund yields and euro-area money market rates fell for the same reasons.

The decline in Bund yields happened despite euro-area economic data releases being broadly in line with market forecasts. This suggests that the Bund market was largely influenced by international considerations during the period. Between October and January, the correlation between daily changes in 2-year Bund and US Treasury yields was 0.63, a higher correlation than during the rest of 2000. This may have been partly because safe-haven flows out of equities and into government bonds pushed down government bond yields in both countries (see Table B). However, longer-term Bund yields

⁽a) Derived using Macaulay duration from Merrill Lynch's Mortgage Master index.

Chart 12 Ten-year swap spreads^(a)



Source: Bloomberg.

⁽a) Five-day moving averages of yield differences between 10-year swap rates and 10-year government bond yields.





⁽a) Derived using the Bank's VRP curve-fitting technique.

Table C Correlations between 10-year government bond vields^(a)

Coefficient

	Treasuries and Bunds	Treasuries and gilts	Bunds and gilts
2000 01	0.48	0.47	0.82
$\tilde{Q}2$	0.40	0.41	0.81
Q3	0.47	0.22	0.73
Oct. 2000 to Jan. 2001	0.45	0.17	0.65

Sources: Bloomberg and Bank of England.

(a) Correlations between daily changes in 10-year government bond yields.

had a similar correlation with US Treasury yields over the review period as during the rest of 2000 (see Table C).

Supply factors help to explain the smaller decline in Bund yields than in US Treasury yields during the review period. In contrast to US developments, forecasts for the German government's 2001 budget deficit were revised up by around DM 5 billion, according to surveys by Consensus Economics. This revision amounts to about 2% of annual gross issuance and 10% of net issuance of German government bonds. It may, therefore, have put some upward pressure on Bund yields during the period.

Euro swap spreads at the 10-year maturity declined by about 20 basis points over the period (see Chart 12). This may have been partly related to the upward revisions to German budget deficit forecasts described above. Alternatively, it may have been related to reduced credit risk concerns, as worries about banks' exposures to the telecommunications sector lessened somewhat. US and euro swap spreads decreased, in spite of 27% and 15% declines in dollar and euro-denominated corporate debt issuance in Q4 compared with the previous quarter.

In Japan, weaker-than-expected domestic economic data, combined with concern about a global economic downturn, led to a fall in Japanese government bond (JGB) yields during the period. In contrast to US and euro-area developments, JGB yields fell by more at longer than at shorter maturities. Consequently, forward short-term interest rates declined even at dates beyond ten years into the future. This may indicate that market participants revised down their assessments of Japanese long-term growth prospects.

International equity market developments

Major equity market indices declined further in Q4 and ended 2000 significantly lower than a year earlier (see Table D). On 29 December, the FTSE 100 index was 1.1% below its level at the end of Q3 and 10.2% down on the year, its worst annual performance since 1994. Declines in US and continental European equity indices were somewhat larger in the fourth quarter, but were broadly similar for the year as a whole. Reflecting these declines, an increasing number of the fund managers surveyed by Merrill Lynch came to believe that the major equity markets were undervalued in January 2001. Although the largest proportion of respondents to the survey continued to think that the US and European equity markets were fairly valued, the balance between assessments of overvaluation and undervaluation shifted towards the latter during the review period, particularly in the United States (see Chart 14).

Table DInternational equity market performance

Percentage changes from previous period, in local currencies

	2000		2001
	Q4	Year	Jan.–Feb. (a)
United States			
S&P 500	-8.1	-10.1	-0.4
Wilshire 5000	-10.6	-11.9	-0.4
Europe			
CAC 40	-5.4	-0.5	-3.6
DAX 30	-5.4	-7.5	1.0
FTSE All-Share	-1.5	-8.0	-0.2
FTSE 100	-1.1	-10.2	-0.9
Ianan			
Торіх	-12.7	-25.5	-1.4
IT indices			
Nasdaq Composite	-32.7	-39.3	0.0
FTSE techMARK 100	-31.4	-32.2	0.9
Neuer Markt	-43.7	-40.1	-7.4

Source: Bloomberg.

(a) 29 December 2000 to 9 February 2001.

Chart 14

Equity markets: balance between overvaluation and undervaluation assessments^(a)



Source: Merrill Lynch Fund Managers' survey.

(a) Percentage of survey respondents reporting that the given equity market was overvalued, minus the percentage reporting an undervaluation.

Chart 15 Profit warnings issued by UK companies(a)



(a) Monthly average number of firms listed in the FISE All-Shar index to issue a profit warning. Correlations between daily changes in the S&P 500, Topix, DAX and FTSE 100 equity indices were relatively high in Q4 (averaging about 0.5). The most significant common influences appear to have been the interconnected effects of worse-than-expected corporate profit announcements (largely from 'new economy' firms in the telecommunications and information technology sectors) and downward revisions to growth prospects, particularly in the United States. The number of profit warnings announced by US, European and Japanese firms rose between Q3 and Q4 (Chart 15 shows figures for the United Kingdom). This, in turn, led fund managers to revise down significantly their expectations about future corporate profits (see Chart 16), causing equity prices to fall.

Share prices of 'new economy' firms declined in response to growing concerns about the impact on future profitability of the higher-than-expected costs for European mobile telephone licences and a growing realisation that earlier forecasts about the demand for IT products and the profitability of Internet-related businesses had been too optimistic. In the United Kingdom, 23 out of the 88 profit warnings announced in 2000 Q4 originated from IT companies, up from 9 out of 71 in Q3.⁽¹⁾ Excluding IT and telecommunications firms, the FTSE All-Share index actually increased by around 1% in Q4. In the United States, the S&P 500 index would have been broadly unchanged in the fourth quarter if IT and telecoms firms had been removed.

Equity market volatility increased during the period, particularly in the United States. This appears also to have reflected the sharp increase in the number of profit warnings and the rapidity with which expectations about US growth prospects were revised down. In addition, the weighted sum of the implied volatilities of the individual stocks within the S&P 500 index remained significantly higher than the implied volatility derived from options contracts that trade against the S&P 500 index. The difference between these two measures of volatility widened during the period. This is consistent with there having been a shift out of the (relatively small number of) IT stocks and into (the much larger number of) more traditional stocks. At an aggregate level, the fall in the prices of IT stocks would have been partly offset by the increase in the rest of the market, thereby generating somewhat lower volatility. In other countries volatility also increased, but did not return to the highs seen in 2000 Q1.

Equity prices recovered somewhat in January, largely in response to the FOMC's reductions in the Federal funds target rate and some better-than-expected profit announcements. But

⁽¹⁾ See article on pages 104-09.

Chart 16 Profits outlook: balance between favourable and unfavourable assessments^(a)





⁽a) Percentage of survey respondents reporting a 'favourable' assessment for the twelve-month profits outlook, minus the percentage reporting an 'unfavourable' assessment.









price declines resumed thereafter. On 9 February, the FTSE 100 index stood at 6164, 2% below its level at the end of Q3 and 0.2% down from the start of January.

Foreign exchange markets

Among the major currencies, the yen and the euro experienced the largest exchange rate movements during the period. Their trade-weighted exchange rate indices (ERIs) moved within 14 and 11 percentage point ranges respectively. Between 29 September and 9 February, the yen ERI depreciated by 9.4% and the euro ERI appreciated by 4.5%. The sterling and dollar exchange rate indices moved within smaller ranges; sterling's ERI fell by 4.7% over the period as a whole, while the dollar ERI remained broadly stable (see Chart 17).

The euro's appreciation against the other major currencies began shortly before unilateral intervention operations by the ECB. Few market participants attributed the euro's appreciation to these interventions, however. The euro moved by much less after the 3, 6, and 9 November interventions than following the co-ordinated intervention by the G7 central banks on 22 September. Nevertheless, the November interventions may have helped to maintain 'two-way risk' in the foreign exchange market. For instance, they appear to have led to a small increase in the risk reversals derived from one-month options on euro-dollar exchange rate contracts (see Chart 18). This implies that market participants had to pay more for options that would be profitable in the event of an appreciation of the euro.

The main explanation cited by market participants for the euro's appreciation in Q4 was changes to short and medium-term economic prospects. As noted above, weaker-than-expected economic data releases in the United States led to significant downward revisions to US growth forecasts for 2001. By contrast, participants were relatively more sanguine about growth prospects for the euro area and the United Kingdom, with GDP projections being revised down only slightly. In Q4 and early in Q1, most market participants expected the slowdown in US growth to be fairly short-lived and, therefore, to represent a temporary negative shock to world demand. This view is consistent with the fact that the observed declines in short-term interest rates during the review period exceeded the declines in longer-term yields in the United States, the United Kingdom and the euro area. Consequently, movements in yield curves principally reflected lower expectations of short-term interest rates over the next few years. Furthermore, US yields fell by more than elsewhere, reducing the incentive to hold dollar-denominated interest-bearing assets. This is likely to have contributed to the dollar's depreciation against the euro.









It is more difficult, however, to rationalise movements in the other main exchange rates in terms of changes in interest rate differentials. Despite the fact that US Treasury yields fell by more than comparable gilt yields, the dollar actually appreciated against sterling over the period. And sterling's depreciation against the euro occurred despite little change in interest rate differentials between the United Kingdom and the euro area. It is also difficult to rationalise the yen's depreciation in terms of changes in short-term growth prospects. During the review period, downward revisions to projections for Japanese growth in 2001 were in line with revisions to euro-area and UK forecasts and were significantly smaller than the changes to Consensus US forecasts (see Chart 3). Nevertheless, the yen depreciated sharply against the dollar, euro and sterling. Against the dollar, the yen moved out of the ¥105-¥110 range in which it had traded for most of the preceding ten months (see Chart 19).

Some market participants have commented that the yen's depreciation reflected increasing concern over medium and long-term Japanese economic prospects. Since market forecasts for long-term growth are less readily available, alternative ways of examining this issue need to be considered. Economic theory suggests that current equity prices could be equal to the present discounted value of all expected future dividend yields. Consequently, movements in broad-based equity indices may provide some indication of changes in market expectations about long-term growth prospects. Chart 20 shows that, since 1995, periods of dollar appreciation against the yen have broadly coincided with periods when the S&P 500 index has risen faster than the Topix. This, therefore, appears to provide some support for the market commentary.

Another potential way of monitoring changes to market participants' expectations for long-term growth is to consider movements in long-dated bond yields. As noted previously, longer-maturity Japanese government bond yields fell by more than short-dated yields during the period. Consequently, forward short-term Japanese interest rates fell both in the near term and for dates beyond ten years into the future. This seems to confirm a more pessimistic assessment of Japan's longer-term growth prospects and may help to explain why the yen depreciated against the other major currencies during the review period.

Flows related to mergers and acquisitions (M&A) activity, which are also likely to be influenced by medium and long-term growth prospects, were much smaller over the period than in 1999 and earlier in 2000. A slowdown in the outflows from the euro area to the United States may have contributed to the euro's appreciation against the dollar. This reduction may have been connected with a reassessment by euro-area companies of the relative returns available on direct investment in the United States. M&A flows also may have helped to limit the extent of sterling's depreciation against the dollar and the euro around the turn of the year as a few corporates carried out large foreign exchange transactions in sterling around this time.

Movements in sterling bilateral exchange rates during the period appear largely to have reflected changes in market sentiment towards the dollar and euro exchange rates. Sterling depreciated by around 6% against the euro over the period (see Chart 21), and tended to depreciate in parallel with the dollar against the euro. As noted earlier, however, it is more difficult to explain why sterling depreciated against the dollar despite the reductions in relative US growth prospects and interest rates discussed above. One explanation might be that market participants expected sterling to recouple with the dollar and to move with the dollar against the euro in the future. However, implied correlations derived from foreign exchange options contracts provide little evidence to support this.

Sterling markets

Short-term interest rates

Short-term interest rate expectations implied by sterling money market instruments fell by around 70 to 100 basis points between 29 September and 9 February, and the Bank of England's repo rate was reduced by 25 basis points, to 5.75% (see Chart 22). In line with developments elsewhere, the fall in money market rates was the largest decline over a four-month period since 1998. In contrast to the United States, however, sterling interest rate expectations fell steadily throughout the period. The view that the UK rate cycle had peaked became widespread in December, and by early January most market participants had come to expect a reduction in the Bank's repo rate during 2001 Q1. On 9 February the central expectation derived from money market instruments was that the MPC would reduce the Bank's official rate to around $5^{1}/_{4}$ % by September 2001. Similarly, most City economists also reduced their forecasts for the level of the Bank's repo rate-the mean forecast for end-2001 reported in Reuters' monthly polls fell from 6.1% in October to 5.5% in late February.

The sharp downward revision in expectations of future short-term interest rates was accompanied by a reduction in the probability that economists polled by Reuters attached to a rate rise at each of the five monthly MPC meetings held during the review period, and a parallel increase in the probability attached to a rate cut (see Table E). Nevertheless, the central expectations both of City economists and market traders before

Chart 21 Sterling exchange rates



Chart 22 **Two-week sterling interest rates**(a)



forward rates

(c)

⁽b) Two-week forward rates derived from a curve fitted to Libor-based money market instruments. For further details see Brooke, Cooper and Scholtes (2000), 'Inferring market interest rate expectations from money market rates', Bank of England Quarterly Bulletin, November, pages 392–402. Five-day moving average.

Table E Mean probabilities attached to MPC interest rate decisions^(a)

		Percentages Rise (25 basis points)	No change	Cut (25 basis points)
2000	October	30	70	0
	November	20	78	1
2001	December	9	84	7
	January	1	74	25
	February	0	35	65

Source: Reuters' polls of City economists.

(a) Figures may not sum to 100% due to rounding.

the October, November, December and January meetings was that the MPC would not change the official rate. The sterling money markets were therefore largely unmoved by each of these policy announcements. By February, market sentiment had changed further—City economists surveyed by Reuters at the beginning of the month attached a 65% probability to a 25 basis point reduction in the Bank's repo rate at the MPC's February meeting. Immediately following the announcement, yields implied by short sterling futures contracts rose by around 4 to 8 basis points, suggesting that some market participants had priced in a small chance of a 50 basis point reduction by the MPC.

During the period, much of the downward pressure on UK short-term rate expectations came from increasing concerns about the implications of slower US demand growth. Six of the ten largest daily falls in the yields implied by short sterling futures contracts were related to US developments. These included the FOMC's decision to adopt an easing bias on 19 December, the sharp fall in the NAPM index on 2 January, and the 50 basis point cut in the Federal funds rate on 3 January. Concerns over US economic prospects, combined with the falls in global equity market indices in November and December and declines in the price of oil in Q4, increasingly led market participants to the view that the downside risks to the United Kingdom's inflation outlook outweighed the upside risks. This, in turn, heightened expectations that the MPC might reduce the Bank's repo rate.

UK data releases had a smaller-than-usual impact on interest rate expectations during the period. As Chart 3 shows, the mean forecast reported by Consensus Economics for UK GDP growth in 2001 was revised down only slightly during the period. This helps to explain why sterling money market rates fell by less than dollar rates. Nevertheless, indicators of UK activity did affect money market rates on a few occasions during the review period. In particular, short-term rate expectations fell following the release of weaker-than-expected indicators of manufacturing and distributive trades activity (in early November), and following the announcement of lower-than-expected Q4 GDP growth (in late January). In addition, interest rate sentiment was also affected on a number of occasions by the announcement by UK firms of weaker-than-expected profit performances.

Indications of changes to the MPC members' interpretations of economic conditions reinforced the downward movements in interest rate expectations. In particular, market participants increasingly focused on any evidence in the minutes of the MPC meetings that appeared to highlight greater downside than upside risks to economic activity. Short-term interest rate expectations fell immediately following the release of each set of minutes. The immediate market reaction to the January minutes had reversed by the end of the release day, however, as market participants reacted to a stronger-than-expected CBI survey and also paid closer attention to the sections in the minutes highlighting the view of some MPC members that the US slowdown might be short-lived.

Market measures of interest rate uncertainty generally remained at historically low levels during the period. Implied volatilities derived from three and six-month options settling on short sterling futures contracts rose in mid-December but then fell back again in the second half of January. This increase in uncertainty about the future path of sterling interest rates was not as large, or as long-lasting, as the increase in dollar implied volatilities (see Chart 6). Measures of skewness derived from options data became negative during the review period, suggesting that a majority of market participants saw greater downside than upside risks to the central expectation of future interest rates implied by short sterling contracts.

The sterling money market

The size of the sterling money market⁽¹⁾ fell by £4 billion between September and December, to £503 billion (see Table F). The main reasons for this fall were an £11 billion reduction in the size of the interbank market and a £5 billion fall in the amount of gilt repo contracts outstanding (see Chart 23). These declines were partly offset by a £5.7 billion increase in the size of the certificates of deposit (CD) market and a £3.8 billion increase in the amount of stock lending.

Interbank flows can be quite volatile from month to month and the exact reasons for the decline in 2000 Q4 are unclear. Most of the fall occurred in December and might, therefore, have reflected a desire by banks to reduce the amounts of unsecured lending on their balances sheets, relative to secured lending, prior to the year-end. A potential reason for this seasonal

Table F Sterling money markets

Amounts outstanding: £ billions

	Interbank loans (a)	CDs (a)	Gilt repo (b)	Stock lending (b)	Eligible bills (a)	Commercial paper (a)	Treasury bills (a)	Sell/ buy-backs (b)	LA bills (c)	Total
1998	150	122	95	35	19	10	1	2	1	435
1999	146	142	99	49	14	14	4	3	0	471
2000 Q1	156	132	100	51	14	15	4	2	0	474
Õ2	159	135	122	54	12	16	4	3	0	505
Õ3	162	125	132	53	12	16	2	5	0	507
$\widetilde{Q}4$	151	130	127	57	11	18	3	6	0	503

(a) Reporting dates are end-quarters.

(b) Reporting dates are end-February for Q1, end-May for Q2, end-August for Q3, end-November for Q4 and end-year.

(c) Local authority bills.

(1) The sterling money market is defined for this purpose as the sum of the outstanding amounts in the interbank, certificate of deposit, gilt repo, stock lending, sell/buy-back, Treasury bill, eligible bank bill, local authority bill and commercial paper markets.

Chart 23 Gilt repo outstanding



reduction in the supply of, and demand for, interbank loans is that rating agencies and shareholders are thought to scrutinise balance sheet accounts more closely at the calendar year-end. At the end of 1999, the interbank market declined by almost £2 billion. At the time, however, this was more than offset by a large increase in the size of the gilt repo market, thereby ensuring that the overall size of the sterling money market increased in 1999 Q4. Furthermore, there was no decline in the size of the interbank market in December 1998. These comparisons suggest that other factors also influenced the interbank market at the end of 2000. As a result of the quarterly fall in 2000 Q4, the annual growth rate of the sterling money market slowed to 6.4% in December, down from 15% in May.

The decline in the gilt repo market was largely due to a £9 billion reduction in the amounts outstanding for 'on call and next day' maturity repos. Turnover in the gilt repo market also fell, averaging £17 billion a day in the three months to end-November, compared with £20 billion a day in the three months to end-August. The recent declines in amounts outstanding and turnover may have been linked to the winding down of the money market operations of Gerrard and King Limited, who had previously been active in the gilt repo market.

Towards the end of December, member-to-member gilt repo transactions involving the $5^{3}/_{4}$ % Treasury 2009 stock traded as low as 2% in the overnight market. This was unusually low relative to overnight general collateral (GC) repo rates and reflected the fact that the 2009 stock was the cheapest gilt to deliver into the December long gilt future contract. The Debt Management Office (DMO) was asked to create an additional £1.1 billion of the 2009 stock under the terms of its standing repo facility—the first time that this facility had been used.⁽¹⁾

Spreads between interbank and gilt repo rates at maturities greater than one month narrowed in December by more than 10 basis points and remained at relatively low levels in January. This contrasts with the large widening in spreads between unsecured and secured lending rates that occurred at the end of 1998 and 1999, influenced by concerns over the introduction of the euro and the century date change respectively. The narrowing in unsecured-secured spreads in December primarily reflected larger declines in interbank rates. This suggests, therefore, that the sharp decline in the size of the interbank market observed in December was primarily related to a reduction in the demand for such loans.

⁽¹⁾ For further details about this facility see 'Response to DMO consultation on 'special' gilt repo operations', on the DMO's web site at www.dmo.gov.uk/gilts/index.htm





(a) Derived using the Bank's VRP curve-fitting technique





Chart 26 Correlations between the FTSE 100 index and the 10-year gilt yield^(a)



(a) Quarterly correlations between the daily percentage changes in the FTSE 100 index and the daily changes in the 10-year spot gilt yield.

(b) 29 September 2000 to 9 February 2001.

Longer-term interest rates

Over the review period gilt yields fell at all maturities and the yield curve continued to disinvert (see Charts 24 and 25). Short yields up to five years' maturity fell by around 50 to 60 basis points, while medium and long-dated yields fell by around 30 to 50 basis points. This continued the declines in yields seen over the first three quarters of 2000. Swap rates fell more sharply during the review period, by around 60 to 75 basis points at all maturities.

The factors that influenced gilt yields at maturities up to around three years were similar to those that affected sterling money market rates (see above). Changes in longer-dated gilt yields were also associated with international developments, but the relative importance of this influence was less than earlier in 2000. In the four months to January, correlations between daily changes in 10-year government bond yields in the United Kingdom, the United States and Germany were relatively low by historical standards (see Table C). Domestic considerations, therefore, had a relatively larger influence on gilt yield changes.

On the demand side, fund managers continued to shift their funds away from equities and into bonds. The correlation between daily yield changes in the 10-year gilt and daily percentage movements in the FTSE 100 index was around 0.3 in Q4, its highest level since the financial crisis of autumn 1998 (see Chart 26). As noted above, similar developments were also evident in the United States and Europe.

On the supply side, the outstanding stock of Government bonds declined by £8.3 billion⁽¹⁾ (or 2.6%) during the period. The main reason for this was the redemption of £9.8 billion of the 8% Treasury Stock 2000 on 7 December (see Table G). In addition, the Debt Management Office (DMO) carried out three reverse auctions purchasing a total of £1.7 billion of gilts from the market. These reductions in the debt stock were only partly offset by the issuance of £3.1 billion of new stock. Since both the size and the date of the December redemption were known in advance, gilt yields reacted little to the cash flows themselves. Nevertheless, anticipation of this significant reduction in the stock of outstanding gilts appears to have added to the demand at the DMO's auction of £2.25 billion $4^{1}/_{4}$ % Treasury Stock 2032 on 21 November. Gilt vields fell by around 20 basis points during the week following the 2032 stock auction, as the cover ratio (at 2.21) was higher than many market participants had expected prior to the auction. Nonetheless, it is difficult to identify separately the supply-side changes over this period, as other factors mentioned also affected gilt yields at the same time.

⁽¹⁾ Nominal value.

Table G DMO gilt auction results

Auctions

Date	Stock	Amount issued (£ millions)	Cover	Yield	Striking price (£)	-
25.10.00 21.11.00 24.01.01	$4^{1/s}\%$ Index-linked Treasury Stock 2030 $4^{1/s}\%$ Treasury Stock 2032 $2^{1/s}\%$ Index-linked Treasury Stock 2016	450 2,250 450	2.07 2.21 3.16	1.87% 4.41% 2.08%	189.00 97.27 218.75	
Switch						
Date	Source stock	Total nominal amount purchased (£ millions)	Cover	Destin	ation stock	Total nominal amount created (£ millions)
6.12.00	8% Treasury Stock 2015	2,000	1.47	$4^{1}/_{4}\%$]	Freasury Stock 2032	2,686
Reverse a	uctions					
Date	Source stock	Total nominal amount purchased (£ millions)	Average acc price (£)	epted	Average accepted yield (£)	
11.10.00	8% Treasury Stock 2003 10% Treasury Stock 2003 6 ³ /4% Treasury Stock 2004 9 ¹ /4% Conversion Stock 2005	221 381 0 38	105.41 111.17 n.a. 115.42		5.77 5.76 n.a. 5.59	
23.11.00	7 ³ /4% Treasury Stock 2006 8 ¹ /2% Treasury Stock 2007 9% Treasury Stock 2008	0 592 0	n.a. 118.20 n.a.		n.a. 5.22 n.a.	
18.01.01	8% Treasury Stock 2003 10% Treasury Stock 2003 6 ³ /4% Treasury Stock 2004 9 ¹ / ₂ % Conversion Stock 2005	$\begin{smallmatrix}&0\\&0\\&0\\430\end{smallmatrix}$	n.a. n.a. n.a. 116.17		n.a. n.a. 5.20	

n.a. = not available.

Two other factors that are likely to have influenced the expected future demand for, and supply of, gilts at longer maturities were the Chancellor's Pre-Budget Report (PBR) and the Myners report into institutional investment, both published on 8 November. The Myners report recommended the abolition of the Minimum Funding Requirement (MFR).⁽¹⁾ It therefore strengthened the expectation among market participants that changes to the MFR would weaken the link between gilts and the discount factor applied to defined-benefit occupational pension schemes. The PBR was interpreted by market participants as confirming their expectations of some loosening in the stance of fiscal policy over the next few years. This, in turn, led respondents to Consensus Economics' regular surveys to revise down their forecasts for the Government's fiscal surplus in 2001-02. However, the effect of these two pieces of news on gilt yields was very small. This was because much of the content of the Myners report was correctly anticipated by market participants. Furthermore, actual outturns for tax receipts continued to turn out higher than expected, while government transfers continued to be smaller than forecast.

The fall in sterling swap spreads during Q4 occurred mainly in October and early November (see Chart 12), and is thought by market participants to have been related to a period of high issuance by supranational and foreign financial institutions in the sterling non-government bond market. These agents tend to issue fixed-rate bonds and then swap the future stream of fixed-coupon payments for floating-rate liabilities. This process

⁽¹⁾ For more details on the MFR, see the November 2000 *Quarterly Bulletin*, page 334.

creates extra demand for receiving fixed in the swaps market and tends to put downward pressure on swap rates.

Index-linked gilts

On 9 February, index-linked gilt yields were little changed from their levels at the beginning of the review period. Although the broad profile of movements in medium and long-maturity index-linked yields tracked the conventional gilt market for most of the period, the average size of the daily changes in index-linked gilt yields was about half that of conventional yields.

Other sterling bond issues

Gross sterling non-government bond issuance was £17.8 billion in 2000 Q4, more than two thirds of which was in fixed-rate bonds. Issuance in Q4 was down from the record level of £26.1 billion in the preceding quarter, but was still relatively high by historical standards.

The Q3 figure appears to have been boosted by a shift in investor demand in favour of non-government bonds in anticipation of possible regulatory reforms that would decrease pension funds' incentives to hold gilts. As noted above, the Myners report, published in early November, recommended abolition of the Minimum Funding Requirement (MFR). This report, together with the publication in September of the Faculty and Institute of Actuaries' review of the MFR, may have prompted institutions to invest more heavily in non-government fixed-interest debt. The second regulatory development in Q4 was the publication on 30 November of Financial Reporting Standard 17 (FRS17). This new standard values pension fund liabilities using the yields on AA-rated corporate bonds, and may, therefore, have further increased the incentive for pension funds to hold non-government debt. From June 2001, firms will have to show that they have the capability to produce accounts that meet FRS17 requirements. However, FRS17 will not become fully effective until June 2003 and so may not have had a large impact on pension funds' asset allocation choices to date.

Table HSterling bond issuance in 2000 Q4

		Amount (£ billions)					
			By crec	lit rating:			
	Number of issuers	Total	AAA	AA/A	BBB and lower		
Fixed-rate issues							
UK corporates	6	0.5	0.0	0.3	0.2		
UK financials	10	2.2	0.5	1.7	0.0		
Supranationals	6	3.8	3.8	0.0	0.0		
Overseas borrowers	23	6.4	3.1	3.0	0.3		
Total	45	12.9	7.4	5.0	0.5		
FRNs							
UK corporates	5	0.4	0.2	0.1	0.1		
UK financials	11	2.7	2.3	0.3	0.1		
Supranationals	0	0.0	0.0	0.0	0.0		
Overseas borrowers	5	1.8	1.6	0.2	0.0		
Total	21	4.9	4.1	0.6	0.2		

Sources: Bank of England, Moody's and Standard and Poor's.

The trend of strong issuance encouraged by greater demand for non-government sterling debt continued in Q4. Almost two thirds of total issuance over the quarter was of AAA-rated stock (see Table H), reflecting pension funds' and other institutional investors' ongoing demand for high-quality non-government debt to hold as substitutes for gilts. Long-dated issuance was by far the largest maturity category of debt issue in Q4, at £10.2 billion (see Chart 27).

Around £20 billion in redemptions and coupon payments on both gilts and non-government bonds were returned to

Chart 27 Sterling-denominated non-government bond issuance





investors in December. This encouraged a spate of non-government issuance to capitalise on investors' wish to re-invest their funds. For instance, some £1.7 billion was issued on 7 December, to coincide with the gilt redemption date. However, market commentators suggested that most of the redemption receipts flowed into short-term gilts and money market instruments, thereby adding to the downward pressure on short-dated yields in December.

Floating-rate issuance totalled £4.9 billion in Q4, of which some £2 billion was mortgage-backed, including one of Europe's biggest mortgage-backed deals to date, from Abbey National. Securitisations offer investors high-rated assets underpinned by a pool of collateral with reasonably well-known risk characteristics. The review period also saw the first floating-rate note priced against the sterling overnight interest rate average (SONIA), rather than the typical six-month Libor rate. This development is likely to have been stimulated by practices in the euro area, where the euro overnight rate has been widely used as a funding benchmark for some time.

Much of the supply of top-rated sterling non-government debt came from overseas borrowers issuing in sterling (see Table H). Of the £11.5 billion of AAA-rated issuance in Q4, only £3 billion came from UK corporates and financial institutions. UK firms made up a bigger share of debt issues in the lower credit rating categories, though smaller sums were involved. Larger UK corporates often prefer to issue in foreign currency and swap the proceeds back into sterling. For example, BT issued \$10 billion of bonds in Q4 (the single biggest dollar corporate bond issue ever), and was thought to have then swapped the dollars for sterling. Had this issue been made in sterling, its effect on sterling corporate bond yields would have been proportionately greater than its impact on the larger dollar corporate debt market.

The sterling non-government index-linked debt market continued to grow in Q4, with around £0.5 billion of new issuance—all at AAA rating, with the bulk coming from the supranational institutions. Here again, the prospect of regulatory reform has encouraged investors to consider switching out of index-linked gilts and into index-linked corporate debt. The European Investment Bank announced its intention to build up some of its index-linked bonds to £0.5 billion outstanding, in the hope that this would encourage some banks to act as market-makers for the stocks.

Credit spreads on AAA and AA-rated debt narrowed in the early part of the review period on strong investor demand for high-quality non-government debt. In contrast, however, A-rated spreads failed to narrow to the same extent (see

Chart 28 Ten-year sterling bond spreads(a)



Chart 29 Stock of money market refinancing and daily shortages



Chart 30 Bank's repo rate, 2-week and 1-month interbank mid rates



Chart 28). Supply of A-rated debt was reasonably strong, partly due to telecoms companies' issuance. Demand for A-rated debt did not strengthen in line with demand for the highest-rated securities. Investors exhibited growing risk aversion, fuelled by worries about equity market weakness and concerns about high-yield debt markets in the United States.

Market operations

Open market operations

The stock of money market refinancing held on the Bank's balance sheet averaged £16 billion over the period from October 2000 to January 2001 (see Chart 29), some £1 billion higher than in Q3, reflecting the growth of the note circulation at Christmas. Daily money market shortages averaged £2.3 billion.

On a number of occasions, short-dated money market rates traded further below the Bank's repo rate than recent historical norms. The Bank continued to respond to these developments by varying the scaling factor used in its open market operations. The scaling factor is the amount by which the Bank leaves the market short after its 9.45 am round of operations, even when the available refinancing is fully bid by market participants. A progressive series of increases culminated in a scaling factor of £1 billion being applied from 21 December to the end of the period.

Chart 30 shows various short-dated money market rates and the Bank's repo rate. From mid-December to mid-January, these market rates traded below typical levels, a feature often observed at the year-end.

Over the period from October 2000 to January 2001, the Bank's OMO counterparties refinanced 30% of the daily money market shortages at the 9.45 am round, compared with a long-run average of around 55% (see Chart 31). Counterparties' greater-than-average reliance on the late operational rounds is demonstrated by the fact that only 79% of the shortage was refinanced by the conclusion of the 2.30 pm round, compared with a long-run average of 90%.

On 23 January, the list of securities eligible to be used as collateral in the Bank's open market operations was expanded to include \in 90 billion (nominal) of Greek government debt. This action followed Greece's full membership of the European Monetary Union at the beginning of 2001 and the associated eligibility of Greek government debt to be used as collateral in the ECB's monetary policy operations. This raised the total value of eligible collateral to around £2,420 billion. Gilts accounted for around 64% of the collateral taken by the Bank in its open market operations in the review period, and

Chart 31 Refinancing provided in the Bank's open market operations

 9.45 am refinancing as a percentage of the 9.45 am published shortage



Chart 32 OMOs—instrument composition(a)



(a) This chart shows the average shares of the various instruments held by the Bank as collateral for open market operations from October 2000 to January 2001. Figures in brackets relate to 2000 Q3. Figures may not sum to 100% because of rounding. euro-denominated eligible securities⁽¹⁾ accounted for 18% (see Chart 32).

HM Treasury and Bank of England euro issues

The Bank of England continued to hold regular monthly auctions of euro-denominated bills during 2000 Q4, and switched to using the electronic Bloomberg Auction System to receive bids in January 2001. Each month, \in 1 billion of bills was auctioned, comprising \in 200 million of one-month, \in 500 million of three-month and \in 300 million of six-month Bank of England bills. The stock of euro bills outstanding was therefore maintained at \in 3.5 billion throughout the quarter. The auctions held between October and January continued to be oversubscribed, with issues being covered an average of 4.9 times the amount on offer. During the review period, bids were accepted at average yields of 1 to 12 basis points below euribid for the relevant maturity.

On 17 October, the Bank reopened (for the final time) the UK Government Euro Treasury Note maturing on 28 January 2003 with a further auction of \notin 500 million, raising the total of this note outstanding with the public to \notin 2 billion. The auction was covered at 2.3 times the amount on offer and accepted bids were in a range of 5.13%–5.19%.

The Bank of England took over from HM Treasury as the issuer of three-year euro notes in January 2001. Further details about this issuance programme are set out in the Bank of England Euro Note Information Memorandum published on 9 January 2001. The proceeds from the issue of these notes will be held on the Bank's balance sheet as foreign currency assets. The first Bank of England Euro Note was auctioned on 16 January. The electronic Bloomberg Auction System was used to receive bids for the €500 million of notes being offered. The auction was oversubscribed by 3.1 times the amount on offer and accepted bids were in a range of 4.555%–4.595%. Further auctions of the new Bank of England Euro Note are scheduled for April, July and October 2001.

UK gold auctions

On 3 March 2000, HM Treasury announced plans for a programme of six gold auctions in the financial year 2000/01, each for 25 tonnes of gold. Two of these auctions took place in the review period. The auction on 7 November 2000 achieved a price of \$264.30 and was covered 3.3 times; the auction on 23 January 2001 achieved a price of \$268.00 and was covered 4.8 times. The last auction in this year's programme will take place on 14 March 2001.

A list of eligible securities is available on the Bank's web site at www.bankofengland.co.uk/markets/money/eligiblesecurities.htm

Sterling wholesale markets: developments in 2000

- Sterling wholesale markets grew by 5% in 2000, less quickly than in 1999.
- The money, corporate bond and swap markets continued to expand, whereas the amount of gilt-edged stock outstanding was broadly unchanged.
- Liquidity in sterling markets stabilised during the year; in some markets turnover and liquidity increased.
- Government cash management transferred to the UK Debt Management Office; the Bank of England's open market operations continued as before.

Overview

The total amount outstanding in sterling wholesale financial markets rose by £249 billion in 2000 (see Table A). By the end of the year, the value of instruments outstanding in sterling markets was equivalent to nearly six years' UK nominal GDP; markets grew less quickly in 2000 than in 1999 on this measure. The money, corporate bond and interest rate swap markets grew in 2000, whereas the amount outstanding in the gilt-edged market was little changed and the market capitalisation of the UK equity market, as measured by the FTSE All-Share index, fell.

Table A Size of sterling markets

Amounts outstanding: £ billions

	Money market (a)	Gilts	Non-gilt sterling bonds	Equities (b)	Swaps (c)	Total	Multiple of annual GDP
1990	183	125	60	486	167	1,021	1.8
1995	195	233	117	849	541	1,935	2.7
1998	434	301	203	1,334	1,979	4,251	5.0
1999	475	294	255	1,893	2,194	5,111	6.0
2000 Nov	504	294	314	1,715	2,533	5,360	5.9

Sources: Bank for International Settlements, Capital Bondware, Office for National Statistics, and Bank of England.

(a) Defined here as amounts outstanding in the interbank, certificate of deposit, gilt repo and stock lending, bill and commercial paper markets.

and stock lending, bill and commercial paper markets. Measured as market capitalisation of FTSE All-Share index: 1990 data are estimated. Single-currency interest rate swaps, notional principal outstanding. 1990 data are not available so the table uses 1992 data; data for 2000 are end-June.

Liquidity in sterling financial markets, which had fallen during 1999 following the international financial crises in the second half of 1998, appeared to stabilise in some markets in 2000. And in some cases, turnover and liquidity increased.

Table B

Market turnover: average daily amounts

£ billions				
	1997	1998	1999	2000
Futures (a) Short sterling Long gilt	40 3.9	67 4.9	54 3.4	45 2.0
Gilts Conventional Index-linked	7.0 0.2	6.0 0.1	5.2 0.1	6.1 0.3
Money markets Gilt repo Overnight interbank (b)	14.8 6.1	14.7 7.5	13.6 8.0	17.8 10.4

Sources: Bloomberg, London Stock Exchange, Wholesale Market Brokers' Association, and Bank of England.

(a) Converted to equivalent nominal amounts. Short sterling is the sum of all 20 contracts extant; long gilt future is the sum of the front two contracts—the third and final contract is rarely traded.
(b) Reported by the Wholesale Market Brokers' Association.

Table B reports turnover in several key sterling markets. Turnover of short sterling futures contracts fell by more than 15% to around £45 billion (equivalent) a day; open interest, the number of contracts outstanding, was lower than it had been for most of the previous two years (see Chart 1). Three factors help to explain this. First, the continued consolidation of the financial markets, through mergers and acquisitions between financial institutions, has reduced the number of active players. Second, short-term interest rates were stable through most of 2000 and, in the second half of the year, the money market yield curve was relatively 'flat'. Against such a stable interest rate background, there may have been less demand to hedge and take views in short sterling futures. Third, though short sterling futures continue to be by far the main tool for taking and hedging short-term interest rate views, there is growing use of other instruments, such as SONIA swaps. In a

Chart 1





Source: Bloomberg.

(a) Sum of all contracts extant.

SONIA swap, one party pays a fixed rate and the other a floating rate linked to the average of the sterling overnight index average (SONIA) over the life of the swap.⁽¹⁾ One advantage of a SONIA swap, compared with futures, is that, because it is a negotiated over-the-counter instrument, it can be tailored to meet a specific hedging or speculative demand. And the ability to trade and take views on the overnight rate is a useful addition to banks' liquidity management tools.

As Table B shows, gilt repo turnover rose from around $\pounds 13^{1/2}$ billion a day in 1999 to £18 billion a day in 2000. This may partly reflect an unusually depressed level of activity in the second half of 1999 as the market prepared for the millennium date change. But it also reflects a wider picture in which banks are tending to shift liquidity management to collateralised markets.

Table B reports that the amount traded through brokers in the sterling overnight interbank market rose in 2000. Chart 2 also shows this: market contacts suggest that the broked market accounts for around three quarters of total activity in the overnight interbank market.⁽²⁾ The rise in overnight interbank volumes is part of a trend in which banks are tending to manage their liquidity and cash management needs at shorter maturities (corroborating this, gilt repo liquidity and turnover is concentrated at very short maturities).

Increased turnover in some markets coincided with other indications of more stable or even improved

Chart 2 Turnover in the overnight interbank market(a)



(a) Turnover reported by the Wholesale Market Brokers' Association.

liquidity and depth. For example, in the gilt market one indicator of greater liquidity was that yield volatility in 2000 was less than in 1999. The rolling 30-day standard deviation of daily changes in 10-year gilt yields fell from 18%–20% at the beginning of 2000 to 10%–12% by the end of the year. The volatility of 30-year gilt yields, measured in the same way, also fell.

The spread of individual bond yields around a fitted curve is another possible indicator of the liquidity of the gilt market. The more efficient and liquid the market, the closer government bonds trade to the fitted curve. The extent to which individual bond yields diverge from the fitted curve is a measure of the liquidity premia at different maturities (bonds are referred to as cheap or dear to the curve, reflecting this gap). The level of dispersion is the absolute average of these differences

Chart 3 Mean absolute deviation from fitted yield curve



(1) Market estimates suggest that turnover of SONIA swaps was around £1 billion– $\pounds 1^{1/2}$ billion a day in 2000, compared

with around £2 billion a day for forward-rate agreements.

⁽²⁾ There are no comprehensive turnover data for maturities beyond overnight in the unsecured interbank market.

from the fitted curve, at various maturity ranges. Chart 3 shows that the dispersion of short and long stocks fell during the year, and the dispersion of medium stocks was little changed.

Changes in bid-offer spreads can also indicate changes in liquidity conditions: market-makers would tend to widen spreads if they were less certain of being able to exit from a position because of market illiquidity. During 1999, for example, contacts reported a widening of bid-offer spreads in the gilt market as liquidity conditions worsened. There is no definitive measure of bid-offer spreads, but market contacts suggest that spreads did not widen further during 2000.

Money markets

Size of sterling money markets

The sterling money market grew by 6% in 2000, to a total of £504 billion outstanding.⁽¹⁾ The highest growth rate (28%) was in the gilt repo market (see Table C and Chart 4). This partly reflected a growing tendency for banks to manage more and more of their liquidity needs in collateralised money markets.⁽²⁾

The value of interbank deposits outstanding rose, though less quickly than for repo, while the certificate of deposit (CD) market contracted. From March 2000 banks have been permitted to 'draw' bills on other banks; in due course this might be expected to affect the CD market, but so far there is little evidence of that happening, with few 'bank on bank' bills issued.

Open market operations

The Bank's money market operations in the early part of the year were influenced by the need to manage larger

Chart 4 Sterling money markets: amounts outstanding



Includes Treasury, eligible and local authority bills, commercial paper and sell/buv-backs

money market shortages. These arose because of the seasonal rise in the Government's tax receipts and the maturing of the longer-term repos, which were introduced in October 1999 to assist liquidity management over the millennium date change. Around £8 billion provided through these repos matured in January and February and, though the Bank offered to refinance these into February and March, there was no market demand for the continuation of the facilities. Consequently, the larger shortages arising from the maturing of the facilities were managed through the Bank's normal two-week repos and, during the course of January and February, the short-term interest rate structure moved back towards the Bank's repo rate from its somewhat depressed levels in December 1999.⁽³⁾

During March short-term rates began to trade increasingly below the Bank's repo rate; SONIA, for

Table C

Sterling money markets: amounts outstanding(a)

£ billions

	Interbank	CD (b)	Gilt repo (c)	Treasury bills	Eligible bills	Commercial paper	Sell/ buy-backs (c)	Stock lending (c)	LA bills (d)	Total
1990	89	53	n.a.	12	23	5	n.a.	n.a.	2	183
1995	93	66	n.a.	9	20	6	n.a.	n.a.	2	195
1999	155	135	99	4	13	15	3	49	1	475
2000 Nov.	159	125	127	2	12	16	6	57	0	504

n.a. = not available

1990 and 1995 data are end-March; other data are end-period. Bank and building society. End-November data.

(d) Local authority bills.

(1) The sterling money market is defined for this purpose as the sum of the outstanding amounts in the interbank, certificate of deposit, gilt repo and stock lending, Treasury bill, eligible bank bill, local authority bill and commercial paper markets.

(2)See also: 'Banking system liquidity: developments and issues', Chaplin, G, Emblow, A and Michael, I, Financial Stability Review, December 2000, pages 93-112.

(3) For example, SONIA, which had averaged around 87 basis points below the Bank's repo rate in December 1999, was 59 basis points and 7 basis points below it in January and February respectively.

example, was as much as 75 basis points below the Bank's repo rate at times in mid and late-March. In response, the Bank temporarily increased slightly the amount by which it was prepared to leave the market short after the 9.45 am round of operations, even when the Bank's counterparties had fully bid for the available refinancing. This may have helped lead to a narrowing of the spread between short-dated market rates and the Bank's repo rate. The Bank repeated the practice of increasing the amount by which it left the market short on a number of other occasions during the course of the year when it judged that short-term interest rates were trading too far away from the repo rate.

The Debt Management Office (DMO) assumed full responsibility for managing the Exchequer's daily cash position from 3 April. Since then, the level of the outstanding 'Ways and Means advance' to the Government on the Bank's balance sheet has no longer varied on a day-to-day basis and the DMO, rather than the Bank of England, now offsets the Exchequer's cash position with the money market each day. Rather than varying the size of the Ways and Means advance to balance the Exchequer's short-term financing needs each day, the DMO aims for a small (constant) precautionary deposit at the Bank each day. So the Bank's balance sheet has become more stable and predictable, and the money market's need for refinancing from the Bank is no longer influenced by the Exchequer's net cash position. The daily money market shortage averaged £2.0 billion in 2000, considerably larger than in previous years. The volatility of the size of the daily shortages (as measured by the standard deviation) has hardly changed since the cash management transfer, largely because of an increased use of overnight facilities. The two key factors that now influence the money market's need for refinancing from the Bank are changes in the note issue and the maturity of the existing stock of refinancing operations.

HM Treasury's Debt Management Report for 2000–01 (published in March 2000) announced that the planned level for the Ways and Means advance for 31 March 2001 was £17 billion. This planned level was reduced to £15 billion when the gilt financing arithmetic was revised (on 20 April) in the light of a higher government cash surplus for financial year 1999/2000. The Pre-Budget Report, released on 8 November, announced that the end-year level will be £13.4 billion, given the higher-than-expected government cash surplus for 2000/01 following the auction of spectrum mobile telephone licences.

The Bank extended the range of collateral eligible in its OMOs in 1999 to include euro-denominated securities issued by central governments and central banks of the European Economic Area.⁽¹⁾ In 2000, around 14% of the stock of collateral taken by the Bank was euro-denominated (see Chart 5). Table D shows the increase in the stock of eligible collateral during the past decade and the consequent fall in the proportion held by the Bank.





Table D Eligible collateral in open market operations

End-year	£ billions	of which, held at Bank (per cent)		
1990	37	13		
1995	30	11		
1996	34	14		
1997	320	2		
1998	327	3		
1999	2,325	1		
2000	2,350	1		

Note: 1995 and 1996 data exclude gilts held in the rough-tuning facility.

The Exchequer cash management transfer necessitated a change to the Bank's method of absorbing any money market surplus. As the Bank is no longer able to issue Treasury bills (as the proceeds contribute to the Exchequer's cash position), the Bank will absorb (or 'mop') any market surplus by a gilt repo, executed by a competitive rate tender. So far it has not been necessary to operate in this way.

Functional criteria for OMO counterparties

The functional criteria required of the Bank's OMO counterparties were also adapted in two small ways

Table E Sterling capital markets

Amounts outstanding and issued: £ billions

	Amounts outstanding					Gross issuance	
Date	Gilts (a)	Corporates (b)	of which, on issue programme	Total bond market	FTSE All-Share (c)	Gilts	Corporates (d)
1990 1995 1999 2000 Nov	125 233 294 294	60 117 255 314	0.3 14 85 117	185 350 549 607	486 849 1,893 1,715	3 31 14 10	12 13 57 74

Note: Corporate outstandings are compiled from a different data source from that for gross issues, and as a result may not give directly comparable figures.

Nominal value at end-period, except gilts outstanding in 1990 (end-March). Index-linked gilts include inflation uplift. These figures include both domestic and international issuance and give the nominal value at period-end. They have been calculated ignoring call and put options;

had these been exercised, total outstandings would typically have a value of around 85% of the figure quoted. Market capitalisation of FTSE All-Share index at period-end.

Non-government international bond issue in sterling.

during the year. First, the transfer of cash management to the DMO meant that the Bank no longer required counterparties to participate regularly in the weekly Treasury bill tenders, since these became the responsibility of the DMO. Second, the Bank had previously required counterparties to maintain an active presence in the gilt repo and/or the bill markets. This meant that counterparties were expected to trade in these markets on a reasonably continuous basis, with a range of unrelated counterparties, on a scale that would enable them to contribute in a material way to distributing around the system the liquidity provided by the Bank. The Bank updated this criterion to take account of the extension of instruments eligible in the Bank's operations, and to recognise that the liquidity provided by the Bank may be distributed through the sterling markets by channels other than gilt repo or bills. The functional criteria for OMO counterparties are now:

- (i) Counterparties must maintain an active presence in the markets for at least one of the instruments eligible in the Bank's operations.
- Counterparties must have the technical capability (ii) to respond quickly and efficiently to the Bank's daily rounds of operations.
- (iii) Counterparties will be expected to participate regularly in the Bank's daily rounds of OMOs.
- (iv) The Bank will look to its counterparties to provide useful information on a regular basis on market conditions and developments in the sterling money markets.

Criteria (ii)-(iv) remain the same as they have always been and are described more fully in the paper: *Reform*

(1) Available on the Bank's web site at www.bankofengland.co.uk/markets (2) These totals refer to the financial year.

of the Bank of England's operations in the sterling money markets, February 1997.(1)

Capital markets

The size of the sterling bond market rose by around £60 billion in 2000 to £607 billion (see Table E). The stock of government bonds was broadly unchanged, as the government's finances were boosted by the sale of mobile telephone licences. The demand for fixed-interest products remained high, however, and the supply of non-gilt bonds rose, partly in response. The fall in the estimated market capitalisation of the FTSE All-Share index coincided with the fall in other major stock markets worldwide.

Gilt-edged market

The total amount of gilts outstanding was £294 billion at end-November, little changed from a year earlier. The March 2000 Budget forecast gilt sales of £12.2 billion and redemptions of £18.6 billion, with the Central Government Net Cash Requirement (CGNCR) forecast to be a surplus of £4.9 billion.⁽²⁾ However the surplus turned out higher than the profile in the Budget forecast, mainly because the proceeds of the mobile telephone spectrum auction were much higher than anticipated. The Pre-Budget Report of November 2000 revised the CGNCR forecast for 2000/01 to a £28.2 billion surplus. With gilt redemptions of £18.6 billion over the year and planned sales of only £10 billion, there is likely to be a significant net debt repayment by March 2001.

The contracting supply of gilts has put downward pressure on yields over the past year (see Chart 6). New issuance for 2000/01 has been concentrated solely at the long end and in index-linked stock. The DMO has

also conducted reverse auctions and switch auctions, which had the effect of converting short and medium-maturity gilts into long-term stock. Falling short-term interest rate expectations during the latter part of the year also affected short-maturity gilts, and the yield curve disinverted.

Chart 6 Gilt spot yield curve



Investment institutions were net sellers of gilts during the first three quarters of 2000 as a whole (see Chart 7). Reduced new issuance partly explains this, but it is also consistent with evidence of increasing investor demand for non-gilt assets. Rising supply of corporate bonds (and of bonds issued by other borrowers, such as supranational institutions) is a natural consequence of reduced government supply, and was also encouraged by the prospect of reform of the Minimum Funding Requirement, which was reportedly behind some of the previous price-inelastic demand for long gilts.

Chart 7





Non-government sterling bonds

The total of non-gilt sterling bonds outstanding was £314 billion at end-November 2000, up from £255 billion at end-1999. Issuance was particularly high from AAA-rated borrowers. This reflected investors' increased demand for high-quality debt instruments in an environment of reduced gilt supply.

Total non-gilt sterling debt capital issuance increased by 30% to £74 billion in 2000. Much of this growth was at long maturities-up from £28 billion in 1999 to £36 billion in 2000—reflecting the strength of demand for long-dated bonds from UK institutional investors. Highly-rated borrowers, mostly from overseas, have been able to take advantage of this demand. (The bulk of these issues are swapped into liabilities in the 'home' currency.) Much of the growth of non-gilt issuance was in the second half of the year, which coincided with a narrowing of the gap between AAA yields and gilt yields (see Chart 8).

Chart 8 Sterling bonds: AAA and A spread over gilts at



Sources: Bloomberg and Bank of England.

There has also been strong growth in short-term (AAA) issuance. The increase at the shorter end is largely accounted for by higher floating-rate issuance (up by nearly £7 billion in 2000). Investors have been particularly keen to acquire securitised assets, such as mortgage-backed bonds. These issues, being backed by a known class of assets, are thought to give greater protection against event risk than standard corporate debt.

Corporate issuers, with lower credit ratings than supranationals and government-related overseas borrowers, have been less able to take advantage of the demand for AAA-rated debt. Some of these borrowers

Inflation swaps

An inflation swap takes the form of an agreed exchange of an inflation-based payment for a fixed payment. The UK market uses RPI inflation as its benchmark; the market's development has been helped by the existence of a range of index-linked gilts at various maturities, from which participants can price the fixed leg of the swap. (The estimated size of the UK market was £2 billion nominal principal outstanding at mid-2000.) In some currencies, a lack of index-linked benchmark bonds is likely to prevent the development of an inflation swap market.

Inflation swaps provide a way for firms with cash flows that grow broadly in line with inflation to hedge their risks. For example, a utility firm or retailer has cash receipts that are linked to the rate of inflation. If inflation turns out below expectations, the firm's nominal cash income will be smaller than expected. The firm can protect against this risk by contracting to pay an inflation-based rate versus a fixed-rate receipt, to cover some proportion of its cash flow. If inflation and the firm's cash receipts turn out below expectations, the income loss will be mitigated by gains on the swap, as the firm pays smaller inflation-based sums while receiving fixed.

Conversely, firms with inflation-linked liabilities, such as insurance companies, can opt to pay fixed versus receipt of an inflation-based rate, protecting themselves against the risk that inflation, and thus

prefer to access the deeper, more liquid dollar capital markets, and swap the liability back into sterling. UK and overseas telecommunications companies issued a significant amount of debt last year to finance mobile telephone licences, but much of this issuance occurred in currencies other than sterling.

The non-gilt index-linked debt market also grew last year, with corporates with inflation-linked cash flows (such as property companies, utilities and retailers) seeking to hedge their real interest rate risks by issuing inflation-linked liabilities. The box above describes the parallel development of an inflation-linked swap market.

Sterling debt issuance programmes, a sub-sector of the non-gilt debt market described above, grew strongly again last year, with the amount outstanding rising by 38% to £117 billion at end-November 2000. Issuance programmes allow companies to issue debt in a standardised format at any maturity of more than a year. their liability, is above their expectations. The inflation swap in this example is in effect a substitute for holding index-linked assets, in terms of exposure to inflation.

Currently in the inflation swaps market, there is a greater demand to receive inflation-linked rates than pay either fixed or a Libor floating rate. This has pushed inflation-linked rates down and created an arbitrage opportunity, which large debt issuers would like to exploit. Such arbitrage-driven issuers would not necessarily have inflation-linked revenue and so would want to hedge their risk by receiving inflation-indexed payments in a swap, and paying fixed or a Libor floating rate. The counterparty to such a swap could in turn hedge its liabilities only by buying an existing index-linked bond. Swap positions are therefore mostly based on underlying holdings of index-linked debt. So the size of the inflation swap market is currently constrained by the size of the underlying index-linked debt market.

However, if the inflation swap market grew from its current small size and became more liquid it could attract more players who might accept the inflation risk, in return for the premium offered by the swap market, to pay inflation. The inflation swap market would then provide a broader indicator of expected future inflation, offer a more liquid hedge of inflation risk, and become more independent of government issuance.

The abolition, in April 1997, of the five-year maximum maturity for programmes has allowed issuers, particularly those with higher credit ratings, to take advantage of high demand for gilt substitutes at longer maturities. Additional advantages of debt issuance programmes for borrowers are their flexibility, convenience and relatively low administrative cost, once the necessary backing documentation is in place. Issuance programmes are particularly heavily used by overseas borrowers.

Derivative markets

According to data collected by the Bank for International Settlements (BIS), swaps accounted for nearly three quarters of the total notional amounts outstanding in the sterling interest rate derivative market at the end of June 1998.⁽¹⁾ In this article, we report two indicators of activity in the sterling single-currency interest rate swap market.

Table F records data from the BIS showing notionalvalues; these give an indication of the amount of

(1) See the BIS triennial central bank survey of foreign exchange and derivative market activity published in May 1999.

Electronic trading

The principal electronic trading initiatives in the sterling market recently have been:

Blackbird

Blackbird, the first Internet-based over-the-counter derivatives trading system, received approval to trade from the Financial Services Authority (FSA) in June. The system allows members to execute trades in euro, sterling, Swiss franc and yen.

E-Crossnet

E-Crossnet, a securities crossing network, was launched on 22 March 2000. Regulated by the FSA, its objective is to reduce the cost of trading UK equities for buying institutions. In its first eight weeks of business, more than £1 billion of trades were crossed through its system.

Gilts

During 2000, it became possible for market-makers to trade gilts electronically via eSpeed, an electronic platform owned by Cantor Fitzgerald;

Table F Sterling single-currency interest rate swaps^(a)

£ billions

Year (b)	Amount outstanding (c)	New swaps (d)
1992	167	n.a.
1993	291	175
1995	541	275
1998	1,979	78
1999	2,194	58
2000	2,533	54

n.a. = not available

Source: Bank for International Settlements (BIS)

(a) The BIS quotes these figures in US dollars; they have been converted to

sterling using period-average exchange rates. Year-end values are used for 1992–99, and the end-June value for 2000.

(b) This is expressed in terms of the notional principal outstanding, and has (c)

been adjusted by the BIS for double-counting for 1998–2000. This is expressed in terms of the notional principal outstanding for 1992–97, (d) and the BIS definition of gross market value for 1998-2000.

underlying business being conducted. On this measure, the value of sterling single-currency interest rate swaps outstanding rose to just over $\pounds 2^{1/2}$ trillion at the end of June 2000. As the table shows, the amount of new business being conducted has been much less in recent years than in the mid-1990s. Table G reports Bank of England data, which are more up-to-date, measured as the mark-to-market values of UK banks' positions (this includes foreign-owned banks conducting business in the United Kingdom). On this measure, there was a fall in swap market activity in 2000. By the end of 2000 Q3, the outstanding mark-to-market value of sterling single-currency interest rate swaps was £31 billion, compared with £38 billion a year earlier.

Garban-Intercapital's electronic trading platform for gilts was expected to come on stream in early 2001.

liway

Jiway, the hybrid electronic order and quote-driven market for the retail sector, was launched on 17 November. Approved as a recognised investment exchange by the FSA, it offers execution in 400 French, Swedish and UK equities (eventually it plans to offer execution in up to 6,000 shares from Europe and the United States). In the first ten days of trading, Jiway saw 3,000 trades with a total value of approximately £27 million.

LIFFE *CONNECT* ™

Last year's article reported that the financial futures contracts at LIFFE had migrated onto its electronic trading system, LIFFE CONNECT™. On 27 November 2000, the remaining floor-traded commodities contracts were moved to LIFFE CONNECT[™], bringing to an end open-outcry trading at LIFFE.

Table G

Sterling single-currency interest rate swap positions^(a)

£ billions: market values

		Assets	Liabilities	Net
1998	Iune	32	37	-5
	Sept.	38	38	0
	Dec.	51	52	-1
1999	Mar.	54	54	0
	June	44	43	1
	Sept.	38	38	0
	Dec.	39	39	0
2000	Mar.	35	36	-1
	Iune	30	32	-2
	Sent	31	33	-2

(a) UK banks' data on gross positions include interest rate swaps, forward-rate agreements and options

Both data sources are consistent with a view that the interest rate swap market has matured during the 1990s, after rapid growth earlier in the decade. Reportedly, market players' attention is gradually switching to more complex derivative products such as credit swaps and inflation swaps (the latter are a small but growing feature of the UK market and are described in the box on the previous page).

Trading and settlement issues

During 2000, there were a number of clearing and settlement initiatives aimed at reducing risk in wholesale markets. There were also further electronic trading initiatives (see the box above).

CREST and RTGS developments

During 2000, further progress was made on the merger of gilts, money market instruments (MMIs) and equities within a single settlement system, CREST. All the changes necessary for the migration of gilt settlement into the CREST system were implemented during the first half of 2000. Technical migration from the Bank's Central Gilts Office (CGO) system to the CREST system was completed over the weekend of 1–2 July 2000, as planned. Both equities and gilts now settle within the CREST system.

Work continued during 2000 on the review of MMIs, in conjunction with CREST and market participants. An interim report was published by the Bank in January 2001, alongside a CREST consultation document. The dematerialisation and integration of MMIs into CREST is expected to take place during 2002.

Delivery versus Payment (DvP) in real-time central bank money

A further improvement to the robustness of the United Kingdom's payment and settlement infrastructure will be the introduction of DvP in real-time central bank money to CREST, in place of

Preparations for T+3 settlement

With effect from 5 February 2001, the standard settlement period for trades in equities and corporate debt conducted on the London Stock Exchange (LSE), the Irish Stock Exchange and Tradepoint was reduced from T+5 to T+3 (ie settlement three business days after trade date).⁽¹⁾

Reducing the period between trade execution and settlement is an important element in risk reduction since it shortens the period of time that a trading party is exposed to the risk of default by its counterparty and thus to the possibility of having to replace the trade, potentially at a price disadvantage. But this risk reduction will be achieved only if the shorter settlement period does not increase the risk of settlement failure on the due date; otherwise, reduced counterparty risk will simply be achieved at the cost of increased operational risk. A working party chaired by CRESTCo has been considering how to ease the transition to a shorter settlement cycle, and so minimise these operational risks. One important aspect of this transitional process has been a gradual tightening of matching and settlement targets in CREST—successful settlement critically requires early input of instructions and

the current assured payment arrangements. At present the cash obligations arising between CREST settlement banks, resulting from securities movements between CREST members, are settled through an end-of-day netting process. The DvP project will introduce a link between the CREST system and the real-time gross settlement (RTGS) payment system at the Bank of England, and will facilitate the movement of securities against real-time payment in central bank money. This project is well advanced, and implementation is due to be completed in November 2001.

Wholesale payments infrastructure (CHAPS)

The first stage of the NewCHAPS project (a programme of development work on the Bank's RTGS system) is also due to go live in August 2001. This project will bring improvements to the CHAPS high-value payment system and will involve the integration of the sterling and euro payment streams into a single SWIFT-based infrastructure. It will also introduce innovations, in response to market requirements, that will increase the efficiency of payment processing, such as a central payment scheduler and central queuing.

matching by close of business on T+2. CRESTCo's Settlement Discipline Committee is monitoring compliance with revised targets. Most participants seem reasonably confident that the transition will be achieved without a material increase in settlement failures.

The LSE has made corresponding changes to its rules, in particular relating to ex-dividend dates (confirmed in a Stock Exchange Notice of 3 July). No technical changes are required to CREST to facilitate T+3 settlement. CREST already handles settlement periods from same-day settlement through to 260 days forward; cash gilts settlement is undertaken for T+1 settlement, and most stock lending and collateral transfers are undertaken for same-day settlement. So the majority of CREST settlement by value is already undertaken for same-day or T+1 settlement.

A central counterparty for the London Stock Exchange

The LSE, CRESTCo and the London Clearing House (LCH) have developed a central counterparty service for all equities currently traded on the Stock Exchange Electronic Trading Service (SETS) or via Stock Exchange Automated Quotations (SEAQ) auctions. This was implemented on 26 February 2001, from which point

(1) Sterling money market instruments settle same day and gilts settle T+1.

LCH acts as the central counterparty for all such transactions. So a firm must either be a clearing member of LCH or pass trades via a clearing member to trade on SETS or via SEAQ auctions. Trades continue to be settled through CREST. The introduction of the central counterparty eliminates the bilateral exposures that arise between counterparties on SETS and SEAQ. LCH assumes responsibility for managing market and counterparty risk, protecting itself by taking initial and variation margin from its clearing members. Initially, settlement is continuing on a trade-by-trade basis, but it is anticipated that multilateral settlement netting will be introduced in 2002. Settlement netting should provide operational savings for Stock Exchange members and their customers.

European consolidation

During the year, there were two attempts at consolidation of the European equities market. The first

was the proposed merger between the LSE and the Deutsche Börse AG, to be known as iX. This was intended to be a significant first step towards the creation of a pan-European equity market, with a market in highly capitalised stocks based in London and subject to UK regulation, and a growth/technology market based in Frankfurt. Detailed discussions between the two exchanges and their respective regulators identified a number of substantive business and regulatory issues, relating for example to the transparency rules of the two markets and to the proposal that the jurisdiction in which an equity was primarily to be traded need not be the jurisdiction in which it was listed. The LSE withdrew from the iX talks when a further initiative was announced in the form of a hostile bid for the LSE, launched by the OM Group. OM Group withdrew its bid in November after it failed to achieve sufficient acceptances of its offer. The iX merger talks were not revived.

The Kohn report on MPC procedures

Report to the non-executive Directors of the Court of the Bank of England on monetary policy processes and the work of Monetary Analysis, prepared by Donald L Kohn⁽¹⁾ on 18 October 2000.

Introduction

This report to the non-executive Directors of the Court of the Bank of England gives the results of the review I was asked to undertake of a number of aspects of the monetary policy processes of the Monetary Policy Committee (MPC) and the staff work supporting those processes.

More specifically, I was asked to assess the materials being made available to the MPC, including the staff briefings; the inflation forecast process and the quarterly Inflation Report; and the work of Monetary Analysis (MA), the staff group providing most of the material to the MPC. With regard to the material being supplied to the MPC, I was asked to assess its quantity and quality, its objectivity, how it measured up against the type of material available to policy-makers at other central banks (including the Federal Reserve), and whether the material supplied adequately covered regional and sectoral developments, among other criteria. I was asked my views on the efficiency and effectiveness of the inflation forecast process, and the contribution of the forecast and the Inflation Report to enhancing the transparency of the policy-making process. The issues with respect to Monetary Analysis included the quality of its work, the mix of its work in terms of research and analysis, the adequacy of its resources, and turnover among the staff.

My review took as given the overall legal structure established by Parliament, including an inflation target set by the Chancellor to be carried out by a nine-member Monetary Policy Committee meeting twelve times a year and issuing quarterly reports detailing how it was accomplishing its objectives.⁽²⁾ In addition, policy choices and economic outcomes were outside the bounds of the review. Moreover, as an outsider, understandably, I was unable to observe the meetings where decisions on interest rates were made. Consequently, while this review covers the inputs into the rate-setting process, it does not include a discussion of the decision-making procedures.⁽³⁾

The review is well timed. The MPC has been in existence for a little over three years. This is long enough for both strengths and weaknesses of the policy processes to begin to emerge. From a number of perspectives, the structure of policy-making has had very favourable results. Although, as noted, it is not within the scope of this report to judge policy outcomes, in fact they have been good. The inflation rate has hovered near the target set by the Government, and output fluctuations have been damped. This may be partly 'luck' resulting from the nature of the developments affecting the UK economy and the general tendency around the world for inflation to be low and steady. But it also likely reflects in some part a well-functioning policy process resting on objective and comprehensive information and analysis. The inflation target has acted to anchor decisions and market expectations. The MPC has emphasised the role of forecasts in its decisions, given the lags between policy actions and inflation outcomes, and, apparently, these forecasts and the procedures used to arrive at them have been sufficiently good to contribute to successful policy. In addition, the considerable emphasis the MPC has put on explaining its decisions

⁽¹⁾ Director, Division of Monetary Affairs, Board of Governors of the Federal Reserve System. The views expressed in this report are those of the author and do not necessarily reflect those of the Board of Governors of the Federal Reserve System or other members of its staff.

⁽²⁾ Parenthetically, one nearly universal recommendation of policy-makers and staff I talked to was to change the legislation to allow fewer meetings each year. The monthly frequency was seen as not justified by the amount of new information becoming available between meetings and, in that context, as imposing considerable and unnecessary demands on policy-makers and staff.

⁽³⁾ In my conversations with people who do attend, these meetings were reported to work quite well. Discussions were said to be lively and well focused on the relevant information and the decision to be made, with ample opportunity for examining key issues and for airing a full range of views by all MPC members.
and revealing its thinking on relevant issues likely has enhanced confidence, built support, encouraged stabilising price movements in asset markets, and facilitated its democratic accountability.

But, not surprisingly after only three years, the process of adjusting to the new policy regime is ongoing. The MPC has needed to adapt many of the procedures and structures put in place when the Bank, in the person of the Governor, was advising the Chancellor, to a situation in which a committee, the MPC, is making the decisions about interest rates. Among other issues, the committee structure greatly complicates transparency; it is far easier to determine and publish the views of a single person than it is those of a Committee with nine individually accountable members.

To conduct my review, I spent seven weeks in London with an office at the Bank. I conducted interviews with all the members of the MPC, with many staff members, and with other individuals currently or formerly associated with the MPC. In addition, I attended the meetings of the MPC at which the May inflation forecast and Inflation Report were put together and two pre-MPC briefings, and received all the associated written material. I was given access to all the material going to the MPC and any information I requested associated with the work of MA. I also participated in research seminars given by the staff of MA. I have consulted with a few individuals associated with other inflation-targeting central banks that are addressing issues similar to those facing the MPC in making and publishing forecasts. I did not talk with market participants or others outside the MPC/central bank circle. All those I talked to at the Bank were extremely open and co-operative in their assessments of the strengths and weaknesses of the policy process and of the work of MA, and forthcoming in their suggestions for changes.

This report is based primarily on these conversations and observations, on my experience at the Federal Reserve, and on background reading. But the Court should be aware that the input and the time available to the task have been limited. Moreover, since I gathered most of my information, changes have occurred that likely are only incompletely reflected in this report. Finally, it has been difficult to measure what I observed against other central banks. My knowledge of what goes on at most other banks is sketchy, except for the Federal Reserve, and in that instance, differences in structure and functioning may reduce the value of the comparison. In particular, the roles of the staff and policy-makers and the relationships between them differ in significant ways in the United States and the United Kingdom.

Lastly, for the most part, I do not have specific recommendations. The Bank and the MPC are already well aware of the issues I highlight and are moving to address them. For most there are no easy or obvious answers, or they would already have been implemented. And it is the policy-makers and staff that are in the best position to identify and evaluate possible courses of action. My one strong recommendation is that the process of addressing these issues not be allowed to flag.

The flow of information to the MPC⁽¹⁾

In general, the flow of information and analysis to the MPC is impressive—providing timely, comprehensive, and objective inputs focused on the needs of policy-making. The level of research and analysis is highly advanced, comparable to that done at the Federal Reserve, with both staff members and policy-makers clearly aware of and utilising recent developments in relevant economic theory and empirical research. Policy-makers and staff appeared to have broad and deep knowledge of economic developments, not only in the United Kingdom, but also in other economies that might affect the United Kingdom. A key precept of the flow is that relevant information and research is shared among all MPC members so that each has the same knowledge base at the policy meeting.

Policy-makers were mostly satisfied with the information they were getting, recognising that any such flow naturally is constantly being adjusted to better serve their needs. Areas they and staff raised for further consideration included whether the information about current developments could be pared down a bit to be more directly focused on the decision at hand, whether that information might not be presented with more emphasis on analysis rather than data reporting, and whether the procedures now driving the research agendas were flexible enough to accommodate the full variety of projects that might prove useful.

⁽¹⁾ The material in this section covers the general flow of information and analysis to the MPC. The particular requirements of the inflation forecast round are discussed in the next section.

Research

As the Court is aware, the procedures for setting the long-term research agenda were altered to more closely involve all the members of the MPC, both to set the agenda and to participate in the research. While this is a relatively new procedure, most thought it promising. Staff were eager to work with MPC members, many of whom have special expertise and international reputations in various areas of macroeconomics, and welcomed the regularisation of the procedures for such contacts and joint work, which they hoped would promote more interaction with both internal and external members. Care will need to be taken that the agenda allows adequate opportunities for proposals to 'bubble up' from the staff and does not become too 'top down' from the MPC, depriving the Committee of some potentially useful work, affording the staff insufficient outlets for their own creativity, and complicating hiring and retention problems. And the MPC and the Bank will need to be certain that promotion and rewards to staff economists continue to depend on the quality and quantity of output, without regard to whether the work is associated with internal or external members.

The Bank has several research economists making important contributions to policy-related research that have been disseminated through papers, conferences, and publications. In addition to my familiarity with some of the work of these economists, I was able to sample work in progress at two 'research awaydays' held during my stay at the Bank. These are seminars organised by MA at which several preliminary research papers are discussed by staff and MPC members. The research presented was of high quality, taking account of the most recent work going on in the field. Projects were tightly focused on, and highly relevant to, the policy issues facing the MPC. Participation by senior staff (including people from the financial stability and markets side of the Bank) and MPC members (including external members) was active and constructive. This is a good way to keep policy-makers current on the progress of research projects and to provide feedback and encouragement to research economists.

Efforts to improve the statistical models used by the staff and MPC should continue to place a significant, if not rising, call on research resources. A number of projects were aimed at improving the modelling of the supply side of the UK economy, an issue of growing importance, as questions about technological change, capital investment, profit margins and long-term growth trends become increasingly prominent in policy deliberations. Models play an important role in MPC deliberations on the inflation forecast, in many respects substituting for a staff forecast as a focus for discussion. They help to organise consideration of how developments in the economy have deviated from expectations and how to treat those deviations in the new projections. Consequently it is particularly important to the MPC that MA be able to incorporate the most recent research in policy-relevant models into its work.

At the Federal Reserve, as at the Bank, the staff and policy-makers use a variety of models to inform forecasts and policy decisions. Federal Reserve models include a large-scale model of the economy and many smaller models of particular sectors or markets. These models are continuously upgraded as the economy changes and previous deficiencies are revealed. There is considerable productive interaction among the modellers and between the modellers, the judgmental forecasters and the Federal Open Market Committee. Models are used to analyse past developments, predict the future, and, often, to discuss possible implications of alternative policies or economic developments. This latter type of exercise can be especially useful for analysing the risks to the forecast and the range of possible outcomes—the 'skews' and 'variances' the MPC places around the central tendency of its inflation forecast.

MA produced a large number of shorter-term research projects aimed at the next quarterly Inflation Report or MPC meeting. Naturally, these were tightly focused on the policy or forecast issues at hand. Many respond to questions and issues raised by MPC members in the course of the pre-MPC briefing or the forecast round. Key issues bridging short-term research and current analysis are covered as well in the pre-MPC notes received by the MPC members with the chartpack before the MPC meeting. Judging from the sample I saw, they are comparable to similar very short-term work at the Federal Reserve. Often at the Federal Reserve Board such projects utilise the large-scale staff model as a starting-point, reinforcing the usefulness of model development at the Bank. The results of these projects are circulated to all MPC members to ensure that each has the same access to staff work as background for policy deliberations. To meet this objective fully, staff and MPC members will need to take care that research is circulated far enough ahead of time to allow its evaluation by all MPC members.

A concern expressed by several staff members was that research seemed to be driven either by the current forecast round or the long-term agenda, leaving inadequate opportunities for intermediate-term research. More such research, stretching over more than one forecast round, might allow somewhat more thorough analysis of important topics, and greater review of that analysis before it influences the forecast.

Current analysis

There are several avenues through which MPC members get information from staff on current developments in the economy. One is through reporting on new data releases. The data themselves are summarised as they become public and the original releases made available by link through the Internet. In addition, a short analysis, posted to the Intranet, draws out the implications of the new data. Overall, the quantity and quality of this response to new data were very similar to that at the Federal Reserve, and the delivery through the day by e-mail was timely, convenient, and complete. Supplying the link to the original data helps MPC members to obtain the information to form their own views of the implications of the data. At times, follow-up memos are circulated that draw several strands together and provide more interpretation. A strong and deep staff of experts who are familiar with the characteristics of the various data series and the underlying economic concepts needed to analyse them is essential to helping the MPC make sense out of a vast and often contradictory flow of information.

Data becoming available through an inter-meeting period are summarised and put into perspective in the pre-MPC briefing. I sat in on a full-day pre-MPC briefing in April and a half-day briefing in May (though the differences in time consumed are less than implied by these descriptions). Many members of the Court have also attended these meetings, and the Court has received several reports on outside evaluations of them. As you are aware, they are comprehensive reviews of incoming information on the economy, including Agents' reports (discussed separately below).

For the most part, policy-makers gave the briefings good reviews. They liked the opportunity to see all the new data summarised just before the meeting and put in some perspective, and to raise questions about the data and its implications. They thought the staff did a good job presenting the information and responding to questions. Many, though not all, would welcome more analysis and assessment by the staff. However, within the group of those who favoured more analysis, views differed as to how far they would want the staff to go in drawing implications for the outlook; some would like only a little more analysis of the particular sector or series in question, others would welcome a drawing out of the implications for the inflation outlook. Views differed as well on the coverage of the briefing. Some welcomed the complete and detailed scope of the coverage—especially those who had less time to follow the daily data analysis; others would prefer a shorter presentation that was more focused on the most important new information becoming available. Among the latter members, however, there was no consensus on what was essential and what was not.

Staff welcomed the opportunity to present information to the MPC, and those attending but not normally presenting came away from the meetings with a better understanding of the issues and questions the MPC considered of special importance, which helped them shape their own research and analysis agendas and enabled them to put their assignments in a broader context. At the same time, staff emphasised the considerable burden imposed on a relatively small number of people by having to do the pre-MPC briefings each month.

My own assessment is that they are indeed very complete briefings, presented with a high degree of technical competence, which, taken together with the chartpack, should provide the policy-makers with all the information they require on the flow of data and surveys since the MPC's previous meeting. I could detect no biases in the presentations, in which staff, in fact, seemed to be expending special efforts to provide a complete set of data in an objective manner. Sectoral information was included in nearly every segment of the briefing and the chartpack: such information can be important in coming to an understanding of emerging trends in financial markets and the economy, and it was highlighted when the analyst considered it would be useful to do so. Regional information was provided by the Agents' reports, discussed below; such information was related to the overall developments in the UK economy, as indeed it must be to assist in making a national monetary policy. The briefings included information from the markets group, giving useful interpretations of recent price movements in financial markets and the expectations built into the structure of interest rates.

At the Federal Reserve, the briefings just before policy meetings are more focused on the outlook—centred around the underlying forces shaping the staff forecast of economic activity and prices. Material like that in the pre-MPC and chartpack is presented in weekly briefings to the Federal Reserve Board and in a background document prepared for the FOMC that reviews developments since the last meeting of the Committee in the domestic economy and financial markets, and internationally. Compared to these materials, the pre-MPC was similar in its sophistication and coverage.

The staff and the MPC might work at meeting the expressed desire by many MPC members for briefings that are better focused and more analytical. The half-day briefing appeared to be just as helpful as the longer one, and perhaps more to the point under the discipline of the slightly tighter time frame.⁽¹⁾ Even the half-day briefing might have been trimmed a little by reducing occasional redundancies and concentrating more on the new information most likely to be important to the policy decision. Staff made special efforts to sort through the data, highlighting potential conflicts among data series. However, if the MPC desires, staff experts might more often attempt to assess the information content of the individual series and draw conclusions about emerging trends, especially in sectors, markets, or relationships that may have particularly important effects on the inflation outlook.

Some presentations compared recent outcomes to assumptions or expectations in the most recent inflation forecast, but consideration might be given to a more complete and systematic use of such comparisons. Indeed, if the MPC would find it helpful, the staff might attempt to pull together the implications of the new data since the last meeting or since the last forecast round for the inflation forecast—using either general characterisations of effects or precise new estimates of inflation eight quarters out. Such an exercise would give a more forward-looking flavour to the presentation even in the absence of a staff forecast and might help to focus staff and MPC members on the most important developments.

Agents' reports are an important part of the briefing and input into the policy process. Such reports should help the MPC on occasion spot emerging trends before they become apparent in the data, which lag. Moreover, by helping the MPC understand regional and sectoral developments from the perspective of individual businesses, they should contribute to understanding and explaining the circumstances and decisions that lie behind the aggregated data and hence shed light on the likely course of future developments.

The Agents' reports appeared already to be useful, and they are under constant improvement. The reports encompassed a noteworthy attempt to systematise and attach quantitative values to the flow of anecdotal reports received from around the country. By achieving comparability over geography and time, the reports should enable the MPC to track the evolution of the information and apply it to national economic trends. In addition, it will facilitate research to establish the value of the information they contain. The presentation of this information to the MPC appropriately emphasises the national picture assembled from the regional reports, but the regional data are presented in detail in the chartpack for the use of MPC members. In addition to the regular questions, a special set of questions is developed each month to address particular concerns of the MPC. Since these are focused on particularly puzzling and important developments, they have the potential to be quite useful to the MPC as it interprets incoming statistics.

Agents and staff reported that MA and the Agents had developed a good and co-operative relationship. This was contributing to making the Agents' reports and resulting series more rigorous and more useful to the MPC. Agents were building relationships with businesses and other groups in their areas and attempting to make their data collection represent something like the mix of GDP in order to increase its usefulness at spotting and analysing national trends.

In my observation, the MPC took considerable interest in the Agents' reports, especially the special questions. Presentations sparked questions and comments from MPC members, suggesting that the reports in fact were playing a useful role in their evaluation of the economic situation and the prospects for inflation. The questions from the MPC often elicited interpretations and anecdotes from Agents that gave a fuller flavour of what was occurring in the regions and sectors. Systematising the collection of reports should not be allowed to become overly rigid and stifle unexpected and unanticipated flows of information, but overall I found the systems put in place both to collect regular

(1) My understanding is that the MPC has decided that all pre-MPC briefings will be a half-day.

information and to zero in on particular questions quite impressive and useful.

The inflation forecast and the Inflation Report Background

The inflation forecast and the Inflation Report are key elements in making policy under the inflation target set by the government and in explaining the policy to the public. MPC members agreed that the process of arriving at the forecast has many useful aspects. It has helped the Committee come to some common understandings on a basic framework for analysis of economic developments, the causes of inflation, and the transmission of monetary policy. Within that framework, the forecast is a comprehensive look at all aspects of the economy and financial markets that entails identification of the important factors that will be affecting the course of inflation and economic activity over coming years and fosters discussion among members of alternative possibilities and analyses of these factors. By focusing not only on the most likely outcomes but also on the developments that might cause outcomes to deviate from forecasts, the process and associated discussion should help the members recognise significant new trends more quickly and improve the odds on responding appropriately when they occur. Through this forecast process, the members are effectively forced to organise their own thoughts and analysis, and they come to a better understanding of alternative positions and possibilities put forth by their colleagues. The questions that arise in the course of the round also help to focus staff research—both short and long-term—on the issues of most concern to the MPC.

The output gives a focus and discipline to policy decisions-the inflation forecast two years out. Although the MPC's remit calls for RPIX inflation to be at $2^{1/2}$ % at all times, if forces push or threaten to push inflation away from target, given the lags between policy decisions and their effects on inflation, the Committee cannot always achieve it in the short run without considerable, unnecessary, economic dislocations. In these circumstances, a forecast is a sensible intermediate policy objective, which if reasonably accurate over time should tend to keep inflation from straying very far from the objective, while avoiding sharp, policy-induced, fluctuations in economic activity. It is readily explained to the public and provides an important element in transparency and accountability. The published forecast should help the public understand the motivation behind the most recent policy decision. The dimensions and discussions of the skews and variances around the forecast should alert the public to the risks the MPC sees to meeting its mandate, and the assumptions and analysis underlying the forecast provide a benchmark to the public and the MPC for judging the possible need to alter policy when events do not transpire as expected.

But in my discussions, both MPC members and staff saw a number of difficulties in the current process and outcome, which my observations tended to confirm. In brief, the process was very time-consuming and in the view of some, the time was not always well allocated to the most important issues. In addition, the outcome was not precisely defined or clearly understood by the MPC and the public. Consequently, the forecast round and *Inflation Report* perhaps may not be as helpful as they might be to the Committee, or to the public, the Parliament, and the markets in understanding, predicting, and judging policy actions.

The process I witnessed involved around ten meetings, not counting those to review the drafting of the *Report*. The number of meetings arose in part because it was a 'bottom-up' procedure, in which the forecast was built from judgments on many aspects of the economy on a piece by piece basis. Those 'pieces' can range from factors that could have a major effect on the course of the economy and prices over coming years to those whose impact is likely to be small or temporary. The staff comes to the MPC for decisions on each of those factors and the staff is not expected to provide much help to the Committee on the appropriate choices, beyond background analysis. One consequence of this is a considerable amount of time can be spent on items that may have only a small effect on the ability of the MPC to meet its mandate. In addition, while the Committee has moved to looking at the potential final result earlier in the meeting rounds, the line-by-line approach has meant that consideration of the overall shape of the forecast and the key underlying forces and relationships driving the outlook can get less consideration than some saw as desirable.

Moreover, a number of members perceive some game playing with regard to choices on individual assumptions; that is, members argue for particular assumptions not out of conviction on those assumptions, but rather to shape the overall outcome in a direction they are most comfortable with. Several also saw the process as 'contentious', though in my experience the discussion was fair and civil, if at times appropriately vigorous. And the process is so complex, the Committee tends to shy away from late changes after the MPC meeting that would accommodate the evolution of Committee members' thinking in the course of policy discussions.

In addition, the outcome is not clear. The MPC needs to continue examining what it means by 'best collective judgment' to refine its understanding and possibly to consider alternative approaches. Originally, apparently, the forecast was a consensus of Committee members, forged through compromise and trade-offs. But as views became more diverse, compromise to achieve a single forecast was no longer possible, and members created Table 6.B, which contains alternative assumptions and outcomes for the inflation forecast eight quarters out. Although the outlook section indicates generally how far from the central tendency some members' forecasts might be, that indication is not explicitly related to the information in Table 6.B. The public does not know the number of members at odds with the central projection, and except for that general statement, the distribution of forecasts around the centre. Table 6.B also has complicated the construction of skews, since members who would have argued for skews to allow them to join the consensus now see themselves on Table 6.B.

As a consequence of uncertainty about the meaning of the forecast, and of the bottom-up approach by which the forecast is built from the transformation of a series of assumptions, the overall result has not always been a forecast that is consistent with and helps to explain the MPC's most recent decision. The centre of the forecast and the variances and skews around it may not consistently represent the views of the centre of the Committee likely to be determining policy and influencing economic outcomes. Although the forecast and the policy decisions cannot be linked mechanically, the higher the degree of coherence, the more useful the forecast will be for transparency and accountability.

Some MPC members and outside observers also have questioned several other aspects of the forecast and report write-up—including the conditioning assumption of a flat policy interest rate and the strong emphasis on keeping the eight quarter ahead inflation rate at or quite near the target. The former introduces complications by often being obviously inconsistent with the most likely path of interest rates. With respect to the latter, there are a number of circumstances in which allowing the forecast to deviate from target under an unchanged interest rate assumption will improve the odds on realising the best possible performance of the economy and prices consistent with achieving the inflation target over time.

The MPC recognises these problems and has taken steps to address them. Since my visit to the Bank, I understand that the MPC has met to discuss both the inflation forecast output and the process. Changes were made to streamline the process, and the August Inflation Report contains a helpful box on the forecast, which addresses the role of the forecast in policy and clarifies the contingencies included in the skews, or risks, to the forecast. The discussion that follows highlights the issues as I saw them last spring, and gives some possible alternative approaches to the forecast and the process of producing it, but it may not fully reflect these more recent changes. Moreover, these are complex issues, which do not admit of easy resolution, and only the MPC and its staff have the knowledge and experience to address them properly.

The inflation forecast

The central tendency

As noted above, the inflation forecast has evolved in ways that have tended to obscure precisely what it is. In particular, the greater dispersion of forecasts among MPC members that has led to Table 6.B has made it more difficult to interpret the phrase 'best collective judgment' that is applied to the forecast, and discussions with and among MPC members revealed differences of opinion on how the forecast should now be viewed or should change. To achieve at least rough alignment between policy and the forecast, whatever is published should reflect the 'centre of gravity' of the Committee that made itself felt in the most recent policy decision. However, determining and presenting a view that would explain actions and shape expectations constructively is difficult in the context of a Committee, especially one with emphasis on individual accountability.

Against this background, the MPC would seem to have a number of alternatives to consider if it wished to alter current practice for representing the central tendency of the basic forecast:

 Publish no explicit forecast, but an extended discussion of general tendencies and concerns. A forecast is not required by law, and this alternative might be a better representation of what in fact the MPC feels it can most usefully say about the future; precise forecasts, even with fan charts, may give the impression of more accuracy and confidence than is felt by the Committee or warranted by experience. Numbers may deflect attention from the underlying analysis of the fundamental trends and tendencies that the Committee sees as the most significant influences on its decisions and sources of its concerns about the future. However, the MPC may feel that it can be more helpful to the markets and the public than implied by only a general discussion, that a numerical forecast is an important element in accountability in as much as it allows the public to judge the technical competence of the Committee, and that the forecasting process itself has value as a technique by which the MPC identifies and debates elements affecting the inflation outlook and reaches conclusions about the stance of policy.

2. Publish a staff forecast and the views of the members arrayed around that forecast. Several MPC members made this suggestion in my conversations with them. A staff forecast would provide a benchmark for MPC discussions, and one that was arrived at with considerably less effort than the 'best collective judgment'. In arraying members' forecasts around the staff benchmark, the MPC would be fully as transparent as it is currently, if not more so.

However, the staff currently does not produce an independent forecast, and it would require more resources if it were to do so. Before a staff forecast were produced, especially one to be published, the responsibilities for that forecast of the Chief Economist and Deputy Governor for Monetary Policy, who vote in the MPC, would need to be clarified. Moreover, publishing the forecast might focus considerable attention on the staff outlook, and the staff might be reticent to present its best judgment if that were greatly at odds with the Committee or likely to have effects on markets. Largely for these latter reasons, the Federal Reserve does not publish its staff forecast for five years.

 Publish a Governor's or Bank forecast, submitted to the MPC but not necessarily approved by it.⁽¹⁾ This would be a transparent expression of a particular view, and would avoid the complications of the divergent views on Table 6.B. However, if the views of the Governor, or the Bank speaking through the Governor, were not representative of the views of the centre of the MPC, such a forecast might not be very useful or well related to past or future Committee decisions. If other MPC members disagreed significantly with the Governor, presumably they would want to have their own views represented in some form, giving rise to alternative forecasts, perhaps a number of alternatives in some circumstances. In such circumstances, publishing a Governor's forecast could well complicate efforts to form a consensus about policy.

4. Publish an average (probably a median) of separate MPC members' forecasts for economic activity and prices, which would represent, literally, the 'centre of gravity' of the Committee.⁽²⁾ The median could be accompanied by some indication of the dispersion of forecasts as well. The MPC could adopt some explicit common underlying assumptions-in particular, the assumption about the path of short-term interest rates-or it could allow each member to choose an expected path for interest rates and exchange rates and publish the median of those choices.⁽³⁾ Over time, the median forecast should line up with the median vote on policy, so that policy and the forecast would be reasonably well related, though that might not be the case for each published forecast. With each member's forecast weighted equally in determining the median, members should not have the same opportunities or incentives to game the forecast process.

Still, with possibly nine individual forecasts, it would become difficult to weave together a coherent story about the common concerns and expectations that are likely to be factored into policy decisions, losing an important element of the information helpful to markets and the public. Another key aspect, the MPC members' sense of risks to and uncertainty around their forecasts, probably also would be problematic to determine and portray relative to the median forecast. With individuals rather than the Committee taking responsibility for forecasting, the

⁽¹⁾ Presumably a 'Bank' forecast ultimately would have to be the responsibility of the Governor rather than a Bank consensus since the other internal members of the MPC, themselves individually accountable, might not agree with the Governor.

⁽²⁾ This alternative resembles the practice followed by the Federal Reserve, in which a full range and centre two thirds of

FOMC member forecasts of a few key variables are published. (3) FOMC members do not specify the monetary policy or other assumptions underlying their forecasts.

MPC might find it harder to achieve the benefits of the forecast process—the grappling together over the forecast, testing ideas, coming to a better understanding of alternative positions, and reaching compromise on many issues. And those members finding themselves well away from the median might still feel the need for an outlet to express their views.

5. Finally, a more incremental change would be to make the forecast explicitly the view of the majority of the Committee, allowing dissents.⁽¹⁾ This would help clarify 'best collective judgment', eliminate the need for Table 6.B and its associated ambiguities, and retain many of the benefits of the current process and outcome. Especially if dissents were limited to a paragraph either in the Inflation Report or in the minutes of the relevant meeting and not shown as alternative fan charts, the majority view would get most of the attention, and incentives to join and shape the majority would persist. The public would be better informed about how many of the MPC members were associated with the forecast, while dissenters would be free to be as specific as they wished about their alternative forecasts and the reasons for them.

Skews and variances

It is not only the middle of the forecast range, however defined, that is important for policy transparency, but perhaps equally, if not more, critical are the skews—the risks the policy-makers see to realising their forecasts and objectives. Especially when the central tendency is often very close to the target, the most important information the MPC can convey may be in the discussion of risks. Explanations of the types of contingencies the policy-makers are concerned about and how they might react should they occur should alert financial markets to noteworthy potential developments and foster responses in those markets to those developments that the central bank is more likely to find constructive and stabilising. In this regard, the clarification in the last Inflation Report that the skews include possible future asset price movements as well as economic developments that may already be in train, like alternative paths for earnings and margins, was useful. The Report also discussed the role that perceptions of potential risks might play in determining the current stance of policy. Further clarification of the central tendency of the forecast will have implications for the definitions and clarification of skews and variances.

(1) This is the model followed by the Rijksbank in Sweden.

Constant interest rate assumption

The assumption used to condition the forecast that the policy interest rate would be held constant over the forecast horizon has been criticised by the IMF and others on the grounds that it is predictably at odds with reality, gives as a consequence a misleading and inconsistent perspective on the forecast, and is less informative and transparent than an alternative that gave the MPC's expectations of how it would react to the expected evolution of the economic environment.

In concept, telling people about the most likely path for policy in the future may well be preferable. In some cases, the MPC may expect that raising or lowering rates over the next few years is likely to be necessary to keep inflation around its objective. These sorts of expectations can arise from several sources. On occasions when the MPC is especially uncertain about some aspects of the evolving economic situation it may want to proceed cautiously-raising or lowering rates only part of the way to what it thinks will ultimately be needed, and awaiting added evidence on whether the full adjustment is called for. In addition, in some circumstances the path of inflation as the two-year horizon is crossed gives strong indications of the MPC's sense of what policy actions are likely to be needed as the forecast rolls forward. To the extent that the MPC has expectations about how the economy will evolve beyond two years and how it most likely would respond to such developments, letting markets know would be a step in the direction of greater transparency that should promote helpful market reactions to new data. Giving the Committee's expectations for interest rates would tend to produce a more credible and consistent forecast—one based on a more likely path of rates and the MPC's best estimate of how financial markets and spending by businesses and households would respond to such a path.

Nonetheless, what is desirable in concept may be problematic or even counterproductive in practice. If the MPC adopted the 'median' approach to its forecast, discussed above, it might allow MPC members to choose their own path for policy rates associated with their forecasts and show a median of those paths as well as of the results for the economy and prices. However, whether MPC members individually would want to do this and whether the medians of the forecasts of interest rates and economic outcomes would be sensibly related and informative are open questions.

If the MPC continued to seek a consensus or majority forecast, the problems are even larger. In my conversations on this issue, many MPC members stressed the difficulty of the Committee coming to agreement on a possible future path for interest rates. They noted the closely argued nature of the debate on current rates, and their inference that agreement on future rates would be essentially impossible. There are many different paths for interest rates that will achieve the same inflation objective, even when members are in rough agreement on the outlook. The MPC itself has too short a history over too few economic circumstances to rely on its 'typical' past reactions as a foundation for a hypothetical future policy path. Moreover, the MPC already publishes a lot of information about its view of underlying economic relationships, in part by showing how it would anticipate economic activity and inflation to evolve if interest rates follow the path expected by the market, in addition to its forecast with rates unchanged. By giving two forecasts based on different interest rate assumptions, the MPC is conveying quite a bit about its views on the interest-sensitivity of spending and the spending-sensitivity of inflation, which should help observers predict future policy actions. In practice, making the constant rate forecast the centrepiece of the Inflation Report has not deterred the financial markets from building in future rate changes, even when the forecast is for inflation to be at target in two years.

An additional potential problem is the degree to which markets might take such an expected path for policy rates as indicating a greater degree of commitment than the Committee intended. Experience in other countries suggests that problems arise not so much in reaction to the announcement of a path, as in market responses to subsequent developments. Central banks making announcements about future paths for policy-related variables try to emphasise that they are conditional and contingent on the expected evolution of the economy, and that deviations from those expectations would require paths to be adjusted. However, it is impossible to foresee all possible developments-every situation is different, and the differences, possibly subtle, may not be clear to markets, which then react inappropriately. The central banks of both Canada and New Zealand found that publication of expected monetary conditions indexes (which include both exchange and interest rates)

tended to produce inaccurate and counterproductive interest rate movements when certain unexpected shocks hit the exchange markets.⁽¹⁾ And in the United States, when the FOMC gave its sense of the odds on possible future rate policy actions, market responses to subsequent policy-maker statements and data tended to build in much stronger rate expectations than appropriate, given policy-maker intentions. As a consequence, the Federal Reserve has changed its announcement to a form that more closely resembles the MPC skews—that is, emphasising the risks to hitting its objectives, rather than its possible actions on interest rates.

In light of these difficulties, the first priority of the MPC might be to improve the clarity and usefulness of its current forecast made under constant interest rates. To further aid the public in forming expectations about future interest rate changes, the Committee might consider extending the forecast beyond two years, either formally in the fan chart, or informally in a discussion of tendencies. Such an extension, together with information about the risks to the forecast, should help the public make informed judgments about the likely course of interest rates. In addition, the Committee might encourage research on how it could determine and publish any views it had about the possible future evolution of the policy rate.

Focus on two-year ahead forecast

Another aspect of the process and the outcome that the MPC may want to give some attention to is the extent of its focus on having its forecast of inflation eight quarters ahead at $2^{1}/_{2}$ %. A two-year ahead intermediate inflation target has a number of advantages: it is clear and obviously related to the MPC's ultimate objective; it underlines the inevitable forward-looking nature of policy actions; and it is far enough in the future to allow many short-term disturbances to die out and so helps to emphasise the underlying forces determining inflation and to avoid possibly disruptive reactions to these short-run disturbances.

But too close attention to this metric can have disadvantages as well. Such an emphasis can give insufficient attention to inflation before and after the two-year mark, and too little weight to the possibility that under some circumstances projected inflation away from the target at the two-year mark may be appropriate

⁽¹⁾ The Reserve Bank of New Zealand now gives its expectations for interest and exchange rates separately.

for the economy. Such a deviation might be caused by an unusual degree of uncertainty that called for gradual policy movement, by shocks of certain type and dimensions, after which a more gradual return to target would help damp output fluctuations, and by the possibility that to protect against the potential effects of an especially serious contingency, such as a major financial market disruption, the MPC might want to steer temporarily away from tight adherence to the intermediate target.

Several MPC members emphasised that they indeed understand the $2^{1}/{2}$ % forecast to be just an intermediate target to help the MPC achieve the objective set by the government, and that they are not driven under all circumstances to adjust policy to align the eight quarter ahead projected inflation rate exactly with this objective. However, others did seem to put considerable weight on keeping this projection very near the target, and many in the public apparently expect the Committee to adjust policy to achieve this intermediate target. The forecast round meetings are almost completely oriented to this standard and, in my observation, there was little discussion of whether it was appropriate under the circumstances, though this lack may have been related to the particular conditions at the time. One risk of the emphasis on the two-year out inflation target, taken together with the use of the unchanged policy assumption to present that target, may be a more active policy—one with greater movements in the policy rate than might be optimal. To be sure, such an outcome would be preferable to a bias toward excessively sluggish policy changes, which could allow misjudgments to build and ultimately require a more wrenching adjustment to the economy.

Thus it might be useful to treat this forecast target flexibly in *Inflation Reports* as well as in policy-making. The MPC has already taken a step in this direction in the August *Inflation Report*, which included an inflation forecast a bit above the target. Under some circumstances, even larger deviations might be appropriate, and they should not cause problems for inflation expectations if the reasons for them and likely policy response are carefully explained and if actual outcomes continue to be favourable. The MPC's inflation round discussions already include consideration of inflation and economic developments beyond the two-year published forecast horizon. More discussion of this sort might be useful in the *Inflation Report* itself to reduce the attention on the two-year horizon. As already noted, such discussion would also help with some of the issues raised in objections to the constant interest rate assumption.

Forecast evaluation

Periodic and systematic evaluation of the forecast can make an important contribution to improving performance over time. The MPC is already engaged in that process, comparing outturns to forecasts in the August Inflation Report this year and last. Such an exercise can be quite useful at suggesting very broadly areas in which forecasts have been closer and further from outturns. But more precision is difficult. As the Report states, the exact reasons for forecast misses are hard to sort out—whether they result from deviations of interest rates and exchange rates from their conditioning assumptions, or from not correctly anticipating the underlying relationships governing spending and prices. Analyses of these sort can be carried out in the context of forecasts developed from statistical models, but the Inflation Report forecasts are necessarily the judgment of the MPC, not the mechanical results of a model forecast. Still, models that embody the understandings of the MPC can be useful for this purpose.

The inflation forecast process

As noted in the background for this section, members of the MPC saw both strengths and weaknesses in the process I observed last spring used to produce the forecast. As the MPC moves forward it will need to see whether it can design some alterations to the process that retain its beneficial aspects—a collective examination of forces shaping the outlook to come to a conclusion that belongs to most of the Committee while reducing its costs, including the burden on MPC members.

Among the goals any changes might consider are: reducing the number of meetings and, except for agenda-setting, beginning them only after the meeting the previous month—in part to be certain that incomplete inflation forecasts cannot influence policy discussions; and allowing sufficient time in the more limited number of meetings to consider the most important issues and risks and the underlying forces expected to shape how the economy and inflation are likely to develop.

In these regards, the staff might play a somewhat greater role, while the MPC still retained clear overall

control. In particular, the MPC might consider asking the staff for a starting-point forecast for deliberations, summarising the effects of developments since the last *Report*, using as far as possible, the assumptions and expectations embodied in the last forecast. In addition, currently, the staff is deferring to the MPC for all decisions and judgments, and while ultimately this is appropriate, if the staff were allowed to recommend positions on small points, the MPC might be able to reach conclusions on them more expeditiously and focus more on the larger ones in fewer meetings. In this way, the MPC might get better value from its staff, reducing the MPC's burden while allowing the staff to play a more rewarding role in the process.

It is my understanding that the MPC has moved in this direction since my visit. Continuous re-evaluation of the process and the balance between its burden and its benefits are likely to pay dividends in terms of a more efficient and effective inflation forecast process.

Inputs into the forecast

An extensive variety of information and analysis went into the inflation forecast. Regional and sectoral analyses, including the Agents' reports, were used to help gain a better understanding of emerging trends. For example, in the round I attended, the Agents' reports on earnings developments in various regions, in particular the influence of year-end bonuses associated with the millennium, shaped the interpretation and forecast of labour costs. In making its forecasts, the MPC weighed all the relevant recent data, examined how that data affected their views of ongoing relationships in the economy, and used a number of research and analytical reports from staff.

The role of the staff in the inflation forecast of the MPC differs from its role in many other central banks. Often in other banks, the staff produces a forecast, sometimes with general guidance from policy-makers, that the policy-makers then react to and shape to conform with their own expectations.⁽¹⁾ At the Bank, the role of the staff has been to help the MPC build a forecast, without the staff at any point making its own forecast. Most (though not all) MPC members preferred this procedure as one that contributed to good policy-making and that more clearly ended up with a forecast that reflected the preferences of the MPC, not the staff.

The Bank's staff did play an essential and constructive role in helping the MPC to arrive at its forecast. It organised and summarised information and identified key issues for MPC consideration. It presented analyses of many of those issues to the MPC with alternative outcomes for MPC consideration. And it followed up promptly on the many questions raised by the MPC with further data and analysis.

In this process the staff relied on statistical models to a considerable extent, both a main model and auxiliary equations, to organise the analysis and present options for MPC decisions. The use of a variety of models is entirely appropriate-no one model can capture all relevant aspects of every issue the MPC would want to consider. This practice conforms closely to that followed in the United States, where the Federal Reserve Board staff has a large multi-equation model used for a variety of simulations and projections, but also makes extensive use of many smaller models to analyse developments in particular sectors and markets. Ultimately any forecast published by the MPC will necessarily be one informed importantly by the judgment of the policy-makers. But models are useful inputs into those judgments, reinforcing the importance of continuing to allocate resources to improve these models.

The inflation forecast process takes substantial time and effort of key staff. In my observation, staff presentations and responses were objective and highly professional. The staff involved had detailed knowledge of the relevant issues and forecasting techniques. As desired by the MPC, they deferred to the Committee for all decisions.

The Inflation Report

The *Report* is a thorough analysis of factors affecting the UK economy and financial markets, and hence the outlook for achieving the Government's inflation target. In addition to the 'Overview' and 'Prospects for inflation' sections, which are keyed very closely to the inflation forecast and the policy situation, it covers a wide range of financial and economic developments that form the background for the forecasts of economic activity and inflation and the conduct of policy since the last *Report*.

The *Report* is thorough in its coverage and logically organised. Recent developments in financial markets

⁽¹⁾ At the Federal Reserve the staff produces a forecast that then acts as a benchmark for FOMC discussion, with Committee members free to disagree with that forecast, which they often do.

and the economy are interpreted and related to the forecasts and decisions of the MPC. The boxes seem especially useful in highlighting and explaining in greater depth elements affecting the forecast that are particularly important or puzzling.

One innovation of the *Inflation Report* is the presentation of the forecasts for economic activity and inflation in the form of a fan chart. Every forecaster must cope with how best to convey not only what he believes to be the most likely outcome in the forecast, but the uncertainty around that forecast. No method is perfect, but the fan chart has a number of favourable characteristics. It encompasses in one picture not only the most likely outcome, but the growing uncertainty about that outcome as one moves into the future, and any sense that the risks around the outcome are skewed more in one direction or the other. And comparing fan charts between *Reports* can convey shifts in uncertainty and risks over time, as well as changes in the central tendency.

A danger is that in a graph intended to illustrate uncertainty, the relatively fine 10% bands end up being read as connoting more precision about the variance and balance of risks around the forecast than warranted or intended. And the MPC will need to be clear about what the bands around the central tendency represent; in particular, in the past some users had been under the mistaken impression that the bands were intended to capture the disparate central forecasts of all the Committee members. In fact, they represent the 'best collective judgment' of the Committee about the risks around its 'best collective judgment' of the central tendency. As the MPC clarifies what the forecast is, it will have further opportunities to clarify and reinforce the proper interpretation of the fans.

Preparation of the *Report* places considerable demands on the time of staff and the Chief Economist, and lesser, but still substantial, demands on other policy-makers. But it is important for the central bank to demonstrate publically that it has considered the broadest possible range of information and to show how it has analysed those elements in arriving at its forecasts and policy decisions. The *Report* is the principal means by which the MPC can show that it has taken account of sectoral and regional information, as required by Parliament. Analyses in the *Report* can influence how others approach the interpretation of important data and can help to stimulate research and a dialogue on the issues with market participants, academics, and other interested observers. Some other central banks publish two main reports each year and two, less complete, 'updates', on the grounds that under usual circumstances not enough new data is available in one quarter to warrant a full new analysis. An update likely would require no less effort in terms of producing a forecast, but it would tend to save resources utilised for the background chapters. However, the MPC would be forgoing two opportunities each year to draw special attention to the interpretation of that background material.

The work of Monetary Analysis

Overall evaluation

The work of Monetary Analysis has been addressed at several points in this report. As implied by the discussion, I found the staff in Monetary Analysis (MA) to be dedicated, highly competent, professional, responsive to the needs of the MPC, and employing advanced techniques to meet those needs. The staff is highly motivated to contribute to the policy process-in many cases connection to that process was what had brought them to the Bank and keeps them there. Increasingly, MA has adapted itself and its work and research orientation to serve the needs of the policy-makers. The output was of high quality and closely linked to the policy issues being addressed by the MPC. While several possible adjustments to research and analysis (ie more intermediate-term research and added resources for model-building) have been identified for consideration, these would involve potential small shifts in existing emphasis, not a major reorientation of programs. As a general matter, I did not perceive that MA was expending significant resources on tasks they should not be undertaking, or that there were significant holes in the research and analysis that need to be filled.

MPC members universally rated the staff of MA highly for technical competence and dedication. They had a variety of views on the allocation of staff time and on the relationship of the staff to the MPC. As discussed above, many MPC members would prefer more research and analysis, though they differed on how much and what type. Both staff and MPC saw the relationship of the staff to the external MPC members as having been clarified and improved by the agreements of late last year. Lines of communication and responsibility were better defined; the dedicated resources of the externals should relieve some of the pressure and uncertainty in MA-external interactions; and the new methods for creating and carrying out long-term research should help to focus research on a broad range of MPC issues and allow productive interactions between MPC members and staff on research projects. During my period at the Bank the programmes had not yet been fully implemented, in that the externals were just getting staffed up and research was just getting under way, so questions persisted on how a number of issues would work out in the end. Those issues included: complications from incongruent spans of authority and responsibility for directing staff, in which external members necessarily had broad authority for directing work, but responsibility for oversight and staff development lay with a few internal members; the exact nature of the limits, constraints, and protocols for staff-MPC interaction, including access of policy-makers to work-in-progress; the role of a potential alternative research operation under the externals; and greater emphasis on a top-down research agenda. Many of these will naturally be clarified and dealt with as experience with the new system is gained. Staff hoped that this evolution would facilitate closer direct interaction with MPC members, including more guidance from the internal members responsible for MA and monetary policy.⁽¹⁾

The level, mix and turnover of staff resources in MA

The MPC schedule of twelve meetings and four Inflation Reports each year puts considerable pressure on key staff, and burn-out was an issue among these staff members. With little down-time between meetings, their ability to focus on anything but the short-run analysis for the next meeting or inflation forecast was severely limited. Nonetheless, most staff and MPC members did not think that greater numbers of people were needed in MA. Rather the keys to relieving this pressure and enhancing the performance of MA within current authorised staffing levels were seen to be: filling authorised slots; spreading the work burden around more-allowing greater numbers of people to have prominent roles in briefing the MPC and helping with the inflation forecast; making sure MPC demands on staff were necessary and reasonable; continuing the trend toward a mix of hires better suited to the new higher-level research and analysis demands of the MPC; and reducing staff turnover.

Shifting the mix of hires toward a greater number of PhD-level economists may require continued adaptation by the MPC and by management in MA. Good researchers will want to have time and opportunities to originate research ideas, related to monetary policy but not necessarily within the tight framework of the MPC research agenda; they should require less detailed oversight of their research by managers and will desire more direct interaction with MPC members; they will expect responsibility and credit for the research to reside importantly in the individual as well as in the managerial unit; and they will expect tolerance (within limits) for publication of ideas and results that may not conform in every respect to MPC or Bank views.

Both staff and MPC perceived staff turnover to be high and costly in terms of meeting the objectives of MA and the MPC. In particular, staff was relatively young, and although quite talented, turnover had meant that its overall level of experience was low, and so the build-up in the type of judgment that comes with experience had been impeded. To some extent, the turnover was seen as inevitable, reflecting the exit of staff not well suited to or interested in the new more demanding policy environment and the unavoidable inability of the Bank to keep up with rapidly escalating City salaries. However, a number of factors other than salaries were seen as important causes of high turnover-in effect adversely affecting the job satisfaction and quality of worklife that can substitute for higher salaries. One such factor was the work stress discussed above, and the associated lack of time for research. Another set of issues concerned governance within MA. Staff recognised that steps had been taken to enhance communication within MA, but several felt that more would be useful reaching well down in the organisation. They wanted to know about and to be able to contribute to the consideration of issues beyond those confined to the relatively narrow area in which they worked, and they saw broader knowledge of the concerns of MPC and top MA staff as better enabling them to direct their work in more productive directions. In addition, staff felt there was a lack of career paths for advancement, especially since turnover had meant that management were relatively young. There had been considerable discussion of creating a 'senior economist' job slot that would give people something to move up to before they got into

⁽¹⁾ A common comment of staff was that they welcomed opportunities to work closely on research and analysis with both external and internal individual MPC members, and that previous ambiguities about relationships had impeded achieving this goal. Concerns persisted to some extent that the full potential for collaboration with both types of members would still not be realised.

management, but to date no such category had been created.⁽¹⁾

A final set of issues contributing to turnover involved relationships between the staff and the MPC. One aspect related to the research agenda. While many staff were pleased with the new procedures for generating longer-term research projects, others chafed under what they perceived to be the more limited scope for staff-initiated research, and for research not directly related to the MPC's agenda. A more difficult issue related to the general tone of the relationships with the MPC. While MPC members often stated that they desired more analytical presentations from the staff, many staff perceived that this would not really be welcome. In their view, the MPC tended to see the staff more as suppliers of data than as expert analysts whose opinions were sought and respected. The staff recognised that their function was to help the MPC carry out its responsibility for making monetary policy, the necessity for the MPC to establish clear bounds between its and the staff's responsibilities, and the possibility that settling-in difficulties in the early years of MPC had contributed to the evolution of the relationship of the staff to the MPC. Nonetheless, within the necessary bounds, many staff members thought they could be more helpful to the MPC than the MPC was allowing them to be, and that being allowed to make more of a contribution would improve their job satisfaction and reduce turnover.

(1) Such a job category includes about 30% of the (non officer-rank) economists on the research staff at the Federal Reserve Board. It is awarded to those economists who have demonstrated a high level of performance on a consistent basis over time and who often are looked to for guidance and expertise by other staff economists, by policy-makers, or by external observers.

Bank of England response to the Kohn Report

Introduction

The Bank of England's Monetary Policy Committee (MPC) was set up in May 1997. Its remit is to meet the Government's inflation target—currently set at $2^{1/2}$ %. The procedures by which it conducts its monthly meetings, interacts with the staff of the Bank of England, and produces its quarterly forecast and Inflation Report are all reviewed regularly. The non-executive Directors of the Court of the Bank are charged under the Bank of England Act 1998 with an oversight role on the MPC's procedures. At their suggestion, the Bank decided to commission an informed expert to undertake an external review of the procedures of the MPC, and its analytical support in the Bank of England, with the aim of helping the MPC think further about its own procedures and enabling the non-executive Directors to form a judgment about those procedures.

To that end, the Bank asked Don Kohn, Director of the Division of Monetary Affairs at the Federal Reserve Board in Washington, to visit the Bank of England for a period in the spring of 2000 and to conduct such a review. His terms of reference are attached in the annex on pages 53–54. To facilitate his work, Mr Kohn spent six weeks visiting the Bank of England in the spring of 2000 and he returned to present his findings and discuss them with both the non-executive Directors of Court and the MPC in October 2000. The Bank is extremely grateful to Mr Kohn for undertaking this review and to the Federal Reserve Board for allowing him to do so.

The Bank has decided to publish Mr Kohn's report. This is being done for two reasons. First, publication of the Report is an ingredient in making the monetary policy process in the United Kingdom transparent as it is a key part of the information upon which the non-executive Directors of the Bank will form their judgment about the procedures of the MPC. Second, the Report itself touches on issues that are at the heart of the monetary policy process in all countries. These include how forecasts should be constructed, who should be responsible for their publication, and the way research in a central bank should be conducted. We hope that central banks and those interested in the monetary policy process around the world will find the Report useful and may find lessons that apply to them as well as to the Bank of England.

The MPC's response

The MPC has discussed the Report, which it found very helpful. It accepts the points that Mr Kohn raises, and agrees with most of the suggestions that he makes. Some of these have already been implemented following discussions with Mr Kohn during his visit. The implementation of the remainder is presently under discussion by the Committee. However, on many of the questions raised in the Report, Mr Kohn notes that there are no simple answers. This is particularly true of one important theme which runs through the Report, namely the problem of reconciling individual accountability of MPC members with the need to present a collective message to the public that explains the decisions of the Committee. The Report stresses the need for the MPC to keep these questions under active consideration, a recommendation the Committee warmly accepts.

More generally, the issues raised in the Report can be usefully summarised under four headings. These are:

- (i) research in support of monetary policy;
- (ii) arrangements for briefing the MPC on the state of the economy;
- (iii) the forecast process; and
- (iv) the relationship between the MPC and the staff of the Bank of England.

(i) Research in support of monetary policy

Under a new procedure agreed at the end of 1999, the MPC holds an annual meeting to discuss and agree the research priorities for the Monetary Analysis Divisions of the Bank for the following year. The first such meeting took place in December 1999. The Report notes that it is important that this research agenda is not simply imposed top-down by the Committee, but allows

(1) The MPC agreed this response on 6 December 2000.

research ideas to 'bubble up' from staff in the Bank. The MPC is aware of this need. The views of the staff are discussed, with those of MPC members, at the annual meeting to set research priorities. At the December 1999 meeting, out of the fifteen proposals agreed by the Committee, eleven were put forward by the staff. The MPC also holds a meeting after each forecast round to set the priorities for research work with a shorter horizon, typically to be done before the next round. However, research can stretch over more than one round, if that is felt to be appropriate. Such intermediate-term research is then discussed by the Committee each quarter.

The Report suggests that increased resources be devoted to the improvement of the models used by the Committee in its forecast process. The MPC agrees that the resources devoted to model development are at present inadequate, and that there is an urgent need to allocate more resources to this task. The Bank will be reviewing its resources for developing its suite of models, including the short-term macroeconometric model, in its next internal budget round.

(ii) Arrangements for briefing the MPC on the state of the economy

The Report suggests that the monthly briefings of the MPC by the staff (known as 'Pre-MPC' meetings) be shorter, better focused and more analytical. The Committee agrees with this suggestion, and, following discussions with Mr Kohn during his visit to the Bank, it has been implemented. The briefings to the MPC have been reduced in length and are now, the Committee believes, better focused. Heads of Division are also being encouraged to be more analytical in their presentations. But there is a genuine dilemma here. Providing more analytical material, and more views from the staff, will reduce the amount of factual briefing, which some MPC members find useful. The aim of the Pre-MPC briefing is not to generate extensive discussion at that meeting, but rather to provide the information for the Committee to conduct the debate at the MPC meeting itself.

(iii) The forecast process

Many of the substantive issues identified in the Report revolve around the forecast process. There is one common theme that runs through all the suggestions in this area. It is the need for the MPC to explain clearly both the nature of the forecast—described in the Inflation Report as the 'best collective judgment'—and how it is constructed. In what way is the forecast representative of the view of a majority of the Committee? Is it that of the median voter on the Committee? In other words, what is the relationship between the views of the nine individual members of the Committee and the published forecast? The Report makes clear that there is no simple answer as to how best to present the views of a Committee where the members are both individually and collectively accountable for its actions. The MPC already has discussed this issue on a number of occasions, and will keep it under review. The Report points to a number of costs and benefits of making changes from the present procedures, but does not recommend any one alternative as the preferred choice; all have some drawbacks. This is not an area in which there is a single best approach.

The Report discusses five ways in which the published forecast could be said to reflect the 'centre of gravity' of the Committee's decision. Each corresponds to a different way of constructing the forecast. This goes to the heart of the difficulty of producing a Committee forecast with nine members whose individual views determine their voting patterns, and who are accountable for those votes. The present method of constructing the forecast ensures that the fan charts do indeed represent the 'centre of gravity' of opinion on the Committee, with Table 6.B of the *Inflation Report* providing an indication of the magnitude and source of the main differences of view within the Committee.

A more technical issue related to the forecast concerns the conditioning assumption about interest rates underlying the forecast. At present, the MPC publishes two sets of fan charts. The first is based on the assumption of constant official interest rates throughout the two-year forecast horizon. The second assumes that official interest rates follow market expectations. As the Report points out, trying to condition the forecast on the Committee's own views on the path of future interest rates is problematic. There is no collective view of the Committee on the likely future path of interest rates, and the Committee instead focuses on communicating its views about the likely paths of inflation and output under the assumption that the current level of interest rates is maintained.

The Kohn Report suggests that the Committee treat the two-year forecasting horizon flexibly in *Inflation Reports* as well as policy-making. In fact, this is already part of

the current forecast process although it may not always be obvious from reading the *Inflation Report*. The Kohn Report also suggests that the MPC should try to explain in more detail the relationship between the forecast for inflation two years ahead and the policy decision. The MPC accepts that this is an area requiring further examination and public explanation and accordingly the November *Inflation Report* contained a box explaining the relationship between the two-year ahead central projection and the policy decision. It also stressed the crucial point that a forecast is a probability distribution, not a point estimate, and that accordingly there is no mechanical link between the central projection and the policy decision.

The Report suggests that there be more evaluation by the Committee of the difference between the outturns and forecasts. Such a comparison has always played a part in the construction of the forecast, and recently more explicit attention has been paid to the details of this. The MPC recognises that more resources need to be devoted to the analysis of past forecast errors, and implementation of this is on the agenda for the next meeting to determine research priorities.

Mr Kohn also suggests that the staff play a greater role in the process of producing the forecast. The MPC agrees with this suggestion, and has implemented it. The forecast process now starts with an updating by the staff of the earlier forecast, which explicitly considers the implications of recent data and suggests the key issues which the Committee needs to discuss.

The Report contains a number of suggestions as to how the forecast process could be made more efficient. These include: reducing the number of MPC meetings on the forecast; starting the forecast process somewhat later than at present; ensuring that the MPC focuses its discussions on the 'big issues' rather than on the detail of constructing the forecast from the bottom up; and enabling the staff to play a greater role. All of these suggestions have been implemented following earlier discussions with Mr Kohn.

(iv) The relationship between the MPC and the staff of the Bank of England

The Report notes the high quality of Bank staff, in both the conjunctural and research areas. It makes some observations and suggestions concerning the relationship between the MPC, on the one hand, and the staff of the Monetary Analysis (MA) Divisions of the Bank on the other. Amongst other things, Mr Kohn identifies the potential impact on MA of the creation of a separate support unit for the external members of the Committee, and the tone of relationships between MA staff and MPC members.

In December 1999 a new arrangement was introduced whereby the external members of the MPC were each provided with two economists to work for them. These new arrangements had only just been introduced at the time of Mr Kohn's visit. The MPC believes that the new arrangements are working well, but the Committee recognises the need to monitor and adapt these arrangements in the light of experience. In particular, the Committee will want to ensure that the allocation of the dedicated researchers of the external members does not lead to reduced interaction between MA staff and the MPC. The Committee recognises the need to maintain an appropriately constructive relationship between MA staff and members of the MPC.

The Report also draws attention to pressure on staff working for the MPC. Bank management is exploring ways of reducing the burdens on staff, through more effective use of IT for example, and efforts in this area will be stepped up. The Report also notes a number of salary and non-salary issues that need to be addressed, and this is in hand. For instance the Bank has recently introduced a 'Senior Economist' position alongside the management grade, thus ensuring that progressive career paths are open to staff members with different strengths. There are currently seven such Senior Economists, and it is expected that the number will expand as experience levels rise. Finally, the Report emphasised that staff promotion and reward must depend on merit and not be influenced by whether the staff member is working within MA or working for an external member of the MPC. The MPC agrees that the promotion and reward of staff must be, and must be seen to be, entirely meritocratic.

In conclusion, both the MPC and the Bank welcome the thoughtfulness and perceptive insights that Don Kohn has provided in his Report. We recognise that it is unusual for a central bank to publish such an external review of its work. But we believe that both our monetary policy process and public understanding of that process will benefit from publication, and we hope that the Kohn Report will also be useful to others.

Annex Remit for Don Kohn's review of MPC procedures

The Monetary Policy Committee (MPC) is a Committee of the Bank of England constituted by the Bank of England Act 1998, with responsibility for formulating the United Kingdom's monetary policy. The MPC meets monthly to determine interest rates.

The non-executive Directors of the Bank of England (NEDs) have a statutory requirement to keep under review the procedures followed by the Monetary Policy Committee, including whether the Monetary Policy Committee has collected the regional, sectoral and other information necessary for the purpose of formulating monetary policy.

You have kindly agreed to undertake a review of the MPC procedures. On behalf of the Court of Directors, we would like you to consider the following issues:

Written briefing for the MPC

- How does the quality compare with the briefing prepared by the Federal Reserve or other examples of best practice?
- Is it provided in the appropriate quantity?
- Do the notes provide the appropriate amount of information?
- Can you detect any bias, in a policy sense, from what is provided?
- Does the briefing adequately address regional and sectoral issues, and how does it compare with the Fed in this regard or other central banks with which you are familiar?
- Do you have any comments on the way information is disseminated, that is by paper, e-mail, or intranet?
- Apart from the answers to the above questions, do you have any suggestions as to how the briefing could be improved?

Pre-MPC briefing meeting

- How does the quality compare with similar oral briefings at the Federal Reserve or other examples of best practice?
- Does the meeting provide the appropriate quantity of information?
- Are there any data that are missing from the presentations, or are there data that are superfluous?
- Can you detect any policy bias in the presentations?
- Do the presentations cover sufficiently regional and sectoral data?
- What is your view on the chartpack supplied for the meeting?
- Apart from the answers to the above questions, do you have any suggestions as to how the meeting could be improved?

Forecast and Inflation Report process

- What are your general views on the process, and how does it compare with the Fed's approach or other examples of best practice?
- Do the meetings achieve their objectives efficiently? How could they be improved?
- The MPC takes the view that no one model can adequately capture the key features of the economy. It has therefore decided to use a suite of models as described in the book *Economic Models at the Bank of England*. Do you have any comments on this approach, do you think it makes a material difference to the forecast?
- What is your view of the fan chart approach to forecasting?
- What is your view of the *Inflation Report* document? Its objective is to enhance the transparency of the policy-making process. Does it achieve that aim?
- Does this process give adequate consideration to the regional and sectoral impact of monetary policy? How does it compare with the Fed's or other central banks' treatment of these issues?

The work of Monetary Analysis

- As the main area of the Bank to service the MPC, does Monetary Analysis have the appropriate level of resources to do its job?
- Are the resources being used efficiently?
- Is the current split between briefing and research appropriate? How does it compare with the Federal Reserve and other examples of best practice?
- Is there anything Monetary Analysis should be doing that it is not?
- Is there work being done that is unnecessary?

Bank capital standards: the new Basel Accord

By Patricia Jackson of the Bank's Financial Industry and Regulation Division.

The 1988 Basel Accord was a major milestone in the history of bank regulation, setting capital standards for most significant banks worldwide—it has now been adopted by more than 100 countries. After two years of deliberation, the Basel Committee on Banking Supervision has set out far-reaching proposals for revising the original Accord to align the minimum capital requirements more closely with the actual risks faced by banks.

On 16 January 2001 the Basel Committee released a consultation package setting out the details of the new Accord.⁽¹⁾ Comments are requested by the end of May and the Committee is expecting to release the final version of the Accord by end-2001 for implementation in 2004. A parallel consultative process is also operating at the EU level. A directive to implement the Basel proposals in the EU, which will cover both banks and investment firms, is also due to take effect from 2004.

The 1988 Accord was based on broad credit risk requirements, although it was amended in 1996 to introduce trading-book requirements as well. The proposed new Accord has three pillars: Pillar 1 will set new capital requirements for credit risk and an operational risk charge; Pillar 2 will require supervisors to take action if a bank's risk profile is high relative to capital held; and Pillar 3 will require greater disclosure from banks than hitherto to enhance market discipline (see the box on pages 56–57, which sets out the details of the new proposals).

The new credit risk requirements will be much more closely tied to the riskiness of particular exposures. In order to set such risk-based requirements the Committee had to consider a wide range of issues regarding the determinants of credit risk. This article sets out the background to the proposed changes and some of the issues that arise.

Background

The 1988 Accord represented a revolutionary approach to setting bank capital—an agreement among the

Basel Committee member countries that their internationally active banks would at a minimum carry capital equivalent to 8% of risk-weighted assets (with the Committee setting broad classes of risk weights). The agreement was made against a background of concerns about a decline in capital held by banks, exacerbated by the expansion of off balance sheet activity, and worries that banks from some jurisdictions were seeking a short-term competitive advantage in some markets by maintaining too low a level of capital.

The introduction of the Accord seems to have led to some rebuilding of capital by the banks in the G10, but over time the broad nature of the risk categories created strains.⁽²⁾ The Accord differentiates between exposures using general categories based on the type of loanexposures to sovereigns (split into OECD and non-OECD), exposures to banks (split into OECD and non-OECD, with the latter split into less than one year and more than one year), retail mortgages, and other private sector exposures. Little allowance is made for collateral beyond cash, government securities and bank guarantees. The broad categories reflected the state of systems in banks at that time. But during the 1990s, banks started to develop more sophisticated systems to differentiate between the riskiness of various parts of the portfolio to improve pricing and the allocation of economic capital. These systems highlighted the discrepancy between required capital and economic capital for some exposures, creating an incentive to sell some loans. The chart below sets out a risk measure, the value at risk (VaR) over a one-year

⁽¹⁾ Basel Committee on Banking Supervision (2001). The Bank of England and Financial Services Authority jointly represent the United Kingdom on the Basel Committee.

⁽²⁾ Jones (2000).

The main elements of the new Accord

Pillar 1-minimum capital requirements

(i) Credit risk

Two approaches are proposed for the new Accord: the standardised approach and the internal ratings based approach (IRB); and within the IRB there will be a foundation approach and an advanced approach—the latter will give more scope to banks to set elements of the capital charges.

The standardised approach

Under the standardised approach banks will slot assets into weighting bands according to ratings from eligible rating agencies (ie recognised by national supervisors in accordance with specified criteria). The bands are as follows:

Per cent	
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	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to BB-	B+ to B-	Below B-	Unrated
Sovereigns	0	20	50	100	100	150	100
Banks 1 Banks 2	20	50	100	100	100	150	100
< 3 months	20	20	20	50	50	150	20
> 3 months	20	50	50	100	100	150	50
Corporates	20	50	100	100	150	150	100

Jurisdictions will choose which of the two possible approaches for slotting interbank exposures their banks will use. Under option 1, loans to banks will be slotted according to the rating of their sovereign; under option 2, according to the bank's own rating. For the latter approach, exposures of less than three months will receive preferential treatment.

Exposures to borrowers without a credit rating will be placed in an unrated band that will carry a 100% weight (ie 8% capital charge), but regulators are requested to review the default experience of the particular market (and individual bank) to decide whether this is sufficient. Undrawn facilities to corporates of less than one year, which currently carry a zero weight, will be weighted at 20%.

There is much greater allowance for credit risk mitigation than currently—both in the form of guarantees and recognition of securities as collateral. Currently only cash and government securities are recognised, but it is proposed that securities rated BB- and above issued by a sovereign or public sector entity should also be recognised, as well as other securities rated BBB- and above, equities in a main index or listed on a recognised investment exchange, and gold. 'Haircuts' will be applied to the market value of collateral in order to reflect potential price volatility, which may reduce the value of collateral taken. A weight will be applied to the collateralised exposure to protect against residual risks associated with the ability to realise the collateral.

Internal ratings based (IRB) approach

Under the IRB approach, categorisation of exposures will depend on the banks' internal risk assessments. If a bank has had its systems for assessing the default probability of borrowers recognised by its supervisor and has had such a system in place for at least three years, it will be able to use its own ratings to slot loans in probability-of-default (PD) bands. The bank will be able to choose as many bands as it wishes, with the capital requirement for each band set by the Committee according to a formula. A loss-given-default factor (LGD) is applied to produce the actual capital charge, reflecting the likelihood of recoveries (given seniority of the exposure and the type of security). For unsecured exposures the LGD is set at 50%. The following table compares the capital requirements under the current Accord, the standard approach, and the IRB foundation for senior unsecured corporate exposures.

Per cent

	PD	Current capital	Standard approach	IRB foundation
AAA (a)	0.03	8	1.6	1.13
AA (a)	0.03	8	1.6	1.13
A	0.03	8	4.0	1.13
3BB	0.20	8	8.0	3.61
3B	1.40	8	8.0	12.35
3	6.60	8	12.0	30.96
CCC	15.00	8	12.0	47.04

(a) Floor PD set by the Committee of 0.03.

Under the foundation IRB approach, commercial and residential real estate are recognised as collateral for commercial loans as well as the financial collateral recognised under the standard approach. The LGD factors are set by the Committee. Under an advanced approach, banks will be able to recognise any form of collateral and set their own LGD factors. They will, however, have to convince their supervisors that they have adequate systems.

For the first two years after the implementation of the new Accord, the credit risk requirement under the advanced approach cannot be less than 90% of that required under the foundation IRB for the same book. After two years, the Committee will review the overall working of the advanced approach.

The Basel IRB proposals include a 'granularity' scaling factor that will generate higher capital requirements for books that are more concentrated than average, and lower ones for less concentrated books.

The proposals for the treatment of retail loan books are a little different. It is proposed that all banks in the IRB approach will set the LGD for retail as well as the PD (this is because many banks assess retail in terms of expected loss (ie PD \times expected LGD)), making it more difficult to disentangle the two. Risks on retail portfolios appear to be substantially lower than corporate and the Committee is currently proposing that, for any PD/LGD combination, the weights would be half those for corporates.

In both the standardised and IRB approaches, there will also be a more fine-tuned approach to securitisation, to reflect the extent to which a bank securitising loans has retained any risk.

(ii) Operational risk

Three different approaches are being considered for setting the operational risk charge. First, a basic indicator approach calibrated to deliver a charge equivalent to around 20% of total capital. The indicator being considered is gross income, with a charge equal to 30% of the annual amount. Second, a standardised approach where different risk indicators will be assigned to each business line. For example, for retail banking it might be average assets, and for fund management assets-under-management, and so on. The capital requirement for each business line will be a percentage of the risk indicator set by the Committee according to an assessment of the riskiness of that business line across the industry. The total operational risk requirement for a bank will be the aggregate of the requirements for each business line. In the third approach, banks will assess the expected losses for operational risk for each risk type (eg IT, fraud or legal risk) in each business line by estimating, from their own data, the likelihood of loss and its severity. As in the IRB approach for credit risk, a capital requirement to cover unexpected losses needs to be aligned with each expected loss.

(iii) Total minimum capital

The total minimum capital requirement will be the sum of the requirements for credit risk, operational risk and the current trading-book capital charge. The Basel capital requirement will still be expressed as an 8% risk-asset ratio but the actual quantum of capital a bank will have to hold will depend on the riskiness of its particular book.

Pillar 2—supervisory approach

The supervisory review is based on four interlocking principles. First, banks are required to have a process for assessing their capital requirements in relation to their individual risk profile. They should go beyond the scope of the Pillar 1 minimum requirements to consider risk concentrations, areas of risk without a specific capital charge such as interest rate risk in the banking book, and the appropriate level of capital to meet their particular strategic needs. Second, this process will be evaluated by supervisors, who will take action if they are not happy with any aspect of the bank's internal process. Third, banks are expected to operate with capital above the Pillar 1 minimum, both to reflect their specific profile and provide a cushion, and, if necessary, supervisors may use their powers to enforce this. Fourth, supervisors should intervene at an early stage to prevent capital from falling below the level required to support the bank's risk characteristics.

Pillar 3-disclosure

The Accord will set out core and supplementary disclosures that all banks should meet and where the supervisors should take action to address non-compliance. The difference between core and supplementary is that banks have more leeway not to make the supplementary disclosures if they are not relevant to their actual activities or if they relate to non-material areas. These disclosures will cover:

- *application* of the Accord to entities within a banking group—ie consolidation;
- risk exposure and assessment—a bank's profile in credit risk (eg the maturity distribution of exposures and amount of past due loans etc), market risk (eg the value at risk for different trading portfolios and the characteristics of any internal models used), operational risk (eg losses due to inadequate systems) and interest rate risk (eg the increase or decrease of economic value which would be caused by an unexpected interest rate shock);
- *capital*—the constituent parts of a bank's regulatory capital, including use of innovative Tier 1 instruments; and
- *capital adequacy*—for example, the amount of capital required for credit risk, market risk and operational risk, and the required capital as a percentage of a bank's total capital.

Under Pillar 3, banks that use internal methods for setting the Pillar 1 capital charges for credit or operational risk will be required as a pre-condition to disclose information on the nature of the procedures used. In addition, quantitative information will be required, such as the percentage of exposures covered by the approach and the distribution of exposures across each probability of default band. A second area of quantitative disclosure will cover the performance of the bank's rating process—for example, the number of defaults in the past year in any probability-of-default band. period,⁽¹⁾ for portfolios of exposures in each rating category, and shows that for loans to all borrowers down to BBB the Basel minimum requirements of 8% capital (of which 4% is equity) would probably be higher than the equity capital that a bank would chose to hold.





Source: Bank of England calculations

This disincentive for banks to hold prime-quality loans was probably one of the factors behind the securitisation boom in the United States. By March 1998, outstanding non-mortgage securitisations by the ten largest US bank holding companies amounted to around \$200 billion (more than 25% of these banks' loans).⁽²⁾ Banks outside the United States were also increasingly turning to securitisation to adjust their portfolios. The ability of banks to choose how much risk they wished to carry against a particular quantum of regulatory capital threatened to undermine the objective of an international capital floor. Another concern about the Accord was that the limited recognition of risk reduction through collateral or credit derivatives would discourage banks from taking advantage of these techniques and more generally impair the development of markets.

This led to pressure on the Committee to try to align more closely the regulatory capital requirements with the risks on different exposures, recognising credit risk mitigation. In 1996, the Committee had amended the Accord to set requirements for trading books and had

allowed banks to use their own value at risk (VaR) models to establish the riskiness of portfolios of securities/foreign exchange according to parameters established by the Committee.⁽³⁾ Some banks had started to develop credit risk models to establish the value at risk on portfolios of loans, and pressure mounted for the Committee to revise the 1988 Accord by allowing these models to be used to set capital for credit exposures. This led to an active debate on the accuracy of the models, during which the Committee reached the view that it would be premature to recognise these models to set regulatory capital.⁽⁴⁾ Credit risk models are at a much earlier stage of development than the trading-book VaR models. This reflects the much more limited data on credit risk compared with long runs of returns data available for the trading-book VaR calculations.⁽⁵⁾ Research on the reliability of the models, carried out for example in the Bank of England, indicated that the models yielded far more exceptions (ie losses that exceed the estimated VaR) than they would if they were accurately measuring the risk.⁽⁶⁾

Proposed new Accord

The Committee therefore had to find another way to assess the riskiness of individual loans. Two approaches are proposed for the new Accord. Under a standard approach, banks will slot loans into risk-weighting bands according to their rating by an external credit rating agency. This approach continues the current differentiation of exposures according to whether they are to sovereign, bank or other borrowers. One drawback of the use of external ratings is lack of comparability across ratings agencies. In some countries local rating agencies rate the local sovereign as AAA (the highest-rated credit in the market) and scale off that for other borrowers, even though the sovereign might be rated at only A or BBB by international rating agencies. This issue will need to be dealt with in implementation, perhaps through mapping ratings into the 'common currency' of default frequency by rating grade.

For some banks the standardised approach will offer a means of setting capital charges that is commensurate

⁽¹⁾ The data are based on the work of Kiesel, Perraudin and Taylor (2001). They carried out a study using a generalisation of JP Morgan's credit risk model CreditMetrics, which uses transition probabilities as the main driver of the value at risk (VaR). Future spreads and hence future prices given particular ratings are assumed to be known. Correlations between ratings transitions are proxied using correlations between borrowers' equity returns. The portfolios include 500 equally sized exposures in each risk category. The VaR is the estimate of loss that will not be exceeded on more than a set percentage of occasions, in this case 0.3%. (2) Jackson et al (1999)

⁽³⁾ Basel Committee on Banking Supervision (1996). (4) Basel Committee on Banking Supervision (1999).

⁽⁵⁾ Jackson and Perraudin (2000).

⁽⁶⁾ Nickell, Perraudin and Varotto (2001).

with the size and complexity of their business. Nevertheless, it will not provide sufficient risk differentiation for many banks. The main disadvantage of the standardised approach is that in many countries relatively few corporates are rated, which will mean that most exposures will be in an unrated category carrying an 8% charge. It is also not clear that the rating agencies have better information on the prospects for the borrowers than the banks themselves. The Committee therefore decided to propose a second approach where the banks themselves would set the rating for the borrower as long as they met standards for the procedures used. In order to provide comparability, the common currency of default probability was adopted for the internal ratings. The Committee then had to decide on capital requirements sufficient to cover the value at risk on portfolios of exposures in these probability-of-default bands. Some of the issues that had to be considered in setting those capital requirements are outlined below.

As part of the new risk-based nature of the requirements, the Committee will recognise a much wider range of collateral and other types of credit risk mitigation. There will also be a more fine-tuned approach to securitisation, reflecting the extent to which a bank securitising loans has retained any risk.

In addition to the major change in the treatment of credit risk, the new Accord will introduce a charge for operational risk (the risk of loss from, for example, fraud, IT problems or legal risk). In the original Accord, coverage of these risks was effectively subsumed within the broad credit risk requirements, which provided an overall cushion for other risks as well. But going forward, perhaps the most important issue is that as credit and market risk are measured more and more tightly, using risk assessment techniques such as internal ratings, the extent of any extra cushion to cover other risks diminishes. Operational risk can be correlated with credit and market risks because problems such as fraud often come to light when a firm is under pressure. The Committee reviewed data on the extent to which banks set aside capital to cover operational risk and found that it amounted in many cases to around 20% of a bank's economic capital. Calibration so far undertaken by the Committee is based on a regulatory capital charge of around this magnitude. Work is continuing on the methods for calculating the charge, but it is proposed

that these would include a simple top-down approach for a whole bank, an approach with separate calculations for each business line, and one that would rely on a bank estimating the expected losses from operational risk in each risk type in each business line, with the Committee setting the formula to convert these into a capital requirement. The Committee envisages that banks will move over time towards more sophisticated approaches to measuring operational risk.

The Accord will also address the problem that one size does not really fit all. Some banks have much higher overall risk profiles than the average and therefore the minimum capital requirements would not always set an adequate floor. Under Pillar 2, banks will be required to assess the amount of capital that they need to hold to support the risks in their business. If supervisors believe that this is insufficient, they will require the bank to hold additional capital. Interest rate risk in the banking book, which is not captured under the trading-book treatment, will be covered by separate provisions in Pillar 2.

The Accord will also lead to substantially enhanced disclosure by banks on their risk profile and capital. Banks using internal methods for measuring the level of credit risk and operational risk will also have to disclose information on the approaches used and their accuracy.

Thus, although a need to change the treatment of credit risk was the main driver behind the revision to the Accord, the proposed approach goes beyond this to address operational risk independently and enhance both supervisory and market discipline.

Some issues regarding the setting of the credit risk requirements

In order to set new risk-based requirements for credit exposures, a number of issues were addressed. Some of the most fundamental are outlined below.⁽¹⁾

(a) Time horizon

One central issue regarding the setting of the new internal ratings based requirements for credit exposures was the period of time that should be covered by the capital requirement—whether banks should carry capital to cover potential losses over the next twelve

(1) For a discussion of other important dimensions of credit risk that had to be considered by the Committee (the effect

of portfolio concentration, seniority and the definition of default), see Carey (2000).

months or a longer period, given that the average maturity of a loan book might be three years, or in some countries as much as seven years. In their economic capital models, banks calculate the requirement for the next year but if a bank has experienced substantial losses in a year, this raises the question of what happens at the end of the year. A bank might not be able to raise more capital if the quality of its loan book has deteriorated sharply, and sale of loans might be infeasible in a poor economic climate. A further complication is that under historical cost accounting banks can accumulate economic losses in a portfolio over a lengthy period without recognising them in the accounts, creating the potential for a large eventual adjustment to capital.⁽¹⁾ The horizon chosen has implications for the method of calibration of unexpected losses-either taking into account only defaults or also economic losses due to deterioration in credit quality. With a one-year horizon an economic loss basis would be more appropriate and will give banks scope to cover specific provisions as well as write-offs.

The Committee has adopted a one-year horizon because it is consistent with current industry practice, and has adopted an economic loss approach for calibrating capital requirements for corporate exposures under the internal ratings based (IRB) approach and for one of the options for adjusting for maturity—see below.

(b) Assessments of borrower quality

Although banks would carry capital to cover one year's worth of losses, there was a question over the approach that should be taken to assessing borrower quality (ie probability of default). In their long-term ratings, the major credit rating agencies assess the prospects for a borrower through the cycle-taking into account ability to withstand a recession. Even so, credit ratings show a cyclical pattern, with more downgrades than upgrades in a recession.⁽²⁾ This may well reflect the fact that the pattern of recessions varies, creating unusually severe effects for some types of borrower. Some banks claim to set point-in-time ratings, which may be based on current economic conditions, creating the potential for greater cyclicality. If capital requirements were based on ratings with high cyclicality, in a recession banks would not only face the usual pressure on capital caused by write-offs and specific provisions but would also have to meet

higher capital charges as they downgraded various borrowers, with possible implications for the real economy.

To avoid an effect of this kind, the Committee stresses in the consultative paper that the probability of default assigned to a particular borrower should 'represent a conservative view of the long-run average probability of default for the borrower grade in question...' and include a forward-looking element.

Over-optimism in allocating ratings by banks could have a similar effect and several checks will be built into the process to try to guard against this. Supervisors will carry out plausibility checks on a bank's ratings (comparing the slotting of individual loans and the distribution of loans across rating bands with those of different banks), and back-testing will be carried out to compare default outturns by band with expected numbers. The main difficulty with this process is that the small number of observations (one per year) will make any scientific analysis impossible. One of the most important cross-checks on the process will be Pillar 3. Banks will be required to disclose the allocation of loans across probability-of-default bands and also the default outturn by band. This will make market discipline in this area more effective.

(c) Effect of the residual maturity of the exposure

The original Accord included a maturity dimension for non-OECD interbank exposures but not for other credits. An important question in the revision to the Accord was whether the residual maturity of the exposure was an important dimension in riskiness—ie whether the value at risk calculated over a one-year horizon increased according to the residual maturity of the exposure. Using a CreditMetrics-type approach, Kiesel, Perraudin and Taylor⁽³⁾ calculated 99.7% VaRs for portfolios of 500 equally sized exposures and found a striking maturity effect, except for the lowest-quality exposures (below BB).

The Committee has decided to calibrate the basic requirements assuming an average three-year maturity. The consultative paper puts forward, for discussion with the industry, two options for allowing a full maturity dimension—one using a default mode and the other economic loss, which also takes into account the likelihood of credit deterioration.

⁽¹⁾ Jackson and Lodge (2000).

⁽²⁾ Nickell, Perraudin and Varotto (2000).

⁽³⁾ Kiesel, Perraudin and Taylor (2001).

(d) Treatment of corporate, sovereign and interbank exposures

The current Accord distinguishes between loans according to whether the borrower is a sovereign, bank or corporate. One question was whether, once the borrowers have been divided into risk classes using probability of default, a further differentiation needs to be made according to the type of borrower in order to align capital with risk, or whether the relationship between default frequency and value at risk is similar for all types of borrower. Data on bond spreads do not appear to point to either sovereigns or banks being lower risk than corporates.⁽¹⁾ Another way to look at riskiness is the likelihood of downgrades in ratings. The results for banks are interesting⁽²⁾—highly-rated US banks are more likely to be downgraded than similarly rated US corporates but below BBB the picture reverses, perhaps because it is difficult for banks to operate below investment grade.

For a given probability of default (PD) and loss given default, the Committee proposes to assign the same level of capital regardless of whether the exposure is to a corporate, to another bank or to a sovereign (although a floor PD of 0.03% applied to exposures to banks and corporates will not apply to sovereigns).

(e) The treatment of expected and unexpected loss

The economic capital models developed by banks assume that expected loss will be covered by margin or provisions and that economic capital covers unexpected losses (up to some confidence level). If a bank has a process for measuring expected loss, it will usually set the margin at the origination of the loan to cover the expected loss and to remunerate the capital held to cover unexpected losses. But over the life of a particular portfolio of loans, news about the outlook may cause credit quality to deteriorate, so that updated expected losses exceed the margin. Under historical cost accounting, embedded losses of this kind are not recognised until they occur. Provisioning policies vary from jurisdiction to jurisdiction but, for example, under the UK accounting standards a bank should only establish provisions to cover losses already in the book,

not a future loss caused by a shortfall of margin.⁽³⁾ Also, under the Basel Accord, general provisions can be included within capital.⁽⁴⁾ This means that a general provision raised to cover an expected loss could also be used to set against unexpected losses through Tier 2 capital.

The question of the treatment of expected losses is particularly important for lower-quality credits and for retail exposures, where expected losses are high in relation to unexpected.

The Committee is proposing to calibrate the capital charges to cover both a one-year expected loss and the unexpected loss.

(f) **Overall** capital

One issue when deciding on the capital requirements for each probability-of-default band is the appropriate solvency standard that regulators should be targeting for minimum capital.⁽⁵⁾ This needs to balance prudence with efficiency. Banks are regulated to protect depositors (because of information asymmetries and the social consequences of loss of savings) but just as importantly to protect the financial system. This reflects their central role in the economy. Because of their position in the payments system and lending to small and medium-sized businesses and retail customers, the cost of banking crises can be very high. Bank of England research.⁽⁶⁾ which examines 43 crises worldwide over the last 25 years, indicates that economic activity forgone during the length of a banking crisis can amount to between 15% and 20% of annual GDP.

Market pressure will ensure that most banks would set an appropriate solvency standard for themselves without any intervention from regulators. Most large banks target AA ratings (around 99.9% confidence that they will have capital to cover losses) so that they can be active in wholesale markets. But weaker banks in some markets, or whole banking markets if they are bolstered by a generous safety net, could gravitate to lower levels. Certainly before the original Accord was introduced market pressure had not prevented an erosion of capital in some markets. The regulatory standard has another

⁽¹⁾ Jackson and Perraudin (1999)

Nickell, Perraudin and Varotto (2000).

⁽³⁾ Jackson and Lodge (2000).

⁽⁴⁾ Tier 1 capital, which accounts for half of the 8% requirement, consists of equity and reserves, and Tier 2 includes

general provisions (up to a ceiling of 1.25% of riskweighted assets) and subordinated debt. (5) In calculating the value at risk of loans in different PD bands using credit risk models, the confidence level (or implied solvency standard) has to be set. The output of the models was used by the Committee to indicate the level of capital required. Gordy (2000) discusses the fact that it is possible to make a risk-bucketing approach (as used in the new Accord) consistent with a restricted version of any of today's leading credit risk models

⁽⁶⁾ Hoggarth, Reis and Saporta (2001).

important role to play as the benchmark against which banks worldwide are judged by the market. If that benchmark is too low or inappropriately designed then it could have a negative effect on market discipline.

The solvency level set by the minimum requirements needs to give regulators time to act before a bank starts to lose counterparties or depositors. This probably means that any standard has to be within investment grade because below it large banks are not viable without a safety net. But it should not be set too high because that will create efficiency problems.

The Committee did not endorse any particular solvency standard but did review the effect on the capital requirements of several solvency standards around the investment-grade level. The relative requirements under the IRB approach were, however, calibrated to an assumed 99.5% confidence level—ie equivalent to a low investment grade (BBB-). An extra buffer was included to cover, for example, measurement errors in PDs. The resulting spectrum of capital requirements for exposures with different PDs gives, for example, an 8% capital requirement for exposures with a PD of 0.7%. Under the Basel definition of capital, up to half of the 8% can be accounted for by subordinated debt and part of the extra buffer included in the capital requirements was to allow for the lower loss-absorbing capacity of this element of capital. In their economic capital models banks cover unexpected losses with equity and reserves.

Overall, the new Accord, under the standardised approach, is intended to deliver broadly the same amount of capital as the current Accord. There should be a modest reduction under the internal ratings approach to provide banks with an incentive to adopt it. For any bank, the effect of the internal ratings approach on required capital will depend on the risk profile of its particular book—high-risk books will demand more capital than currently and low-risk books less. The effect on a range of different banks across the G10 and beyond therefore needs to be determined. This will be achieved through a quantitative impact study over the first half of this year. The results will inform the final decisions on the shape of the new Accord later this year.

Conclusion

The new Basel Accord will represent a major change in the way that regulatory capital for most large banks is calculated, given the proposed adoption of the internal ratings approach. Ensuring that the capital requirements set by the Committee are accurately aligned with the risks has made a careful assessment of the structure of credit risk and its determinants essential.

Given the systemic importance of banks, there need to be careful checks and balances in an approach that allows banks to use their own internal processes to set the main component of their credit risk charge. The Committee is building into the process plausibility checks for the ratings and back-testing of probability-of-default bands against default outturns, but Pillar 3 will also be crucial. It will ensure that there is market scrutiny of each bank's allocation of loans to probability-of-default bands. Pillar 3 overall will be an important bolster to the minimum capital requirements, helping to shift emphasis towards market discipline and away from reliance on regulators.

Likewise, Pillar 2 will provide an important encouragement to supervisors to consider the risk profile of individual banks and to consider supervisory action, including higher capital requirements if risks appear to be high.

Clearly the new Accord will have a number of implications for the banking sector and the relationship of different financial intermediaries. The Bank will be exploring these further in the period ahead.

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The financing of technology-based small firms: a review of the literature

This review assesses the academic literature of recent years on the financing issues faced by technology-based small firms (TBSFs). It was produced as part of the latest report on these firms by the Bank's Domestic Finance Division, published last month.⁽¹⁾ This report finds that, while there may still be market weaknesses in the provision of relatively small amounts of risk capital to TBSFs at the start-up and early stages, these appear to be less than four or five years ago, and to impact on TBSFs less than was the case then. Peter Brierley, Head of Domestic Finance Division, explains why the literature suggests that market imperfections in the provision of finance to small companies may apply with particular force to the start-up and early-stage financing of TBSFs, but concludes that there is little compelling evidence of a major market failure.

Introduction

Technology-based small firms (TBSFs) are generally defined either as businesses whose products or services depend largely on the application of scientific or technological knowledge,⁽²⁾ or as businesses whose activities embrace a significant technology component as a major source of competitive advantage.⁽³⁾ These businesses are generally located in industries such as communications, IT, computing, biotechnology, electronics and medical/life sciences.⁽⁴⁾

Earlier work at the Bank⁽⁵⁾ suggested that there might be some inefficiencies in the market for financing TBSFs, especially at the start-up and early stages of finance. Recent official enquiries in this area have focused in particular on possible barriers that high-tech companies in the United Kingdom might face in attracting finance.⁽⁶⁾ The profile of this work has been enhanced by the current Government's desire to encourage 'entrepreneurship', by growing interest in the 'new economy', and by the swings in investor sentiment towards high-tech stocks over the past two years.

These factors have motivated a new Bank report on the financing of TBSFs, which was published on

5 February.⁽⁷⁾ As background to this report, an extensive review of the economic literature on the financing of TBSFs has been undertaken, the results of which are summarised in this article.

Information asymmetries, moral hazard and adverse selection

There is a huge literature on the appropriate capital structure of companies, dating back to Modigliani and Miller (1958) and earlier. That part of it relating to small and medium-sized enterprises (SMEs) emphasises information asymmetries as one of the most important factors affecting small business finance.⁽⁸⁾ These asymmetries arise if small business owners or managers possess more information about the nature of, and prospects for, their businesses than potential finance providers. Information asymmetries can give rise to agency conflicts between entrepreneurs and investors that can affect the willingness of the latter to provide both equity and debt capital.⁽⁹⁾

The literature suggests that equity finance provides the entrepreneur with an incentive to engage in activities that benefit him disproportionately, because part of the associated costs are imposed on the shareholders. Even

(6) See, for example, the reports by the House of Lords (1997), the CBI (1997), and the Williams (1998), Riches (1998) and Waterstone (1999) committees

⁽¹⁾ Copies of the Financing of Technology-Based Small Firms Report are available from the Public Enquiries Group, Bank of England, EC2R 8AH; telephone 020-7601 4012; fax 020-7601 5460; or from the Bank's www.bankofengland.co.uk/hightech2001.pdf

⁽²⁾ See Allen (1992).

⁽³⁾ McNally (1995).
(4) See Butchart (1987) for the DTI's sectoral classification.

⁽⁵⁾ See Bank of England (1996).

⁽⁷⁾ Bank of England (2001).

⁽⁸⁾ See, in particular, Berger and Udell (1998).

⁽⁹⁾ See Jensen and Meckling (1976) for an early demonstration of this result.

in the absence of such moral hazard, in cases where companies aim to maximise shareholder value, models of capital structure under asymmetric information indicate that firms will only issue shares when they view their stocks as overvalued.⁽¹⁾ Debt markets also suffer from information asymmetries giving rise to moral hazard and adverse selection. In this case, moral hazard occurs to the extent that the entrepreneur raising debt finance has an incentive to increase risk, given that he benefits fully from any associated additional returns, but does not suffer disproportionately if the firm is liquidatedpart of that cost is imposed on the creditors. Adverse selection arises if debt providers such as banks find it difficult to discriminate between companies and react to the moral hazard risk by increasing the price of debt to all potential borrowers. This in turn may then discourage all but the highest-risk borrowers, inducing the banks to refuse finance to a greater proportion of borrowers, both good and bad-a form of credit rationing.⁽²⁾ These are examples of capital market imperfections that may affect both the quantity and price of equity and debt finance provided to SMEs.

These capital market imperfections may apply with particular severity to TBSFs. The notion that such problems may obstruct the external financing of innovative business activities goes back at least to Arrow (1962), although his conclusion that this represents a market failure justifying public sector intervention is much more contentious.⁽³⁾ This strand of the literature emphasises that the key characteristics of high-tech companies are that: (i) their success is linked to difficult-to-value growth potential derived from scientific knowledge and intellectual property; (ii) they lack tangible assets in the early stages of their life cycles which may be used as collateral; and (iii) their products have little or no track record, are largely untested in markets, and are usually subject to high obsolescence rates. These factors mean that TBSFs are likely to be more vulnerable than SMEs generally to asymmetric information about risk characteristics and default probabilities, especially in view of the difficulties finance providers face in assessing the sophisticated technology and R&D involved and the prospective demand for the end-product.(4)

Furthermore, the staged development process faced by most TBSFs may generate additional risks compared with those relating to SMEs in general. The innovation cycle involves a complex process, beginning with the initial concept of a product, and continuing with prototype development, initial production and, finally, product sales. The financing of this process requires a series of injections of money, and failure to finance adequately any part of the cycle may cause the firm to fail. This in itself tends to increase the risks to any single finance provider. Oakey (1995) finds that such risks are likely to be most acute in the biotechnology sector, where the gestation period for sustained profitability may well be 10-15 years, well beyond the investment horizons not only of banks but also of many venture capitalists.

Funding gaps: empirical evidence

The extent to which SMEs are subject to funding 'gaps' in the provision of finance has been the subject of official reports dating back to the MacMillan Report in the 1930s. More recently, empirical studies investigating whether TBSFs in the United Kingdom face particular difficulties in obtaining finance have produced conflicting results. Utilising data from two company surveys carried out by the Cambridge University Small Business Research Centre, Moore (1994) finds that a sample of 89 high-tech companies raised only 7% of its start-up finance from banks (compared with a figure close to 40% for SMEs generally). A reluctance by banks to finance high-tech start-ups has also been identified in other studies,⁽⁵⁾ although Moore's results also indicate that banks were the most important source of external finance for TBSFs (and for SMEs generally) in stages of finance subsequent to start-up. More crucially, Moore tests the availability and cost of finance against a range of firm characteristics, relating to technology, innovation, life cycle, origin, growth, profitability, size and region, in a series of probit regressions. He finds that the most important determinants of the likelihood of a firm facing financing constraints are size and profitability, rather than degree of innovation.

Empirical work by Westhead and Storey (1997), however, has produced rather different results. They develop a variety of regression equations utilising information from a survey of 171 SMEs located on and off science parks in the United Kingdom. The equations regress the degree of difficulty in obtaining finance, as derived from survey responses, on a wide range of firm characteristics,

(2) The seminal article by Stiglitz and Weiss (1981) first demonstrated this clearly

⁽¹⁾ See especially Leland and Pyle (1977), Myers and Majluf (1984) and Greenwald et al (1984).

⁽³⁾ See, in particular, the critique of Arrow by Demsetz (1969).

⁽⁴⁾ See, *inter alia*, Moore and Garnsey (1992), Matthews (1994) and Storey and Tether (1996).
(5) See Oakey (1984) for the UK and Roberts (1991) for the US evidence.

including: the extent to which the firm is high-tech (variously proxied by R&D expenditure in relation to turnover, the number of qualified scientists engaged in R&D in relation to total employees, and the number of patents taken out in the last year); the age of the firm; legal status; industrial sector; growth rate; profitability; and location. Westhead and Storey find that firms with relatively high R&D expenditures are more likely to report continuing financing constraints. The other indicators of technology—the proportion of scientists and the number of patents—are also positively related with financing constraints.

Debt versus equity finance

Although the evidence is conflicting on whether TBSFs face greater difficulties in accessing finance than SMEs generally, some common themes do emerge. Perhaps the most important relates to the unsuitability of debt finance for the early-stage financing of TBSFs. The information asymmetries and moral hazard present at the start-up stage have a particularly marked impact on banks and other debt providers because of the lack of collateral and market presence which characterise most high-tech start-ups. Some studies⁽¹⁾ attribute the source of the information asymmetry underlying debt finance of TBSF start-ups to the difficulties banks face in assessing technical projects and hence in distinguishing between good and bad lending propositions. Others⁽²⁾ emphasise the inability of TBSFs seeking early-stage finance to relieve moral hazard by meeting banks' requirements for collateral. In the early stages of product development and prototype testing, once the personal assets of the business founder (plus family and friends) have been exhausted, the only remaining business assets of the TBSF are likely to be intangible and therefore unsuitable as collateral. This will not change until the TBSF achieves production levels that generate more tangible business assets, such as receivables and inventories, which can be pledged as collateral, ie at later stages of financing.

This implies that smaller firms pursuing innovation strategies may face greater difficulty in obtaining debt finance for start-up and the early stages of development than their conventional counterparts. Some commentators have speculated that bank-centred systems, such as those that predominate in continental Europe, may be less effective in promoting high-tech industries than stock market-centred systems, such as the United States and the United Kingdom.⁽³⁾ On this argument, bank-centred systems are identified with conservative approaches to the provision of finance, and with social and financial incentives that reward entrepreneurial zeal less richly and punish failure more harshly. This theory, however, probably underestimates the willingness of banks to provide finance to TBSFs, albeit generally at later stages of finance and indirectly, through venture capital subsidiaries rather than direct lending.

Other empirical studies confirm that debt finance is less important to TBSFs than equity finance. Himmelberg and Petersen (1994) find that SMEs pursuing innovation strategies tend to have lower debt levels than other SMEs. This is supported by Jordan, Lowe and Taylor (1998), who find that the most innovative SMEs are those with the lowest debt-equity ratios. Other studies in the United Kingdom and the United States suggest that high-tech firms may be heavily dependent on internal finance and trade credit, especially for finance in the initial and early stages.⁽⁴⁾

These studies focus mainly on the initial injections of finance at the seed/start-up phase, where information asymmetries are greatest. But growth-oriented TBSFs also face high costs associated with technological product development. One estimate⁽⁵⁾ is that the amount of finance required to develop and launch a technology-based product is on average ten to twenty times greater than the initial R&D expenditure. Such firms will generally find that internal sources alone are insufficient to meet the high capital requirements for development and will need to seek external finance while still in the relatively early stages of growth. For these firms also, the literature suggests that equity will be a more appropriate source of finance than debt.

These findings imply that the optimal capital structure for TBSFs is very different to that thought suitable for SMEs generally, the vast majority of which finance themselves broadly in line with the 'pecking order' hypothesis.⁽⁶⁾ This postulates that smaller businesses tend to prefer internal finance, while those requiring

⁽¹⁾ For example, Mason and Harrison (1998).

⁽²⁾ Notably Philpott (1994).

⁽³⁾ See Black and Gilson (1998) for a statement of this thesis.

⁽⁴⁾ See, in particular, Sahlman (1990), Roberts (1991) and Wetzel (1994) for the US evidence and Moore (1994) for the UK

evidence.

⁽⁵⁾ By Standeven (1993).

⁽⁶⁾ Developed initially by Myers (1984).

external finance opt initially for debt rather than equity finance. This preference is associated with information asymmetries. The difficulty investors face in assessing whether returns on SME investments adequately compensate for risk means that SME equity generally has to be issued at a greater discount than debt. The apparent reversal of the pecking order theory for TBSFs may be rationalised if it is assumed that private equity providers such as venture capitalists possess superior information in certain respects than do banks and entrepreneurs.⁽¹⁾ Conventional wisdom assumes that entrepreneurs have better knowledge of project-specific aspects such as the feasibility of the technology, but venture capitalists may have greater information on the project's marketability and operational implementation. In such cases, venture capitalists may be able to mitigate information asymmetries through reliance on particular types of equity finance, such as preferred and/or convertible stock (see below).

One other strand in the literature relevant to the optimal capital structure of TBSFs relates to control rights. This is linked to the use of contracts to eliminate agency problems, but is based on the view that such contracts cannot be 'complete', ie they cannot specify each party's obligations in all circumstances. Hence, they need to be used to determine the allocation of control rights.⁽²⁾ The entrepreneur will seek a capital structure for his firm by weighing the marginal costs of diluting his control rights through the issuance of equity to new shareholders against the marginal costs of issuing more debt and therefore raising the risk of default. Some commentators⁽³⁾ argue that the different control rights attached to debt and equity are just as important in determining the capital structure of closely held firms as differences in projected revenue streams or tax treatments. In such models, the optimal balance of control between entrepreneur and outside investor is shown to be state-contingent: it should reside with the entrepreneur in states of the world where his private benefits are relatively high, and with the investor when the entrepreneur's private benefits are relatively low. For venture capital finance of TBSFs, such state-contingent control, dependent also on the performance of the firm, can best be achieved by issuance of a form of quasi-equity, such as convertible preferred stock.

The venture capitalist—small firm relationship: agency problems

The literature assessed so far indicates strongly that information asymmetries and potential conflicts of interest between SMEs and their finance providers may affect financing and investment decisions. The first writer to apply these theories specifically to the venture capital industry was Sahlman (1990) in the United States, and indeed most of the subsequent literature in this area emanates from the United States.⁽⁴⁾ In his pioneering study, Sahlman represents venture capitalists as facing a two-level principal-agent relationship with investee companies and end-investors. In the first relationship, the venture capital firm acts as principal, and is subject to the problems of evaluating potential investments in companies (the agents in this case) in an uncertain environment in which moral hazard and adverse selection may exist. In the second relationship, the venture capital firm is the agent, and is subject to the risk that, if it does not perform satisfactorily, it will fail to attract further funding from the end-investor as principal.

As far as the first relationship is concerned, the main requirement of the venture capital fund is for the small firm to provide it with ongoing information to ensure that any current investments are properly monitored and to allow an evaluation of the prospects for additional commitments of capital.⁽⁵⁾ The problem is that the entrepreneur's desire for autonomy makes him reluctant to share fully and in a timely manner all relevant information.⁽⁶⁾ This means that, at the time of consideration of an investment, the venture capitalist is faced with a potential adverse selection problem because of the difficulty of assessing the entrepreneur's performance. This may induce the venture capitalist to tighten the conditions attached to his financing offer to avoid paying too much for investments subsequently revealed to be poor performers.⁽⁷⁾ As noted by Wright and Robbie (1998), this can explain why firms that turn out to be highly successful may initially have been refused venture capital finance, and why only small amounts of venture capital finance go to early-stage deals, where the information asymmetries are greatest. It also seems likely that these information problems will be most acute for TBSFs, in view of the more complex

⁽¹⁾ See Garmaise (1997) for a demonstration of this idea.

⁽²⁾ See especially Hart (1995).

⁽³⁾ Notably Aghion and Bolton (1992), Dewatripont and Tirole (1994), and Hart and Moore (1998).

⁽⁴⁾ See Wright and Robbie (1998) for a comprehensive recent review, on which part of the analysis in the text is based.

⁽⁵⁾ As noted, for example, in Bruno and Tyebjee (1985).(6) See Sapienza (1989) and Sapienza and Korsgaard (1995).

⁽⁷⁾ See the model developed by Amit *et al* (1990) for a formal derivation of this result.

specialist skills required of the entrepreneur and the greater difficulties faced by the venture capitalist in assessing those skills.

Several studies consider how to balance the venture capitalist's need for timely information with the entrepreneur's desire for autonomy and operating control. Both agency theory (as elaborated by Jensen and Meckling (1976)) and transaction cost theory (Williamson (1975)) emphasise the scope for co-operation between venture capitalist and entrepreneur as a means of reducing the need for costly monitoring mechanisms to control behaviour. An especially novel approach is to model the venture capitalist-small firm relationship utilising the Prisoner's Dilemma.⁽¹⁾ Although this approach indicates that both the venture capitalist and small firm have an incentive to procure higher short-term payoffs by 'defecting' from their relationship, it also recognises that both parties can maximise joint returns by mutual co-operation. Ceteris paribus, the likelihood of co-operation rises with the quality and frequency of communications, the closeness of the business relationship, the expected payoffs, the degree of time pressure, and the existence of penalties for non-co-operation.

Much of the remaining literature on the venture capitalist-entrepreneur relationship is concerned with assessing the mechanisms available to venture capitalists to ease moral hazard and adverse selection problems arising from agency risk. These can be divided into the following categories: (i) imposition of high hurdle rates; (ii) evaluation or 'screening' of investments; (iii) precise contract specifications; (iv) alignment of incentives through appropriate remuneration and bonding strategies; (v) use of preferred and/or convertible stock; and (vi) close monitoring of investments.

The use of high discount or hurdle rates by venture capitalists in evaluating potential investments is fairly well documented. Furthermore, the evidence from a number of studies⁽²⁾ suggests that these hurdle rates tend to be higher for start-up ventures, especially of high-tech firms. These results are consistent with the likelihood that agency problems and information asymmetries will be most marked for early-stage investments in TBSFs. High hurdle rates, however, may

in some cases actually exacerbate adverse selection by inducing the best firms to seek alternative sources of capital, leaving the less good firms, with no other financing options, as venture capitalists' clients (an idea again associated with Sahlman (1990)). This risk may be reduced by effective due diligence and a closer venture capitalist-entrepreneur relationship.

Several studies have examined the criteria that venture capitalists take into account in screening potential investments.⁽³⁾ The earlier papers suggest that the key criterion used by venture capitalists relates to the business experience and personality of the entrepreneur; issues associated with the product and market appear to be less important. These findings seem to be contradicted in more recent studies, which conclude that industry and market factors are more important than the entrepreneur and his team. But all these studies rely on face-to-face interviewing techniques using 'verbal protocol' analysis (ie observing venture capitalists 'thinking aloud' over proposals), or use mailed questionnaires. In both cases, sample sizes are very small and the full essence of the screening process is unlikely to be captured. The studies also focus only on early-stage investments. A more extensive study covering a fuller range of investing stages (Fried and Hisrich (1994)) concludes that venture capitalists make use of three broad criteria in screening investments: the viability of the project; the integrity, track record and leadership skills of the management; and the possibility of high returns facilitated by easy exit. Another important paper in this area (Muzyka et al (1996)) concludes that venture capitalists opt for a combination of a good management team and reasonable financial and product market characteristics, even if these factors do not match the overall deal/fund requirements exactly. But all the literature agrees that a combination of extensive screening and high hurdle rates results in venture capitalists rejecting the vast majority of proposals. Most estimates suggest that the UK venture capital industry rejects around 95% of all applications for finance each year (see the survey by Bannock Consultants (1991)).

There is also a substantial literature on the optimal design of contracts to reduce or eliminate agency problems between venture capitalists and entrepreneurs.

⁽¹⁾ See especially Cable and Shane (1997).

⁽²⁾ For example, Mason and Harrison (1999b) estimate that established companies need to generate annual internal rates of return of at least 30%, rising to 60% or more for seed/start-up investments. This is consistent with earlier calculations by Plummer (1987). Murray and Lott (1995) find that venture capitalists impose higher hurdle rates on technology-based projects at each stage of investment than on comparable non high-tech investments.

⁽³⁾ See, for example, Bruno and Tyebjee (1985), MacMillan *et al* (1985 and 1987), Hall and Hofer (1993), Fried *et al* (1993), Rah *et al* (1994), and Zacharakis and Meyer (1995).

These contracts are designed to specify the rights of the parties and the basis on which their performance is monitored and rewarded (see, for example, Fama and Jensen (1983)). Berger and Udell (1998) usefully classify the various possibilities as follows: (i) staging of venture capitalist investments to ensure optimal exercise of production options and efficient development and termination of projects;⁽¹⁾ (ii) control and choice of particular equity and/or debt instruments;⁽²⁾ (iii) appropriate entrepreneur compensation schemes, including provisions for the replacement of underperforming entrepreneurs;⁽³⁾ (iv) restrictive covenants;⁽⁴⁾ (v) board representation;⁽⁵⁾ and (vi) allocation of voting rights.⁽⁶⁾

To take one high-profile example, the use of remuneration and bonding schemes to reduce agency conflicts between venture capitalists and entrepreneurs involves, inter alia, performance-related pay structures and share option schemes for entrepreneurs. Bonding schemes impose penalties on the company if certain performance targets, eg in relation to gearing ratios, are not met. One prominent model (Bergemann and Hege (1998)) is based on an optimal contract between the venture capitalist and entrepreneur that provides for inter-temporal risk sharing. The entrepreneur's share is akin to an options contract, and therefore depends on the length of the contract and the volatility of information flow consequent upon his actions. This model allows for the possibility that, because the venture capitalist cannot always observe if the entrepreneur is diverting funds and under-investing in the company, he may erroneously conclude that the company's prospects are poor and terminate the project even though, had this moral hazard problem not been present, the project would have attracted further funding. It is possible that, for some attractive projects, the likelihood of the entrepreneur diverting the venture capitalist's funds is so high that the venture capitalist will not finance them in the first place. If taken to its extreme, however, this predicts that the least successful firms may receive most venture capital finance,⁽⁷⁾ a result which contradicts both common sense and other findings⁽⁸⁾ that unsuccessful firms are revealed early and receive less finance.

One implication of this work is that, as has been indicated earlier, venture capitalists may be able to reduce agency problems if they provide quasi-equity rather than full equity finance. The use of convertible and/or preferred stock is fairly widespread in venture capital contracting,⁽⁹⁾ because it enables venture capitalists separately to allocate cash flow, voting, board and liquidation rights to exercise appropriate control over entrepreneurs and take precedence over any ordinary shareholders. This limits the entrepreneur's incentives to behave opportunistically under conditions of asymmetric information.⁽¹⁰⁾ It is interesting that the use of convertible preferred stock is especially widespread in high-tech industries such as software and biotechnology. The initial phases of development here often involve tests only the entrepreneur can observe and evaluate, while later stages are more readily assessed by outsiders. Some commentators have advocated favourable tax treatment of preferred stock (ie placing it on an equal footing to debt) largely for these reasons.

Further insights and empirical evidence on these features of typical venture capital contracts are provided in an interesting recent paper by Kaplan and Stromberg (2000). They consider detailed information on 200 venture capital investments in 118 US companies by 14 venture capital firms over the period 1987-99. Some 36% of these companies are located in the IT/software industries and a further 39% in other high-tech sectors such as biotechnology, telecommunications and healthcare. The evidence shows that convertible preferred stock is by far the most commonly used financing instrument, appearing in 189 out of the total of 200 financing rounds. Such instruments generally ensure that the cash flow rights, voting rights and control rights of the venture capitalists and entrepreneurs are contingent on observable measures of financial and non-financial performance. If the company performs poorly, the venture capitalists take full control; as company performance improves, the entrepreneur acquires more cash flow and control rights; if the company performs very well (defined as a median return of more than 30% per year over a four-year period to initial public offering (IPO)), the venture capitalists relinquish most of their control and liquidation rights,

See Admati and Pfleiderer (1994), Bergemann and Hege (1998). (1)See, *inter alia*, Gompers (1993), Cornelli and Yosha (1997) and Trester (1998). See Sahlman (1990) and Fiet (1995).

⁽²⁾ (3)

See Chan et al (1990). (4)

See Lerner (1995). (5)

See Fenn et al (1997) (6)

⁽⁷⁾ As pointed out by Lerner (1998).

⁽⁸⁾ See Gompers (1995).

See, inter alia, Norton and Tenenbaum (1992) and Kaplan and Stromberg (2000).

⁽¹⁰⁾ As demonstrated by Trester (1998).

while retaining their cash flow rights. These state contingencies are found to be more common in start-up and early-stage financings than in later financing rounds, a result which supports the theory that the potential conflicts of interest between the entrepreneur and the venture capitalist will depend on the degree of uncertainty about the project's economic viability, which should be greatest in the high-tech sectors and at the early stages of the project's life.

These results are consistent with the control theories of Aghion and Bolton (1992), Dewatripont and Tirole (1994), and Hart and Moore (1998). They also accord with a variant of the screening models⁽¹⁾ mentioned earlier, because state-contingent provisions not only motivate entrepreneurs to provide effort, but also discourage entrepreneurs with poor projects from accepting the contract.

The venture capitalist—end investor relationship

The second principal-agent relationship, involving the venture capitalist as agent this time and the end-investor as principal, is by comparison an under-researched area. But it is subject to similar agency problems induced by information asymmetries as those implicit in the entrepreneur-venture capitalist relationship. A number of mechanisms can be identified which may be utilised to minimise these agency problems, including: (i) incentives for mutual gain; (ii) prohibition of acts by venture capitalists causing conflicts of interest; (iii) limited life agreements; (iv) mechanisms to ensure gains are distributed to investors; (v) monitoring of venture capitalists by end-investors; and (vi) regular provision of information to end-investors (again, see Sahlman (1990)). These strategies are designed to align the interests of venture capitalists more closely with those of institutional investors.

To attract funds from end-investors, venture capitalists must demonstrate competent behaviour, involving effective screening, due diligence and contract formulation, before investments in risky companies may be made.⁽²⁾ Agency problems may also be mitigated by the activities of intermediaries between venture capitalists and institutional investors, such as 'gatekeepers', who advise on venture capital fund selection and operate 'funds of funds' which invest in a spread of venture capital funds. Most crucially, the limited partnership structure of most venture capital firms is designed to reduce agency problems by providing a framework within which the interests of the limited partners (ie the end-investors) may be aligned with those of the general partners (the venture capitalists). As demonstrated again by Sahlman (1990) and Hay and Abbott (1993), among others, this can be facilitated by various contractual features, most notably by linking venture capitalists' remuneration to a fixed proportion (currently usually 2%) of total capital committed (the 'annual fee'), plus a proportion (currently generally 20%) of realised capital gains on investments ('carried interest'), thereby relating general partners' compensation directly to the success of the partnership.

It is possible, however, that certain features of these contractual relationships may actually have a perverse effect on the willingness of venture capitalists to invest in early-stage high-tech deals. The annual fee's linkage to capital committed arguably motivates the venture capital firm to increase fund size and make larger investments. A recent study by Murray and Marriott (1998) constructs a 'model' venture capital fund based on plausible assumptions and finds that the internal rate of return to the general partners only becomes positive at a fund size of £10 million and only reaches an acceptable level (say 30%) for a fund size of £20 million. The pressure to increase investment sizes may also lead to a shift to later-stage financing.⁽³⁾

The problem, in a nutshell, is that small fund structures are necessary to encourage a flow of investment into 'classic' activities (ie seed, start-up and early-stage finance), but such structures may not be profitable due to relatively high operating costs.⁽⁴⁾ On this view, considerable economies of scale are available in the venture capital industry. Early-stage funds tend to incur greater unit costs while having smaller total funds over which to defray costs than later-stage development capital or MBO funds. As venture capital fund sizes increase, the attractiveness of investing small amounts in start-up companies falls. This may have particularly serious implications for investments in TBSFs, where scale-related costs are exacerbated by such factors as increased information costs associated with more

⁽¹⁾ See Prendergast (1999) for a recent general description of these types of model.

⁽²⁾ See, in particular, van Osnabrugge (2000).
(3) See especially Gompers (1998).

⁽⁴⁾ Murray (1999) provides an excellent summary of this line of argument.

complex products, reluctance to invest large sums early in the life cycle of the TBSF, and long product development cycles in some cases.

The risk-reward relationship

The willingness of end-investors to provide finance to venture capital firms that invest in TBSFs will depend ultimately on the risk-reward relationship, ie the extent to which such investments are likely to provide returns commensurate with the risks involved. Returns on venture capital investments depend, inter alia, on such factors as: the period of investment; the method of exit; and the company valuation at exit.⁽¹⁾ An assessment of returns therefore requires consideration of the exit process, recognising that the ease and availability of the exit process is fundamental to the provision of venture capital finance. Statistics on the US venture capital industry show a correlation between the availability of exit through IPO (proxied by the number of venture capital-backed IPOs) and the willingness of end-investors to allocate funds to venture capital-backed firms (measured by new capital commitments), with a lag of about one year.

The potential for exit through an IPO may also help to overcome demand-side constraints⁽²⁾ on the financing of TBSFs, associated with entrepreneurs' reluctance to cede equity control. This may arise because an IPO often effectively ends the venture capitalist's close involvement in the company and provides the entrepreneur with an opportunity to regain control of the company. In other words, the prospect of an IPO gives the entrepreneur a call option on control, contingent on the firm's success. This incentive is not available in a trade sale, where control passes to an acquirer, even if the entrepreneur remains in charge of day-to-day management. According to this theory,(3) the potential for exit through an IPO is critical to the development of an active venture capital market, allowing the venture capitalist and entrepreneur to enter into an explicit contract over the future control of the company. Although this model does not pay sufficient regard to the fact that an IPO more usually results in control passing from either the venture capitalist or entrepreneur to third-party investors, it is consistent with the idea that the success of early-stage venture capital financing of high-tech firms is closely linked to the prospects for exit through IPOs. The existence of well-developed public equity markets,

including markets specialising in small high-growth stocks (Nasdaq in the United States is the best example), is on this view vital to encourage greater focus on 'classic' venture capital finance.

The risk-reward trade-off between different types of venture capital activity has unfortunately received only limited attention in the literature. The venture capital market does not possess the characteristics of most other markets, such as rapid flows of information, large numbers of buyers and sellers and relatively homogeneous expectations. Most early-stage investment in new companies is through private equity offerings or capital allocated within established companies. Since such transactions are generally fairly infrequent, it is difficult to develop comparable performance criteriaprice information is simply not available at consistent intervals for most venture capital investments. This in turn means that rates of return cannot easily be computed over monthly and quarterly time periods, as is possible in other securities markets. In the same way, the lack of frequently reported market prices makes it virtually impossible to derive soundly-based price measures of riskiness (eg betas) in the venture capital market. This explains why the literature in this area has tended to focus on target rates of return over longer periods of time.

These target IRRs need to be related to actual returns generated by venture capital investments. One of the first studies to look at such returns in the United States was that by Huntsman and Hoban (1980), which finds that the average annual rate of return on a sample of 110 venture investments by three venture capital funds over the 1960–75 period was 18.9%. This estimate may be biased upwards because the sample is drawn solely from surviving firms. This study also uncovers two other findings which have come to be regarded as standard features of the venture capital risk-reward relationship: (i) a high probability—about 1 in 6—of complete failure of the investment; and (ii) the average return being driven mainly by a small number of investments exhibiting extraordinarily high returns. Subsequent US studies reveal the sensitivity of IRRs to the start date of the fund, but a review of the US evidence⁽⁴⁾ concludes that venture capital returns are most often in the teens, with occasional periods in the 20%-30% range and rare spikes above 30%.

⁽¹⁾ See especially Hay and Abbott (1993).

⁽²⁾ See Cressy and Oloffson (1997) for an analysis of such constraints.
(3) See Black and Gilson (1998) for more details.

⁽⁴⁾ See Bygrave (1994).
Turning to the UK evidence, an early analysis of returns to venture capital funds launched in the United Kingdom between 1980 and 1990⁽¹⁾ shows an average annual return to end-December 1994 of 12.1%, with large MBOs generating the highest returns, at 23.1% on average, and early-stage deals the lowest, at only 4.0% on average. But these figures are heavily influenced by the recession of the late 1980s, and the resulting failure of large numbers of SME-including TBSF-start-ups. More recent statistics are more encouraging, perhaps not surprisingly given that they cover a period of uninterrupted real economic growth. Net returns for private equity funds raised between 1980 and 1999, measured to the end of December 1999, are 33.6%, 31.1%, 27.2% and 20.0% per annum over periods of one year, three years, five years and ten years respectively.⁽²⁾ These funds outperformed UK pension funds, and various stock market indices, over all these periods, although very high returns were achieved by only a small proportion of funds (the top decile).

Very recently, Burgel (1999), in a study commissioned by the British Venture Capital Association (BVCA), has produced returns figures and risk indicators for different types and stages of funds. They show that the pooled annual IRR for all UK venture capital funds (134 are covered in the survey) since 1980 is 14.3%, but the annual IRRs for early-stage and technology-based funds are 8.2% and 9.8% respectively. Over the ten-year period to 1998, the IRR for UK early-stage funds, at 7.9% per annum, compares very unfavourably with a 19.7% annual IRR for US early-stage funds. Once again, however, such comparisons are crucially dependent on start dates and periods; excluding the poor returns generated by the UK venture capital industry in the late 1980s can make a huge difference. For example, over the seven-year period 1992-98 or the six-year period 1993-98, the annual IRRs for UK early-stage funds rise to 26.9% or 26.7% respectively.

It is instructive to compare these results with indicators of the risks associated with venture capital funds, measured by the spread of returns generated. Burgel shows that the standard deviations of returns on technology and early-stage funds over the 1980-98 period are actually well below those of development and large MBO funds, although this mainly seems to reflect

much greater upside potential for large MBOs in particular. Interestingly, it also appears to be the case that technology funds (but not early-stage funds in general) are subject to lower downside risk than other funds, which seems contrary to the theory that TBSFs are riskier than SMEs in general. But it remains the case that the maximum IRRs recorded for technology and early-stage funds over the full 1980-98 period (at 20.2% and 18.9% per annum respectively) are still well short of the target IRRs mentioned in the literature. If the latter are regarded as the returns that investors believe will adequately compensate for risk, it has to be concluded on the basis of this survey that the long-term risk-reward relationship has been less favourable to investment in UK technology and early-stage funds than in either later-stage UK funds or corresponding US funds.

Business angels

Private equity finance for TBSFs may be provided not only by the formal venture capital industry but also by the business angel (or informal venture capital) market. It has been estimated that the United Kingdom has approximately 18,000 actual and potential business angels, whose current annual investment activity amounts to around £500 million in total in some 3,500 businesses.⁽³⁾ Surveys⁽⁴⁾ indicate, however, that business angels have substantially greater funds available for potential investments, but face problems identifying suitable investment opportunities. This suggests that the UK market is inefficient, reflecting information gaps and high search costs incurred by investors seeking investment opportunities and entrepreneurs seeking finance. The invisibility of the business angel market, its fragmented nature and poor channels of communication between firms and investors create what Mason and Harrison (1996) term a 'discouragement effect', curtailing the search for equity capital.

In addition to these imperfections, the business angel market is also subject to similar kinds of agency risk, moral hazard and adverse selection as characterise the formal venture capital market, although angels do not have to cope with agency problems with end-investors given that they invest their own money. The invisibility and fragmented nature of the business angel market arguably may exacerbate some of these problems.

⁽¹⁾ See BVCA (1995).

⁽²⁾ See BVCA (2000a).

⁽⁴⁾ See Mason and Harrison (1998, 1999a).
(4) See Stevenson and Coveney (1994) and Mason and Harrison (1997).

Several studies⁽¹⁾ suggest that business angels seek to manage agency risk and other market imperfections by becoming actively involved with the company in various supportive roles. There is some evidence⁽²⁾ that 'serial' business angels (those private investors who have made at least three separate investments), whether operating on their own or as part of syndicates, manage agency risk largely by backing entrepreneurs known personally to them, to another syndicate member and/or to the deal referrer. These studies also confirm that business angels face considerable difficulties in trying to unearth promising investment opportunities, and in identifying suitable partners with whom to share the risk of investing in private unquoted early-stage companies.

US studies tend to conclude that business angel finance complements that of venture capitalists. The evidence there⁽³⁾ implies that US business angels typically invest in smaller amounts and at earlier stages than US venture capitalists, and are often the main source of very early-stage external equity finance for small high-tech companies. Statistics on the size and type of investment by US private investors indicate that individual business angels, along with internal funds, are currently the principal source of finance for seed and start-up capital of amounts ranging from \$25,000 up to \$500,000, with business angel networks heavily involved in the provision of early-stage finance in the range of \$500,000-\$2 million: formal venture capital finance in the United States now seems most focused on the provision of follow-up finance of above \$2 million, once the company develops beyond the risky seed/start-up stages towards sustained growth.⁽⁴⁾

Evidence for the UK market is less clear-cut. It has been hypothesised⁽⁵⁾ that business angels have the potential to fill a gap in the United Kingdom in the provision of seed, start-up and early-stage finance. This may be facilitated if angels are content with lower annual IRRs (say of around 20% rather than 30% minimum for venture capital firms), and are less concerned than venture capitalists or banks with lack of track record or collateral. But early empirical studies⁽⁶⁾ find only limited support for these hypotheses. More recent research⁽⁷⁾ finds more evidence of complementarity, but is based only on business angel networks listed in the BVCA directory. The most recent evidence, in Harrison and

Mason (2000), suggests that both business angels and venture capitalists have participated in complementary relationships, including deal referral and (to a lesser extent) co-investing and sequential investing. In most cases, however, these relationships account for a relatively small proportion of their investment portfolios.

More light has been thrown on these issues in an extremely useful recent study by van Osnabrugge (1998), which examines in detail the characteristics and objectives of both venture capitalists and business angels in the United Kingdom. This finds some evidence of complementarity, with venture capitalists often providing expansion capital to developing firms which initially received start-up finance from business angels. But it also suggests that business angels are less involved in financing TBSFs than venture capitalists: some 13% of the sample of business angels finance TBSFs, compared with 57% of venture capitalists, and only 24% of total business angel finance goes to the high-tech sectors, compared with 44% of venture capital finance. In a later study, van Osnabrugge (2000) rationalises revealed behaviour differences on the part of business angels and venture capitalists as reflecting different approaches to agency risk control. Business angels place greater emphasis on ex post involvement in investments as a risk-reduction method, whereas venture capitalists are more concerned about reducing those risks in the pre-investment process as a means of signalling competence to end-investors.

Overall, the evidence on the extent to which UK business angels are involved in the provision of finance to TBSFs is inconclusive. Van Osnabrugge's rather negative findings receive support from several other studies, suggesting that only a small proportion—around 5% are technology specialists. Lumme et al (1996) find that just 8% of a sample of TBSFs in the Cambridge area raised finance from business angels. But Mason and Harrison (1999a), in a recent survey of business angel networks, find that more than half of their deals are start-up and early-stage ventures and nearly one third of amounts invested are in high-tech sectors. They also discover evidence of greater permissiveness in business angel financing decisions than is likely to be tolerated by the formal venture capital industry, eg lower rejection

⁽¹⁾ See in particular Landstrom (1992 and 1993).

⁽²⁾ Reviewed in Kelly and Hay (1996).

See, in particular, Freear, Sohl and Wetzel (1990 and 1996). (3)(4) See Sohl (1998) for a detailed analysis of this process.

⁽⁵⁾ By, inter alia, Aernoudt (1999).

⁽⁶⁾ See especially Mason and Harrison (1995) and Lumme *et al* (1996).
(7) BVCA (2000b).

rates, longer exit horizons and lower target IRRs. But all the UK surveys agree that the UK business angel market is nowhere near as involved in the provision of early-stage finance to TBSFs as its equivalent in the United States. This is variously attributed to: a smaller pool of high net worth individuals in the United Kingdom; higher marginal tax rates; fewer high potential growth companies; and a lack of entrepreneurs who have built successful technology companies, thereby limiting the future supply of technology-oriented business angels.

Corporate venturing

Corporate venturing provides an alternative source of private equity finance for TBSFs. It tends to be found most frequently in the high-tech sectors of the economy, especially pharmaceuticals and software. In many cases, corporate investors are likely to have a greater understanding of the risks involved in the development of new high-tech products than institutional investors. This provides scope for corporate venturing to reduce information asymmetries: to the extent that corporate venturing activity is focused on markets in which the corporate venturer is currently competing, the corporate venturer is in a better position to assess the viability of an investment in a TBSF than the venture capitalist or institutional investor (see the report by Withers Solicitors (1995)). The desire of large companies to broaden their access to new technologies, and thereby to diversify their technological base by sharing costs and spreading risk, suggests that corporate venturing may fill equity gaps in the provision of early-stage finance to TBSFs.

This hypothesis receives some support from what is admittedly fairly limited evidence in the United Kingdom. In a survey of 48 mainly TBSFs, McNally (1995) finds that direct corporate venturing is the most common form of first-round financing. Moreover, more than two thirds of the investee companies in his sample that raise finance through indirect corporate venturing do so at the seed, start-up or early stages, and almost three quarters of total finance from indirect corporate venture funds to the sample of TBSFs is at these stages. This seems to imply that venture capital funds backed by corporate investors are more likely than other venture capital funds to make investments in early-stage TBSFs. But other evidence (such as that reviewed in Mason and Harrison (1994)) suggests that many corporate venturers

(1) See the report by the CBI (1999).
 (2) See Roberts (1991), Hall and Young (1991) and Hall (1992).

avoid early-stage financing. In any event, it needs still to be borne in mind that corporate venturing in the United Kingdom remains an activity undertaken by only a relatively small proportion of larger companies, and a source of external equity for only a limited number of TBSFs.⁽¹⁾

Access to finance and performance

If TBSFs do face greater financing difficulties than SMEs generally, it has been argued that this should be reflected in higher default and failure rates among TBSFs. Westhead and Storey (1994), for example, postulate that, although TBSFs are likely to grow more rapidly than SMEs in general, they are also likely to experience higher default rates. They attribute this to four key factors, all of which, as we have seen, are associated with the degree of risk attached to TBSFs: (i) greater lack of managerial and entrepreneurial skills of owners/founders; (ii) greater difficulties of assessing prospects for products or services; (iii) shorter product life cycles; and (iv) greater uncertainty over the outcome for R&D.

In fact, the empirical evidence is by no means conclusive on this crucial issue. Moore (1994) finds that the difficulty in obtaining start-up capital, and the adequacy of initial finance, are linked to subsequent performance; a greater proportion of companies facing problems in accessing start-up finance subsequently underperform. Bates (1990), in a study that uses logit, discriminant and regression analysis to assess factors relevant to SME survival rates, finds that firms that receive debt and equity finance at start-up are more likely to survive than firms reliant on internal finance. Rather surprisingly, in view of the literature on the superiority of equity over debt finance at start-up, he also finds that a reliance on debt finance does not increase the risk of failure. Other studies,⁽²⁾ using both US and UK data, identify under-capitalisation as the most important reason for SME insolvency. More recently, Mason and Harrison (1998) also conclude that the post-start-up survival of businesses is in part a function of the ability of management to secure/gain access to finance. Firms launched exclusively on personal finance are more likely to fail, while the ability to acquire additional finance, post start-up, is positively associated with business survival. Such studies, however, do not always recognise properly the endogeneity of debt and other forms of finance, which means that causality may run from

performance to ability to raise finance, rather than the reverse. This qualification must be borne in mind when assessing the main inference of these studies, which is that TBSFs are more likely to fail than SMEs generally, because they face greater problems in obtaining suitable finance.

Analysis of relative failure rates can throw more light on these theories. Westhead and Storey (1994) find that the evidence on relative failure rates does not support the thesis that high-tech firms are higher risk than SMEs in general: the survival record of the TBSFs in their sample is actually superior to a random sample of UK small firms. Garnsey and Cannon-Brookes (1993), in a study of a sample of high-tech firms in the Cambridge area, find that failure rates since 1984 are only 33%-50% of the national average for smaller companies. These results are rather surprising in view of the theoretical literature on the risks associated with TBSFs compared with SMEs in aggregate. They may, however, reflect possible sample bias in the surveys; the Cambridge study, for example, may say more about regional variations in insolvencies among SMEs generally than about divergencies in failure rates between high-tech and conventional companies.

Storey and Tether (1996), in their comprehensive evaluation of the performance of TBSFs in a large number of European countries, quote studies carried out in Germany, Italy and France which also suggest that TBSF failure rates are below those of SMEs in general. They argue that the reluctance of many institutional investors in those countries to increase the proportion of funds allocated to high-tech start-ups between 1985 and 1995 does not reflect concern over any likely additional risks, but rather an inability to distinguish between firms likely to be successful and those likely to be unsuccessful. Given the greater reliance on sometimes unproven new technologies, on this view the variability of performance of TBSFs, ie the distinction between successes and failures, may be greater than that of SMEs generally, even if overall failure rates are similar. This may be one way of reconciling conflicting empirical results. Another is that the results will be sensitive to the choice of samples and time periods over which performance is assessed. But the evidence overall on relative failure rates provides little support for the thesis that TBSFs face significantly greater financing difficulties than SMEs on average.

Role of the public sector

Public sector initiatives to support the financing of TBSFs, whether based on public expenditure or the tax system, may be justified if market imperfections mean that the private sector does not provide capital to firms on competitive terms. Activities in the high-tech sectors of the economy may be more likely to generate positive externalities, the benefits of which are not taken fully into account by private markets. An extensive literature⁽¹⁾ reveals how R&D expenditure by TBSFs may generate social returns in excess of private returns: the investing firms, however, may not capture these spillover effects. They may, therefore, invest below the socially optimal level of R&D, for fear that subsequent profits may accrue mainly to competitors introducing imitations or to developers of complementary products. Such problems may be especially acute among smaller companies, because they are less able to defend their intellectual property rights.⁽²⁾

But this review of the literature suggests that conclusive evidence on whether there is a major market failure in the provision of finance to small high-tech companies in the United Kingdom is lacking. This means that the case for general public sector initiatives is also unproven. Indeed, in the absence of market failure, such initiatives may themselves cause distortions by subsidising, at considerable public cost, non-viable firms, which are not attracting private capital because they do not offer good investment opportunities. The information that is then conveyed to other potential investors may be misleading, either inducing wrong decisions or, as private investors learn from their mistakes, acting as a deterrent to the future provision of finance to all firms, regardless of viability.

There is little empirical evidence on the effectiveness of existing schemes of public sector support for TBSFs, either in the United States or the United Kingdom. One exception is the recent study by Lerner (1999), which looks at the US Small Business Innovative Research (SBIR) Programme. This was established in 1982 to stimulate small business innovation by providing inducements to TBSFs to meet federal R&D requirements. Lerner considers a sample of 1,435 firms participating in SBIR programmes over a ten-year period, and finds that SBIR awardees enjoyed substantially greater employment and sales growth than matching firms, and were also more likely subsequently to receive

⁽¹⁾ See Griliches (1992) and Jaffe (1996) for reviews of this literature.

⁽²⁾ This argument is associated with Lerner (1999).

venture capital financing. In particular, the relationship between SBIR awards and growth appears to be much stronger in high-tech sectors of the economy.

There have been even fewer studies of the effectiveness of UK public sector schemes to support TBSFs, partly because most of the initiatives are comparatively recent. But Moore and Garnsey (1992) did look at the effectiveness of the Small Firms Merit Award for Research and Technology (SMART). This provides grants to help SMEs to access technology and research, and to develop innovative products and processes. In providing such grants, SMART awards in effect aim to reduce information asymmetries by attaching a track record of achievement to TBSFs, thereby also helping to lever in additional funds through a form of accreditation process. Moore and Garnsey reach the conclusion that the long-term financial viability of the firm is enhanced by the injection of finance for innovation via the SMART scheme, although this rather weak test should not be taken as a justification in itself of the scheme.

This suggests that public sector intervention should be targeted at those areas where market imperfections can be identified. Research at the Bank (2001) concludes that public sector initiatives should be aimed specifically at improving the provision of small amounts of risk capital to TBSFs at the seed, start-up and early stages. This is especially so given that debt finance, which is readily accessed by SMEs in general, is frequently not an available or appropriate source of funding for TBSFs at these stages of their life cycles.

Conclusion

In conclusion, this review has emphasised that the information asymmetries, moral hazard and adverse selection that feature in aspects of SME financing potentially apply with particular force to the provision of start-up and early-stage finance to TBSFs. This reflects the key characteristics of high-tech companies, notably that their value is linked primarily to longer-term growth potential, they lack tangible assets in the early stages of their life cycles which may be used as collateral, and their products are usually subject to high obsolescence rates. These factors are compounded by the greater difficulty that finance providers face in assessing the technology, and the greater uncertainties over both the cost of R&D and the prospective demand for the new product. Public sector initiatives should be targeted specifically at these problem areas, because conclusive evidence of a major market failure in the provision of finance to TBSFs more generally is lacking.

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Measuring interest accruals on tradable debt securities in economic and financial statistics

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The following article examines a current international debate which could affect the way in which some important macroeconomic statistics are measured. The article is based on a longer paper, commissioned last year by the International Monetary Fund as a contribution to the evolution of international statistical standards. The views expressed here are those of the author and do not necessarily reflect those of either the Bank or the IMF.

Introduction and summary

This article reports a current methodological debate about the way in which interest flows are recorded in a variety of macroeconomic statistics. When new international statistical standards were published in 1993, one of the major changes to the recommended presentation of the System of National Accounts and the Balance of Payments was the adoption of accruals recording for income and expenditure. However, as countries have begun to implement these standards, questions have been raised about their exact interpretation in respect of interest flows associated with tradable debt.

In essence, the issue is how to measure the property income from a fixed-term debt security on which the cash flows are fixed but whose market value is free to vary. Two methodologies in particular are under scrutiny: the first views the accruing interest income as fixed over the life of the security, once the issue price and conditions of future cash flows are known; the second takes the view that there is no *a priori* way of determining what proportion of the future payments stream represents interest and what proportion principal. Under this view the income stream is fixed only for so long as market conditions are constant after issue. Following any change in conditions that results in a change in the value of the security, a new future income profile is established.

Choosing between these alternatives raises some profound conceptual and practical questions. At one level, these concern the accounting rules required for coherence within the National Accounts—for example defining the boundary between income and holding gains, and the implications of moving from a 'historical cost' system to fair value accounting. At a second level, the issues concern the practical implications of a change in terms of both data collection and interpretation. National accountants and government finance statisticians in the United Kingdom, and most other countries, adopted the first of the two methodologies when implementing the new standards. Moving to the alternative methodology would have consequences for recorded interest flows within the accounts, in turn leading to different profiles for national and sectoral saving and deficits, including the general government surplus/deficit.

This article reviews these alternatives and concludes in favour of the second approach. It is a summary of a longer discussion document, commissioned by the International Monetary Fund (IMF).⁽¹⁾ The full paper looks separately at the principles of accruals accounting; the conditions for coherence within the National and Sector Accounts; measurement problems; and the implications for users, particularly in the area of government debt management. The present shorter text aims to give sufficient flavour of the central arguments to indicate why this is an important issue for users of macroeconomic statistics, and the reasons for recommending a change of practice.

Accruals accounting—some conceptual issues

Prior to the adoption by EU Member States of the European System of Accounts (ESA95)⁽²⁾ as the common

^{(1) &#}x27;Calculating the accrual of interest on tradable debt securities', by Chris Wright and John Joisce prepared for the thirteenth meeting of the IMF's Balance of Payments Committee, October 2000. Papers for the thirteenth meeting will be available shortly at www.imf.org/external/bopage/stindex.htm

⁽²⁾ The European standards derive in turn from wider international standards—the 1993 System of National Accounts (SNA93), and the fifth edition of the IMF's Balance of Payments Manual (BPM5).

standard for economic statistics, income flows were recorded on a 'due for payment' basis, ie at the point where cash payments were scheduled to occur. For many economic transactions, this meant that the statistical recording of events through the flow of income did not map well to the timing of the economic events or processes generating these flows. Thus economic activity taking place in a given period would frequently not be recorded in the statistics until some later period.

For many transactions, these timing discrepancies were small. However, for some activities, the due date for settlement could be a considerable time after the economic activity that the National Accounts were seeking to record. This was particularly true for interest income, where the practice of annual or semi-annual interest crediting has been widespread. The advent of zero-coupon bonds, where interest is settled at redemption, made these timing discrepancies even greater, potentially running to many years.

For funds intermediated through the banking system, principally deposits and loans, the concept of interest accrual is generally clear. The actual flows, as recorded under the old standards, represent the contractually agreed rates-fixed or variable-applied to the outstanding balances and settled at the due date. The application of the accruals standards in these cases is generally straightforward: the income accounts record the flow of interest continuously throughout the period(s) that funds are provided/used; the balance sheet simultaneously records the interest as accruing within the asset/liability position of the lender/borrower of the capital sum; and the actual settlement of the interest receivable/payable at the due date is recorded not as interest income, but as a financial transaction which, in the case of a cash payment, may be viewed as extinguishing the accumulated accruals within the balance sheet.

The recording of interest may be less straightforward for some other instruments. For example, where an instrument can be issued or acquired at a price different from its face value, the total return—the yield to maturity—will comprise two elements: any contractual payments between the issuer and the holder; and the effects of the reversal of any discount or premium at the time of issue/acquisition. Current statistical standards are not entirely clear about the treatment of this second element. Specifically, the circumstances under which the yield is to be regarded as synonymous with the interest stream are at best ambiguous and at worst contradictory.

Commercial historical cost and mixed-value accounting practice has long regarded the accrual of discount within the acquisition cost of securities as reflecting the accrual of interest. This confirms two important principles: first, that interest can be delivered through a change in the value of a security as well as by means of an explicit payment as is the case with a Treasury bill or deep-discount bond; and second, that the interest deliverable by a tradable security can be viewed differently by different holders, because the acquisition cost and hence the yield to maturity for new holders will be determined by market conditions at the time of acquisition rather than at the time of issue.

These two principles demonstrate that no clear delineation exists between interest income and the yield to maturity, and that, as a consequence, the historical cost standards permit two agents to report the same economic event in two different ways. This is best illustrated by an example.

A five-year zero-coupon bond, issued for £747 but with a redemption value of £1,000, has a yield to maturity of 6% and would be shown by both the issuer and acquirer as generating an accrual of interest of £45 (£747 @ 6%) during the first year of its life. If there were no change in market conditions, then a new acquirer purchasing this security in the secondary market at the end of the first year would pay £792 and would amortise this smaller discount over the remaining four years to maturity. Under this scenario, both the issuer and the new acquirer of the security would record an accrual of interest of £48 (£792 @ 6%) in the bond's second year. This result satisfies the requirements of the National Accounts that flows of income should be reported symmetrically by counterparties, and, if the accrual of interest is treated as a re-investment within the parent instrument, would also mean that the respective liability and asset positions of the two parties are reported identically.

In practice, the above example is not realistic. Market conditions would normally change over the life of such a bond so that a new acquirer, purchasing in the secondary market, will typically view the return differently from the issuer. If, in our example, market conditions had changed at the end of the first year of the bond, immediately prior to the new acquirer's purchase, so that the new acquisition price was £823 rather than £792 previously, then the new acquirer will face a yield to maturity of 5% and will amortise the new discount to redemption over the four years to maturity. This gives an accrual of interest of just £41 (£823 @ 5%) in the second year of the bond rather than the £48 (£792 @ 6%) that will be reported by the issuer. Both estimates of accruing interest are meaningful, in the context of each counterparty's reported accounts, but they now fail to satisfy the National Accounts requirement for symmetry. The amortised present value calculations and associated accruing interest estimates by the two parties are set out in Table A.

Table A

Interest accrual under amortised cost accounting

Figures in £s

	Issuer		New acquire	r
Year	Opening value	Interest accrual	Opening value	Interest accrual
1	747	45	n/a	n/a
2	792	48	823	41
3	840	50	864	43
4	890	53	907	45
5	943	57	952	48
Redemption value	1,000	n/a	1,000	n/a

n/a = not applicable.

Under 'fair value' accounting, both the issuer and the holder of tradable securities will record the revalued price of the instrument following any change in market conditions—in the example this means a reported value, by both parties, of £823 outstanding at the end of year 1. The question for the issuer is then how to record the subsequent flow of accruing interest. If he continues to record his original estimate of the flow in the second vear of the bond—£48—then the implied effective interest cost is 5.8% as against 6% at the time of issue. Put another way, the internal coherence between the reported stocks and flows in the accounts is impaired: £48 of accruing interest has apparently been re-invested in the bond, yet its fair value increases by only £41 during the second year (from £823 to £864). Market conditions were unchanged throughout this period, so that the 'missing' £7 (£48-£41) cannot be attributed to a price change. The issues raised here take us to the crux of the methodological debate. In a system built on the principle of market prices—the present value of future payment streams—can it be meaningful to base the associated future income stream on a historical interest rate? Based on this example, the answer would appear to be no.

Nevertheless, the revaluation of the security associated with the change in market conditions can be perceived differently by the two parties: the issuer may view the revaluation as a temporary disturbance that is reversed over the remaining life of the security; while the new acquirer accepts the revaluation as a once and for all change that establishes a new future income stream. Understanding these differences of perception is crucial. In principle, changes in the capital value of a bond occur either as an unplanned 'windfall' gain or loss, or as an incremental change in value, which is 'expected' in the sense that it is implicit in the yield to maturity. The distinction between these two is conceptually unambiguous. The former occurs as the consequence of some external event—for example through a change in market conditions or because of a change in the credit rating of the issuer. The effect of such a change may only be viewed with hindsight, ie, it is backward-looking. By contrast, the latter type is wholly forward-looking, a new future stream: the accrual of value associated with the yield to maturity, which the holder can rely upon subject to the non-default of the issuer. In a world where securities are recorded at amortised cost, agents record their 'expected' valuation changes based on the cost at issue/acquisition. In this situation, differences in the reported income stream follow directly from differences in the reported value of the security. By contrast, where both agents report a security at the same market value, there can be only a single interpretation of 'expected' and 'unexpected' valuation changes: in the example above, the change in value from £792 to £823 at the end of year 1 was 'unexpected'—a windfall gain (loss) to any agent holding (issuing) the security; but thereafter, the new present value profile of the bond represents the yield faced by both agents.

Why then might perceptions be thought to differ? The key to unlocking this question is the issuer's perception of the bond itself. An explicit feature of the above example was the ability of the bond holder to sell the security and for a new acquirer to assume ownership. However, an implicit, and erroneous, assumption is that the security will remain in the market until it matures ie that the issuer either cannot or will not redeem the liability early. If this assumption were true, then the issuer's liability cannot be strictly viewed as tradable as the issuer would, in effect, be locked into a loan with no right of early repayment. Under such circumstances, the issuer would rightly pay more regard to the historical cost measure of accruing interest liabilities. In practice, of course, the issuer is free to buy back the bond so that the interest cost should reflect the prevailing rather than the historical cost of finance. Tradability is the primary distinguishing feature of securities from other financial instruments and is the central element of this debate.

To anchor this point, suppose that, in the earlier example, the issuer redeemed the bond at the end of the first year, immediately following the change in market conditions. However, no sooner has he redeemed the bond than he decides to re-issue it at the same price (£823) at which he re-bought it. What are the consequences of this action? Abstracting from any transfer costs, one would hope that the issuer's position is unaffected-his balance sheet has been restored to its position prior to the dual transaction. However, if the issuer had thought that his recorded stream of accruing interest liabilities would also return to its previous historical cost path, then he is mistaken. By his own amortised cost calculation he will now record an interest stream of £41 in year 2, in line with the new yield to maturity. While the specific example may appear implausible, the general principle here is sound: the issuer is free to re-finance his borrowings at any time, so that the relevant cost of his current liability is that given by the current yield.

Interest accrual within the National Accounts

It should be clear from these examples that the use of the standard amortised cost calculations for accruing interest fails to satisfy one of the most basic principles of the National Accounts—the symmetrical recording of flows by counterparties. Two alternative solutions have been proposed: imposing symmetry by the overlaying of the flows, as viewed by one counterparty (typically the issuer), onto the accounts of both parties (the 'debtor' approach); and the recalculation of interest flows subsequent to any change in market conditions (the 'creditor' approach). These alternatives form the subject of the current methodological debate.⁽¹⁾

The current SNA/ESA guidance is generally understood to recommend the first of these approaches.⁽²⁾ Under this treatment, the future flow of interest is determined at the point of issue—ie it is not affected by any subsequent changes in market conditions. Supporters of the approach argue that it best represents the cost of capital associated with the security and that this cost remains the most relevant flow for financial analysis, even though it may not be recognised by a purchaser in the secondary market, who may be unaware of the original issue price. This treatment is widely referred to as the 'debtor approach' because it records the accrual of interest from the perspective of the issuer.

Many national accountants and government finance statisticians favour the debtor approach on practical data collection grounds. The quality and availability of data from issuers of securities has tended to be higher than from holders, so that practical considerations have commonly made it acceptable to impose the data provided by issuers.

The arguments ranged against the debtor approach typically focus on the conceptual rather than the practical. A key concern is that, while the accounting requirement for symmetry is met (by constraining the flows of the holder), the historical cost flows fail to reconcile the changes in the market value of the security subsequent to a change in market conditions. This is best illustrated through a further example.

Consider a five-year bond with a face value of £1,000 and paying an annual coupon of £50. The bond is issued at £1,000 and so delivers a yield of 5%, with the issuer recording an annual accruing interest liability of £50 which is exactly extinguished at the year-end by the annual coupon. At the end of the third year, market conditions change and the value of the bond drops to £964, ie, a current yield to maturity of 7%. During the fourth year of the bond, under the 'debtor' approach, the accounts will continue to record an annual interest accrual of £50, but the market price of the bond has now increased to £981. In the final year the bond returns to its face value of £1,000 at redemption. The reconciliation between opening and closing balance sheet positions is set out in Table B.

Table B

Balance sheet reconciliation under the debtor approach

Year	Opening market value	Interest accrual	Coupon payment	Revaluations Market revaluations	Other revaluations	Closing market value
1	1,000	50	-50	0	0	1,000
2	1,000	50	-50	0	0	1,000
3	1,000	50	-50	-36	0	964
4	964	50	-50	0	17	981
5	981	50	-50	0	19	1,000

(1) Some sources refer to a third method—the so-called 'acquisition approach'. Like the debtor approach, this relies on an amortised cost measure of interest income—in this case viewed from the perspective of the acquirer. While this does, in practice, represent the way in which source data for asset positions are still frequently available, this third approach is not materially different in principle from the debtor model.

(2) This treatment has since been endorsed by the *ESA95 manual on government deficit and debt*, first edition 2000, which states that the debtor approach should be used in national accounts for the government sector.

The main point to note here is that following the debtor approach requires the addition of revaluation adjustments in each period after the initial change in market conditions, in order to reconcile movements between the opening and closing balance sheet positions. Put another way, the receipt of the annual coupon is not sufficient to prevent the value of the outstanding principal from changing. Critics of the debtor approach argue that only the first revaluation adjustment—a fall of 36 in year 3—is analytically meaningful, being linked to a change in market conditions. The recorded revaluations in years 4 and 5 cannot be explained either as a consequence of wider market conditions or as the result of changing perceptions about the creditworthiness of the issuer. They may only be interpreted as a balancing entry and thus constitute evidence of mis-measurement somewhere in the other changes of assets account. Adopting the fair value creditor approach to income recognition eliminates the need for these additional balancing entries. The equivalent flows for the last example are set out for comparison below.

Table CBalance sheet reconciliation under the creditor approach

Year	Opening market value	Interest accrual	Coupon payment	Revaluations Market revaluations	Other revaluations	Closing market value
1	1,000	50	-50	0	0	1,000
2	1,000	50	-50	0	0	1,000
3	1,000	50	-50	-36	0	964
4	964	67	-50	0	0	981
5	981	69	-50	0	0	1,000

User practice

Supporters of the debtor approach commonly cite user practice, particularly in the field of government debt management.

Central to this issue is the question of how debt managers perceive their strategic role. Traditionally this has been cast as one of minimising government funding costs for a given view of interest rate risk. Put simply, the aim has been to minimise the funding costs of each new issue on the assumption that it will be in the market to maturity. Under such a rule, no policy objective has been formulated in respect of the market value of debt and, consequently, no role is given to prevailing market rates as indicative of the opportunity cost of existing issued debt.

More recently, the move to public sector surpluses in a number of OECD countries, coupled with a concern for the liquidity of government bond markets, has motivated some buying in/switching, facilitating higher new issuance than would otherwise have been the case, and helping to concentrate liquidity in the most actively traded stocks. Buy-backs and switches are now becoming a common feature of debt management. The UK Debt Management Office is active in both.

In practice, incentives to refinance debt could arise in a number of ways. For example, governments could set objectives for their net debt, on a marked to market basis, at some future horizon; or patterns might develop where governments perceive trade-offs between the cash measure of the debt interest bill and the nominal value of outstanding debt. The point to note here is that the ultimate drivers may be based as much in short-term presentational pressures—to meet a cash flow objective or an EU Stability Pact target—as in a strategy to minimise funding costs over the longer term.

Nevertheless, longer-term thinking about the role and objectives of debt managers is likely to require the further development of forward-looking funding strategies and the wider use of buy-backs and switch auctions. Just how far this process can go will depend on the circumstances of individual markets. It may be that large quantities of old debt could not be exchanged for new without paying some premium, so that it may remain prudent for a debt manager to assume that any bond, once issued, will remain in the market until maturity, and that the debt manager is committed to the full set of cash flows on it until that time. But it may also now be the case that more attention than in the past will be given to the options for switching operations to take advantage of lower funding costs within benchmark issues, or to modify the maturity structure of debt to reflect longer-term strategic goals.

Impact on sectoral and national saving estimates

One of the concerns that has been raised about the creditor approach is the impact that it will have on measured sectoral and national saving. Critics of the creditor approach argue that one of the purposes of so-called fixed-rate debt is that it provides an assured payment stream, and that interest payments are known in advance. And by adopting the creditor approach that certainty would be eliminated: in effect, all debt becomes floating, and extraneous changes in interest rates would increase (decrease) sector/national saving with no changes in the behaviour of the borrowers/lenders.

This charge is correct: under the creditor approach, a sector/nation would find its deficit (surplus) increased (decreased) following an increase in market rates for debt. But that is what must happen under an accrual system that requires market pricing of assets and liabilities. To believe that sectoral saving is unaffected by a change in interest rates is to misunderstand the nature of financial markets, or of a system that is based on accruals and market prices.

However, this is less of a change than resulted from the introduction of the 1995 European System of Accounts, indeed merely a clarification. Moving from a 'due for payment' basis, or even a strict cash basis of accounting, involved considerably more adjustment. Moreover, what the introduction of the creditor approach would also mean is that more interest/emphasis would be placed on other aspects of the National Accounts and balance of payments than on the 'above the line' transactions. The financial account, and above all, the balance sheet/international investment position would become more useful analytical tools than they are at present. In particular, net worth and changes in net worth due to saving and capital transfer would be more valuable analytical concepts and statistics.

The changes to sectoral balances resulting from any change to the accounting methodology have not been estimated here, but are likely to be material. The yield curve has shifted downwards considerably during the last several years, the result of reductions in actual and expected inflation. Moreover, as governments have moved into surplus or sold assets, they have retired a considerable amount of debt outstanding (as noted above). There have been two primary results from these developments. The first is that debt that was issued in a period of higher inflation usually carried a higher-coupon payment than equivalent debt issued recently. There will be a substantial portion of long-term debt issued in periods of higher coupon that are still outstanding in the market. The prices of most of these instruments will have risen as the yield has fallen. At the same time, the increasing scarcity of certain instruments that have resulted from governments reducing their borrowing needs and/or retiring debt has meant that, in some countries, the yield curve has become inverted. Part of the reason for this is that certain lenders (notably life insurance companies and pension funds) with very long-term durations for their liabilities need long-term assets to match. As the supply has dwindled, the price has risen, pushing down the yield. As a result of these developments, there may be a considerable difference between the measured interest payments under a debtor approach versus a creditor approach.

Conclusions

This article has reviewed two possible ways of measuring interest accrued on tradable debt within economic statistics. While many statisticians and users have become accustomed to a measure based on the amortised cost at the time of issue (the 'debtor' approach), it has been argued here that such an approach fails to satisfy the wider accounting rules for the System of National Accounts. Once the designers of the System chose to adopt market prices as the underlying basis for all aspects of the system, not just transactions but balances as well, the creditor approach for the calculation of interest flows became the only method consistent with the System's overall integrity.

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Saving, wealth and consumption

By Melissa Davey of the Bank's Structural Economic Analysis Division.

The UK household saving ratio has recently fallen to its lowest level since 1988. A key influence has been the large increase in the value of wealth, which is likely to have reduced households' incentive to save. This article discusses the various forms of household saving and their determinants, and discusses the interactions between saving, wealth and consumption.

Introduction

Since the mid-1990s the UK household saving ratio has fallen substantially, recently reaching its lowest level since the late 1980s. Over the same period, household wealth has risen sharply, driven by rises in both equity and house prices. How should we interpret these developments, and what might they imply for the future growth of consumption?

The first section of this article shows that the fall in the saving ratio has been associated with rising borrowing, including mortgage equity withdrawal, which tends to be related to increases in housing wealth. The second section looks at capital gains and losses, and how these can be considered as part of wider income and hence affect the level of saving. The third section discusses how the sources and composition of wealth gains may affect the response of consumption and saving.

Saving and borrowing

The household saving ratio is the proportion of post-tax income⁽¹⁾ that households save for future consumption rather than consume now.

The saving ratio fell to 3% in 2000 Q3, its lowest level since 1988 (see Chart 1). As recently as 1997, the ratio was more than 10%. The sharp fall since then, which is similar in scale to that in the late 1980s, is accounted for by falls in post-tax income growth relative to consumption growth, which has been fairly stable at around 4%. In the year to 2000 Q3, real post-tax income growth was 2.6% (see Chart 2).⁽²⁾



Chart 2 Consumption and post-tax income



The components of saving

Saving comprises net purchases both of physical assets (mainly investment in housing) and of financial assets. Net financial saving can, in turn, be split between net

(1) Called 'available resources' by the Office for National Statistics.

(2) Post-tax income and consumption are deflated by the consumers' expenditure deflator to give real post-tax income and real consumption.

purchases of financial assets and changes in liabilities, ie borrowing.

The fall in the saving ratio since the early 1990s mainly reflects a fall in net financial investment; investment in physical assets has remained robust (see Chart 3). This is the typical pattern in a cyclical upswing.

Chart 3 Financial and physical saving



Since 1997, the fall in net financial investment has to some extent reflected a fall in gross saving, ie purchases of assets have fallen. But since the early 1990s the main influence has been the rise in borrowing. Indeed, since the mid-1980s changes in net financial investment and the saving ratio have broadly reflected movements in borrowing (see Chart 4).

Chart 4 Contribution of borrowing and saving to net lending



The components of borrowing

The main components of household borrowing are consumer credit and borrowing secured on

(1) See the box on page 6 of the February 2001 Inflation Report.

dwellings. Both have grown strongly in recent years, contributing to the fall in the saving ratio since the early 1990s.

Consumer credit is unsecured borrowing. It includes borrowing on credit cards and other short-term loans such as overdrafts. The stock of nominal consumer credit debt has been growing by more than 10% a year since 1995, with borrowing increasing by around 2% of post-tax income since 1996 (see Chart 5). The importance of credit card lending has risen over the past decade—the flow of net borrowing on credit cards is now around 1% of post-tax income. Part of this growth may reflect falls in interest rates for unsecured borrowing.⁽¹⁾

Chart 5





Secured lending has also been growing strongly in recent years, with nominal mortgage debt increasing by more than 6% a year since the beginning of 1999. Some of this has been accompanied by rises in housing investment, but not all; the part that has not represents mortgage equity withdrawal (MEW), which is then available for consumption. The article on pages 100–03 discusses MEW in more detail. Chart 5 illustrates that MEW rose sharply in 1999, accounting for much of the recent rise in the saving ratio.

Capital gains and losses

The incentive to save will be affected by capital gains and losses. In particular, the large rises in equity and house prices in the past ten years and the fall in inflation will have allowed households to achieve a given level of wealth with less saving. Indeed, the main source of the growth in net household wealth over the past few years has been revaluations related to price changes, not saving. Chart 6 illustrates that the saving ratio tends to fall when the ratio of wealth to income rises and *vice versa*.

Chart 6



One way to assess how much these capital gains and losses may have affected saving is to adjust measures of the saving ratio to allow for the effects that the gains and losses have on income, defined more broadly than simply current income. The behaviour of these adjusted measures can be compared with that of the standard measure.

Two adjusted saving ratios are considered here: one that adjusts only for the capital losses associated with general price inflation and one that adjusts for all capital gains and losses.

Adjusting household savings for inflation

Inflation generates capital losses on wealth denominated in nominal terms.⁽¹⁾ The saving ratio tends to rise with inflation when households are net holders of nominal wealth, as savers try to compensate for the falling real value of nominal assets. This makes it difficult to compare the real level of saving in the recent low-inflation period with earlier periods, particularly the 1970s.

The most important components of wealth that are fixed in nominal terms⁽²⁾ are households' bank and building society deposits and holdings of bonds via insurance companies and pension funds (see the box on page 94).⁽³⁾ Inflation erodes the real value of these assets. To compensate for this loss, the nominal interest rate on these assets can be thought of as consisting of a real interest rate plus an inflation supplement. The inflation component merely compensates for a real capital loss, as a higher price level erodes the spending power of wealth. This increases nominal household income. But to maintain the real value of assets, households have to save this extra income: it does not increase the resources available for future consumption, but merely compensates for the falling real value of their savings.

A measure of gross saving can be constructed that adjusts for the effects of inflation on the real value of assets; adjusted gross saving is measured saving minus this inflation component.

There is of course an offsetting effect on liabilities. When inflation is high, households with nominally denominated liabilities (such as mortgages) will have lower measured income and net saving, because the interest rates they pay are high to compensate the lender for erosion of the real value of the loan; but the real value of the debt is also falling, and this is not measured as income or saving.

The impact of the inflation adjustment depends not only on the inflation rate but also on the proportion of household assets with values fixed in nominal terms. This proportion has varied considerably. The most important change is the fall in net deposits from the mid-1980s onwards (see the box on page 94). But net nominally denominated assets were clearly very important in the 1970s and early 1980s.

As households are net holders of nominal assets, high inflation tends to increase measured saving and the saving ratio. Unlike the conventional saving ratio, the adjusted ratio⁽⁴⁾ shows that current saving is not low in historical terms, given the recent return to a low-inflation environment (see Chart 7). And the high saving rates in the 1970s were not sufficient to offset the effect of inflation on net wealth. The adjusted ratio is close to its average of 2.7% since 1968 and above the trough of the late 1980s, although well below the 5.6% average since 1980.

⁽¹⁾ This analysis follows Taylor and Threadgold (1979).

⁽²⁾ That is, assets whose value on redemption is fixed in money terms

⁽³⁾ Since 1982 the United Kingdom has issued index-linked gilts which, to an extent, protect holders from the effects of inflation. An adjustment can be made for this based on data on pension funds' holdings, but it has little effect on the series.

⁽⁴⁾ Measured as a proportion of post-tax income adjusted for inflation.

The composition of household wealth

1

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Household wealth has many different components, including financial assets, houses, jewellery and other valuables, and consumer durables, but the official measures of wealth include only housing and net financial wealth. Table 1 shows how the composition of total net wealth has changed over time.

Table 1

Household wealth (percentage of total net wealth)

	1975-84	1985-94	1995-99
Gross financial wealth	60	65	75
Gross financial liabilities	18	20	19
Net financial wealth	43	44	57
Housing wealth	57	56	43

Note: Net financial wealth is gross financial wealth minus gross financial liabilities (subject to rounding).

Housing wealth has fallen in importance relative to financial wealth. In the 1970s it accounted for around 60% of total wealth but now it is around 40%. Gross financial asset holdings have risen from around 60% of total wealth to 75% by 1995–99, but liabilities (mainly mortgages) have been a broadly constant proportion. These changes are partly due to changes in household portfolios, and partly due to differences in the growth of asset prices.

Assets

Chart 7

Households' financial assets include bank deposits, government bonds, shares in companies, and indirect



Adjusting household saving for asset price changes

A broader measure of saving includes all capital gains or losses. The ratio of gains-inclusive saving to post-tax holdings in insurance companies and pension funds (ICPFs), which invest in a variety of assets on behalf of households (see Table 2). An increase in the importance of wealth held indirectly in the 1980s was largely offset by a fall in the relative importance of bank and building society deposits. In the 1990s, rises in both ICPF assets and directly held equity wealth led to a sharp rise in gross financial wealth and a large rise in its share in total wealth.

Table 2 Financial assets (percentage of total net wealth)

	Foreign assets	Bonds	Deposits	Equities	ICPFs
975-84 985-94	1 1	3 1	27 21	8 11	21 31
995-99	1	1	19	15	39

Table 3 shows households' total holdings of each asset type, including both direct holdings and indirect holdings. Households' exposure to bonds and equities is greater than suggested by the direct holdings only: bond holdings are 12% of total net wealth and equities 42%.

Table 3Household gross exposure to asset types (percentageof total net wealth)

	Bonds		Deposits		Equity	
	Foreign	United Kingdom	Foreign	United Kingdom	Foreign	United Kingdom
1975–84 1985–94 1995–99	1 2 2	8 7 10	$\begin{array}{c} 0 \\ 1 \\ 1 \end{array}$	30 23 21	4 5 7	21 27 35

income looks very different from the inflation-adjusted measure (see Chart 8).⁽¹⁾ It is more volatile and, on average, larger. In 1999, the inflation-adjusted household saving ratio was less than 4% but gains-inclusive saving was more than ten times higher, at 60% of current post-tax income (not including gains as income).

The large fall in the gains-inclusive saving ratio in 1990 was related to sharp falls in house prices. This is clear from Chart 9, which splits the gains into those due to changes in gross housing wealth and those due to changes in net financial wealth. The strength of the total gains-inclusive ratio since the early 1990s is mainly related to equity market gains, although the housing market has played an important role in the past few years, supporting gains-inclusive saving in

(1) This ratio can also be calculated using gains-adjusted income as well as gains-adjusted saving, but this increases the volatility of the series and is not reported here.

2000 when the equity markets gains were unwound somewhat.

Chart 8 Total gains-i



Chart 9 Financial and housing gains-inclusive saving



Wealth and consumption

What does all this imply for the relationship between wealth and consumption? Increases in wealth will tend to increase consumption and so reduce saving out of current income. But the linkages are not straightforward, as not all increases in measured wealth imply higher future consumption possibilities.

In this section, we look at some factors that influence the relationship between household wealth and consumption—the composition of wealth, the effects on wealth of windfalls from demutualisations and privatisations, the source of wealth changes, the distribution of wealth, and the effect of wealth on consumer confidence. Wealth effects may in practice be weaker than the size of capital gains might suggest, but there is some evidence that they may be becoming more important.

The composition of wealth

The composition of household wealth may be important in determining how changes in wealth affect household consumption. Different characteristics of assets may affect households' willingness or ability to spend out of capital gains. Asset characteristics include liquidity, capital certainty and visibility. At the most 'spendable' end of the scale, for example, wealth held in a bank account is highly liquid, capital certain (in nominal terms) and visible.

Equities-direct and indirect holdings

Equity values are capital uncertain—gains today may be lost tomorrow, for both direct and most indirect shareholdings. So households may be unwilling to increase consumption if they are uncertain about the sustainability of any wealth increase.

The visibility and liquidity of equity gains depend on how shares are held. Direct holdings are highly visible; shareholders will usually be able to follow the value of their investment easily. And these holdings can usually be liquidated with little notice, so gains can be cashed in quickly.

By contrast, indirect investment via insurance companies and pension funds (ICPFs) is usually intended as longer term, and can often only be redeemed at set dates or when certain events occur. So these assets are highly illiquid from the perspective of households. It may be possible to liquidate assets early but this will generally be costly. ICPF assets can sometimes be used as collateral for borrowing, but less commonly than housing. As this is a longer-term form of saving, gains accruing to these assets may be treated differently from those on other wealth to protect future consumption.

Indirect wealth is also less visible. Holders of ICPF assets may only be informed of the value of wealth at discrete intervals, for example in an annual statement. And even if they know the current value of the fund this may be only loosely related to the redemption values for some policies, eg final salary schemes and with-profits insurance policies. So it may be difficult to see the link to stock market changes.

There is some evidence from the United States on this. Poterba and Samwick (1995) find that US pension fund holders are less willing to spend these stock market gains. The consumption of those holding shares indirectly through a retirement account is less correlated with equity returns than the consumption of direct shareholders.⁽¹⁾ Even the effects on those directly holding equity may be small. The majority of respondents to the US Survey of Consumer Finances say that equity market gains have no appreciable effect on their spending, whether they are using retirement accounts or not (Starr-McCluer (1998)).

Windfall payments

Windfalls worth nearly £37 billion were paid out by demutualising building societies and insurance companies to around 15 million households in 1997. Further windfall payments have been made since then, most notably in 2000, though these have been smaller in scale. Because of the way in which demutualisations are treated in the National Accounts, the payment of windfalls increased measured wealth but did not increase measured saving. Saving would have been reduced by sales of shares to fund consumption or spending of windfalls paid in cash.

Households hold a much greater proportion of demutualisation shares than shares in general, but they have been reducing their holdings over time. The Share Ownership survey contains information on individual shareholdings in recently demutualised companies. It shows that at end-1997 individuals held 60.6% of shares in demutualised firms but by end-1998 this had fallen to 48.5%, and by end-1999 to 45.2%. So sales of demutualisation shares are likely to have provided funds for household spending.

Windfall payments were a highly visible, permanent and to some degree unexpected shock to wealth, received by a wide variety of households. And some windfalls would have been paid to credit-constrained households, who are less likely to smooth consumption. In the Bank's 1997 *Inflation Report* forecasts it was assumed that windfall payments would have different effects on consumption than other wealth.

The Bank and MORI conducted research into the use of windfalls in 1997.⁽²⁾ This suggested that around 26% of the windfalls would be spent in 1997–98, of which 16 percentage points was spending that would not otherwise have taken place. This is around ten times more than would have been spent out of a normal revaluation to equity wealth, according to standard

This could also be related to other differences between the two groups.
 See the box on page 20 of the November 1997 *Inflation Report*.

consumption function coefficients. Windfall payments were assumed to continue to fund additional consumption in 1999. It is difficult to isolate the effects of windfalls on total consumption, although durables spending was strong following the windfall payments (and there was a fall in gross saving in 1998—see Chart 4). It does seem likely that windfalls have had a negative impact on saving over the past three years, although perhaps less than was assumed originally. And to the extent that they widened share ownership, these windfalls may increase the future responsiveness of consumption to wealth changes.

Housing wealth

Housing wealth differs from financial wealth in several important respects. It is, for example, less liquid and there are high transactions costs associated with selling property—though it is visible and can be used as collateral. But most importantly, housing acts both as a store of wealth and as a source of housing services. These services, measured by imputed rents, are included in consumption, which means that housing wealth will affect nominal household consumption but not necessarily real consumption.

In particular, house price increases may not make the household sector much better off in aggregate. Owner-occupiers who want to realise any house price gains have to sell their current property and either purchase a cheaper property or rent in order to continue to consume housing services. If the aggregate real housing stock is unchanged, there is no overall increase in consumption of real housing services. But homeowners can borrow against price rises without selling the property, which indirectly may affect consumption, as discussed in the article on pages 100–03.

The sources of capital gains

The effect of any wealth revaluation partly depends on its cause. The capital gains or losses on wealth reflect both physical additions to the underlying capital and revaluations from factors such as changing long-term interest rates, expected profits and risk premia (and in the case of the housing market, increased relative demand for housing services).

Some of the changes in measured wealth do not involve increased resources and so may not lead to

higher consumption.⁽¹⁾ If a company's share price has risen because its assets have become more productive then future resources are higher and this should be counted as saving. But if the share price goes up due to a shift in preferences, such as changes in discount rates or risk premia, then this is not saving, as the capital gain has not contributed to future income or production.⁽²⁾ So the wealth change should have less of a direct effect on current consumption though the discount rate change (or other preference shift) may itself affect consumption. In addition, there may be indirect effects, for example, through improved collateral for borrowing.

Similarly for housing, if the housing stock rises due to the building of new dwellings or improvements to existing dwellings—this is a resource gain. But to the extent that most changes in house prices represent changes in preferences rather than increases in resources, gains in housing wealth will not necessarily lead directly to increased future consumption (except of nominal housing services), though there may again be indirect effects.

For financial wealth, it is unlikely that future productive capacity varies as much as implied by the capital gains shown in Chart 9. It is difficult to create a measure that captures just that part of capital gains. But it is possible to get a crude measure by stripping out real interest rate changes from bond and equity prices changes using the dividend discount model. This isolates the part of equity and bond price changes associated with real interest rate changes (in this case ten-year index-linked gilt yields) and subtracts them from household financial wealth.⁽³⁾ The resulting series shows how financial wealth may have evolved in the absence of real interest rate movements since 1995 (see Chart 10).

The gains in the late 1990s can to a large extent be accounted for by falls in real interest rates, and may not represent future resource gains.⁽⁴⁾ Although other non-productive factors could offset these falls in real rates somewhat, this does illustrate that non-productive

Chart 10 The impact of real interest rate changes on financial wealth



gains may be a significant proportion of total capital gains.

The distribution of wealth

The concentration of wealth, particularly equity wealth, may affect how wealth changes pass through to consumption. The effect on consumption of any increase in wealth will depend on how the gains are distributed and the extent to which individual wealth elasticities of consumption vary.

Changes in the distribution of wealth *per se* might not affect the wealth elasticity of consumption. However, it is likely that households with small amounts of wealth have a higher marginal propensity to spend out of wealth than do wealthier households. Hence, a wider spread of equity and property wealth may increase the sensitivity of consumption to wealth.

Although there is limited official data on the wealth distribution in the United Kingdom, the Institute for Fiscal Studies (IFS) has analysed individual wealth holdings using a variety of sources.⁽⁵⁾

Across all directly held financial assets the median net financial wealth of individuals in the NOP Financial Research Survey⁽⁶⁾ was £750 in 1997–98, and mean

rate, r_p is the risk premium and g is the expected future growth of dividends.

⁽¹⁾ See Auerbach (1985).

⁽²⁾ This holds for a closed economy. In an open economy, capital gains may result from a shift in domestic tastes relative

to the rest of the world. So households can buy more from abroad. (3) The equity price is given by $EQ_t = \frac{D_t}{r + r_p - g}$ where EQ is the share price, D is the level of dividends, r is the real

 ⁽⁴⁾ There are difficulties in measuring real interest rates with index-linked gilt yields as the demand for bonds has been artificially raised by the Minimum Funding Requirement. But estimates of real rates have fallen in many countries.
 (5) Banke and Tanner (1999) use information on property income from the Family Fundation System (1999) to address the second system of the secon

⁽⁵⁾ Banks and Tanner (1999) use information on property income from the Family Expenditure Survey (FES) to calculate changes in the percentage of households holding different types of assets and data from NOP's Financial Research Survey (FRS) to study the value of individual wealth holdings in 1997–98.

⁽⁶⁾ Excluding pension fund wealth.

wealth was £7,136. The gap between median and mean implies that wealth is unevenly distributed.

Equity prices are the main component of aggregate financial wealth data, so it is also useful to look at the distribution of equity holdings. The percentage of households holding shares rose from 8% in 1980 to 23% in 1990. And in 1997–98 17% of households owned privatisation or demutualisation shares. But only 8% held other shares directly and 9% held shares through PEPS and ISAs.⁽¹⁾ Although privatisations and demutualisations widened share ownership, a lot of households have only small holdings and around three quarters of the population have no direct equity wealth.⁽²⁾

Wealth and consumer confidence

Stock market gains may also affect the non share holding population and those with a small shareholding through confidence effects.

Consumer confidence is an important determinant of households' willingness to spend. There are several surveys of consumer confidence that provide useful information about households' attitudes to their own finances and the state of the economy as a whole.

Changes in confidence are closely related to wealth, and so wealth changes may affect even non-wealth holders, in the shorter term at least. The change in housing wealth has been closely related to the GfK measure of confidence over a long period. The change in financial wealth has not been very closely correlated with confidence in the past (see Chart 11). But the link has become closer over the past three years. This is seen particularly in 1998 when the Asian crisis led to falls in both stock markets and general confidence. US measures of confidence have been closely related to equity price changes over the same period.

We may expect a close correlation between asset prices and confidence since these both change quickly and reflect current and future economic prospects. It is costly for consumers to collect large amounts of information so they may use asset prices as an

Chart 11 Consumer confidence and wealth changes



indication of the state of the economy. In general, however, it is likely that consumer and investor confidence are driven by similar perceptions of economic prospects.

Conclusions

The level of the UK household saving ratio does not seem unusually low when adjusted for changes in inflation rates over the past 30 years. But saving has fallen sharply over the past three years. A key reason for this fall has probably been the increases in wealth, particularly through increases in equity and house prices.

Equity wealth has become a more important part of household wealth in the 1980s and 1990s, partly through increased direct holdings, but also through insurance company and pension fund holdings.

Housing wealth gains in the late 1990s have also supported consumption as homeowners borrowed against these gains. But this has been less important than it was in the late 1980s.

If the strength of household consumption has been supported by increases in wealth, particularly equity wealth, then the asset price slowdown over the past year may lead households to slow their consumption growth. But equity and house prices are still well above their levels for most of the 1990s, so longer-term gains are still positive.

⁽¹⁾ Note that the same people may be in more than one category.

⁽²⁾ The data suggest that those with pension fund assets also have higher other assets on average.

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Mortgage equity withdrawal and consumption

By Melissa Davey of the Bank's Structural Economic Analysis Division.

Mortgage equity withdrawal is borrowing that is secured on the housing stock but not invested in it, so it represents additional funds available for reinvestment or to finance consumption spending. Mortgage equity withdrawal was an important source of finance in the 1980s. But it fell back sharply in the 1990s, and remained negative for much of the decade. This article discusses the motivation for and the effects of mortgage equity withdrawal, using evidence from a recent consumer survey carried out for the Bank of England and the Council of Mortgage Lenders.

Introduction

The article on pages 91–99 looks at how changes in wealth affected consumption and the saving ratio in the second half of the 1990s. One of the factors accounting for the fall in the saving ratio was mortgage equity withdrawal. This article discusses mortgage equity withdrawal in more detail.

The first section outlines how the Bank calculates aggregate mortgage equity withdrawal, and explains the relationship between this aggregate measure and other macroeconomic variables. The second section outlines the results of a microeconomic study of the various ways in which households can withdraw equity. The third section reports the results of a recent MORI survey, which investigates how equity is withdrawn, what it is spent on and why this method of finance was used.⁽¹⁾

An aggregate measure of mortgage equity withdrawal

Mortgage equity withdrawal (MEW) occurs when lending secured on housing increases by more than investment in the housing stock. Investment in the housing stock, including buying new dwellings and spending on improvements, will tend to increase housing wealth. If investment is fully funded by an increase in debt, then net housing equity is unchanged for given house prices. If the increase in debt is greater than investment, funds are available for non-housing purchases and housing equity is withdrawn. The Bank's measure of MEW is the difference between net lending secured on dwellings (plus grants for housing) and households' gross investment in housing.⁽²⁾ Investment comprises new houses, home improvements, transfers of houses between sectors, and house moving costs, such as stamp duty and legal fees.⁽³⁾ So MEW measures mortgage lending that is available for consumption or for investment in financial assets (or to pay off debt).

Relationships with MEW at the aggregate level

MEW is closely related to consumption, and the relationship is closer when consumer credit is added (see Chart 1). But this may partly reflect an accounting identity. By definition, consumption is funded by income, unsecured borrowing, MEW or disposal of

Chart 1



⁽¹⁾ A joint report on this survey will be published by the Bank and the Council of Mortgage Lenders later this year.

 ⁽²⁾ See www.bankofengland.co.uk/mew.htm for a full description and codes for the series, and a link to the latest data.
 (3) Although these fees do not add to the value of the housing stock, they are measured as investment, so reduce the

funds available for consumption.

assets. Typically it is changes in borrowing, rather than changes in gross saving, that are associated with changes in the ratios of consumption and saving to income.⁽¹⁾ So an increase in borrowing may be an early indicator of consumption growth.

Recent Inflation Reports have discussed the close link between MEW and housing market transactions.⁽²⁾ But when transactions picked up in 1997, MEW remained subdued (see Chart 2). This perhaps partly reflects the financial and psychological impact of housing market conditions in the early 1990s, when prices fell sharply and led to a sustained period of negative equity for some homeowners, and partly the availability of finance from other sources, such as demutualisation windfalls. The link between MEW and housing transactions was re-established clearly in 1999.

Chart 2 **MEW** and transactions



Another influence on MEW is the level of house prices, and particularly the level of net equity. To withdraw equity, households need to have positive net worth in their home. For the household sector as a whole, net housing equity has averaged around 75% of gross housing wealth since 1970, but has been quite variable over time-mainly reflecting changes in house prices.(3)

Net housing equity and MEW were, however, unrelated until around 1985 (see Chart 3). This may reflect an increase in the ability of households to withdraw equity following liberalisation of the financial sector in the 1980s. So MEW is now related to house price changes and to housing market activity.

Chart 3 MEW and housing equity



A microeconomic measure of MEW

As an alternative to the Bank's aggregate measure, MEW can be calculated as the sum of various types of gross withdrawals of equity from housing, net of gross injections. The resulting net equity withdrawal figure should, in theory, be the same as the Bank's aggregate measure. The flows represent the ways in which individual households are taking money out of, and putting non-secured funds into, property. These are set out in Table A.

Table A Ways of withdrawing and injecting equity

Withdrawals

Last-time sales	A seller does not buy a new property, so the proceeds of the sale are released from the housing market.
Trading down	A seller moves to a cheaper property but reduces the mortgage by less, to leave a cash sum.
Over-mortgaging	A moving owner-occupier increases their mortgage by more than the difference between the old and new house prices.
Remortgaging	A borrower takes a new mortgage and increases their debt without moving properties or improving the property to the same extent.
Further advances and second mortgages	A borrower raises a further advance on an existing mortgage or takes a second mortgage without improving the property to the same extent.
Injections	
First-time purchases	The deposit paid by first-time buyers.
Under-mortgaging	A mover changes their mortgage by less than the difference between the old and new house prices.
Under-remortgaging	A borrower takes a new mortgage and reduces their debt without moving properties or improving the property.
Repayments of mortgage debt	Regular repayments of principal and the redemption of mortgages, except on sale or remortgaging.
Home improvements	Home improvements paid for with non-secured funds.

An example

A simple example illustrates how the micro and aggregate measures compare. Suppose someone inherits

(1) See Chart 4, on page 92 of this Bulletin.

(2) See, for example, the November 1999 Inflation Report, page 6.

(3) For many individual households gearing is likely to be much higher. A sector-wide measure cannot be used to analyse the incidence of negative equity, for example.

a property and sells it for £100,000 to a first-time buyer, who pays a 10% cash deposit and borrows the rest. On the micro measure, the seller withdraws £100,000 and the buyer injects £10,000—so net MEW is £90,000. On the aggregate measure, there has been no investment in housing but net lending has risen by £90,000, so MEW again is £90,000.

Flows of gross withdrawals and injections

Alan Holmans of Cambridge University, in a joint Bank of England/Council of Mortgage Lenders (CML) project, has estimated the flows of withdrawals and injections from various data sources.⁽¹⁾ His preliminary figures show that last-time sales are the largest component of gross withdrawals, although over-mortgaging and remortgaging are important factors in the pick-up in MEW. Repayments of debt are the most important injection—although these mainly consist of many small injections by a large number of households (eg the capital amortisation element of repayment mortgages).

Evidence from a consumer survey

The Bank and the CML, as part of their joint project, commissioned MORI to carry out a survey of people who had been in a position to withdraw equity (because they had recently moved, remortgaged or taken a further advance).⁽²⁾ The sample consisted of 918 respondents, of whom 301 had moved, 502 had remortgaged and 200 had taken a further advance, between June 1998 and September 2000.⁽³⁾

How equity is withdrawn

35% of movers withdrew equity and 39% injected it.⁽⁴⁾ In money terms, net equity withdrawal by movers was small (see Table B). But 5% of movers were

Table B

Average withdrawals and injections

Figures in £s

June 1998 to September 2	000		
	Gross	Gross	Net
	withdrawals	injections	withdrawals
Moved	21,400	23,800	1,100
Excluding first-time buyers	21,400	23,000	2,600
Remortgaged	27,000	17,900	11,100
Took further advance	22,000	n/a	22,000

n/a = not applicable.

Note: Average size of gross withdrawals by those withdrawing, average size of gross injections by those injecting and average net withdrawal by all respondents (excluding 'don't knows'). first-time buyers who will tend to inject some equity in the form of a cash deposit. Excluding these, net withdrawals were more than twice as large. For remortgagers, 13% injected equity, with 37% keeping the size of the loan unchanged; the remaining 50% withdrew equity. Average net withdrawals by remortgagers were £11,000 and by those taking a further advance £22,000, the greater amount reflecting the lack of offsetting injections.

The relatively low value of net withdrawals for movers may look surprising, given the close correlation between the aggregate measure of MEW and housing market transactions. But it excludes an important source of gross withdrawals—last-time sales—which will also be linked to transactions and lead to high levels of net equity withdrawal (there are no injections for last-time sales). Around half of gross equity withdrawal over the 1990s has been by last-time sellers. In addition, the remortgage and further advance figures are particularly boosted by withdrawal for home improvements—see below—which does not affect the aggregate measure.

What equity is used for

64% of those withdrawing said that they spent some of their withdrawn equity within the first six months. 20% used the money to pay off previously acquired debts so would not have increased their consumption. Only 9% saved the money for any length of time.

Those who said that they spent some of the money within the first six months were also asked what things they spent money on. The majority (76%) mentioned home improvements, although these are not in the Bank's definition of MEW.⁽⁵⁾ 22% mentioned purchases

Table C

Use of withdrawn equity for those who said that they spent the money^(a)

Per cent

June 1998 to September 2000

	Moved	Remortgaged	Took further advance	Total
Home improvements New goods for the	70	75	80	76
property	34	25	13	22
Car	13	6	6	7
Other goods	11	5	3	5
Holiday	7	5	3	5
General expenditure	11	12	7	10
Other	30	13	12	15

(a) Respondents could list multiple items.

(1) Holmans (2001), Housing and mortgage equity withdrawal and their components flows, forthcoming.

(2) The survey does not provide evidence on last-time sales or the effects of making injections, except at the time of a

house move or remortgage. Further advances include second mortgages.

(3) The survey was carried out between Friday 29 September and Monday 23 October 2000.

(4) The remainder either kept their net equity constant or did not know whether they had withdrawn or injected.

(5) Home improvements are included in household investment and are netted off the measure of MEW.

for the home, and 7% said they bought a car or other vehicle (see Table C). Of the respondents who had moved, fewer mentioned that home improvements were the most expensive item on which they spent money.

Why equity withdrawal was used

It is not possible to tell from the aggregate data whether increases in house prices trigger spending that would not otherwise have happened (in which case MEW provides a channel by which the wealth effect of house price rises affects spending), or whether equity withdrawal is simply a cheap way of funding desired spending (in which case, MEW arises from substitution towards borrowing with relatively lower interest rates on secured lending). So the survey also asked what encouraged the respondent to raise cash this way, and what respondents would have done had they not withdrawn the equity.

32% of responses cited a rise in the value of their house as a factor for using equity withdrawal, with more of those remortgaging with the same lender giving this reason (see Table D).⁽¹⁾ But 31% of responses said that it was a cheap way to finance desired borrowing. Significantly fewer movers, 10%, said that the price of

Table D

Why finance was raised through equity withdrawal^(a)

Per cent

June 1998 to September 2000

	Movers	Remortgagers	Further advance	Total
House prices	25	35	33	32
Cheap Ìoan	10	31	42	31
Best way to borrow	19	5	7	8
Advice	9	31	26	25
Advertising	1	8	8	7
Awareness	13	31	33	28
Other	37	3	12	13
Don't know	13	9	3	7

(a) Respondents could list multiple reasons.

the loan was important, though 19% saw withdrawing equity when moving as a good opportunity to raise capital, suggesting lower transactions costs play a role.

In a separate question, those who had remortgaged were asked for their motivation for changing their mortgage. 42% said that they wanted a better interest rate or deal and 31% said that they wanted to raise money for a specific purpose (ie they remortgaged in order to withdraw equity).

Further, 63% of decisions made would have been different if equity could not have been withdrawn. Other responses indicated that alternative sources of finance, such as taking an alternative loan or reducing savings, would have been used to fund activities.

So the evidence is mixed. House price rises appear to trigger MEW for some borrowers, but many households say that they wanted to spend anyway and used equity withdrawal as a relatively cheap way to fund this spending. And even for those households who do not see house price rises as a trigger, the amount they are able to withdraw will be affected by past rises in house prices.

Conclusions

Mortgage equity withdrawal picked up in 1999 and has remained high since. According to Alan Holmans' estimates, over-mortgaging and remortgaging are important factors in this rise. Evidence from the MORI consumer survey suggests that MEW will have helped to fund consumption over the past two years. It is also likely that at least some of this spending would not have occurred if housing market variables had been weak, or if lending restrictions had prevented households from withdrawing equity.

The information in UK company profit warnings

By Andrew Clare of the Bank's Monetary Instruments and Markets Division.

This article examines the information content of trading statements issued by UK companies between 1994 and 2000. These statements are released by companies quoted on the London Stock Exchange when they have information that is relevant to their share price. The article concludes that trading statements indicating that earnings will be lower than expected by the market—so-called 'profit warnings'—are particularly informative, as shown by the impact of trading statements on their associated stock prices. There is also preliminary evidence to suggest that the incidence of profit warnings may be a useful leading indicator of UK economic activity.

Introduction

A wide range of indicators of UK economic activity is available. One relatively new indicator is a time series of 'profit warnings' issued by UK companies. These profit warnings are trading statements that have been reported in the press identifying an adverse outlook for a firm's future earnings and profitability. Bank staff recorded 88 UK company profit warnings in 2000 Q4, compared with 57 in 1999 Q4.⁽¹⁾ Of the 88 warnings, 26% were issued by IT companies. We were able to identify clear reasons for 76 of the 88 statements: 21% related to weakening domestic demand, 21% to 'industry-specific' causes, while 26% related to 'firm-specific' events. The remainder gave more idiosyncratic reasons.

This article summarises work undertaken at the Bank aimed at establishing: whether these statements contain genuine information; which types of statement are most informative; and whether the incidence of the statements can tell us anything about the state of the UK economy.

It appears that statements reporting an adverse outlook for the future prospects of the firm ('profit warnings') do contain market-relevant information, causing financial agents to revise expectations about future profitability dramatically. Statements reporting a positive outlook for future profits tend to have a much smaller (though still significant) impact upon prices—implying that the information content of these statements is lower. There is also some weak and preliminary evidence that the incidence of negative trading statements issued by FTSE 350 companies may be a leading indicator of UK economic activity.

The data and preliminary analysis

The analysis draws on two related databases. The first consists of all trading statements made by UK listed companies between January 1994 and December 1998. The second database consists of all those trading statements given the journalistic label of 'profit warning', spanning the period from July 1997 to January 2000.

Directors of companies listed on the London Stock Exchange (LSE) are required to issue trading statements when there has been a change in the financial condition of their company or in the performance of its business that is likely to be relevant to the company's share price, ie that is not reflected in the current share price.

More formally, the requirement for the issuance of a trading statement according to Financial Services Authority (FSA) rules is as follows:

'Where to the knowledge of a company's directors there is such a change in the company's financial condition or in the performance of its business or in the company's expectation of its performance that knowledge of the change is likely to lead to substantial movement in the price of its listed securities, the company must notify the Company Announcements Office without delay all

(1) Bank staff also recorded a total of 50 warnings in January 2001, the highest monthly total in the Bank's data set.

relevant information concerning the change.' (FSA, (2001)).

The Extel trading statement database

Extel Financial Services provided a database of trading statements in hard copy format. The data consist of all statements made by UK listed companies between January 1994 and December 1998. Due to the vast number of such statements and because of the difficulties of working with hard copy, the analysis discussed here concentrated on those statements made by firms within the FTSE 350 index at the time that their statement was issued. The historical composition of the FTSE 350 index (which is not readily available) was constructed using the 'Constituent Additions & Withdrawals' lists for the FTSE 100 and FTSE 250 indices, available from FTSE International. One benefit of concentrating on these firms is that higher-quality data are available for them, for example their share price is less likely to be affected by thin trading. Each trading statement was categorised into one of three groupspositive, negative and neutral-according to the news embodied in the statement. An example of each category of announcement is given below.

Neutral:

BCI Plc, 7 December 1995.

'Group's overall 1995 profits before exceptional items and tax are anticipated to be in line with market expectations.'

Positive:

W.H. Smith Plc, 19 October 1994.

'Since August, trading has improved—helped by new products, aggressive price promotions and cooler weather. Prospects for Christmas are encouraging with the Christmas range better than for many years and stronger than ever value offers.'

Negative:

Lonrho Plc, 17 March 1997.

'...results for its continuing businesses for 6 months to 31-3-97 have been adversely affected. This has been due to the strength of sterling, poor precious metal prices, lower profits at Ashanti (for quarter ended 31-12-96 plus group's lower interest at 33.3%) and moderate results in the group's African trading businesses. Pre-tax profits of continuing businesses will depend upon exchange rates at 3-13-97, but could be around one third down on the previous year'.

Chart 1 shows the total number of statements issued each year, over the five-year sample period. The increase in statements after 1994 may have been precipitated by the issue of a London Stock Exchange (LSE) committee publication,⁽¹⁾ which was designed to give listed companies guidance on the dissemination of price-sensitive information (PSI) following a high-profile insider dealing court case in 1993. The document was published at the same time as the 1994 Criminal Justice Act, which strengthened existing law relating to PSI.





Both the LSE guidelines and the Act require firms to release information that, if made public, would be likely to have a 'significant impact' on the ordinary shares or other securities issued by the firm. However, it is clearly very difficult to discern whether a piece of PSI will have a 'significant impact' or not. Furthermore, neither the Act nor the guidelines quantify 'significant impact'. So the net result of these two publications was to encourage companies to reveal more information than they had previously been inclined to release, ie they chose the low-risk option of releasing information, even where there was only a very small possibility that it would be interpreted as being 'significant'.

The table overleaf shows the proportion of positive and negative statements by sector over the five-year period. The first row for each sector refers to the number of negative statements made by firms in that sector as a proportion of the total number of such statements made. The second row presents the analogous statistic for positive statements. The table shows that, in general, the proportions are fairly stable over time, perhaps not surprisingly over such a short sample period. In 1998

(1) Guidance on the dissemination of price-sensitive information, London Stock Exchange (1994).

approximately 36% of all negative statements were issued by the manufacturing sector, with the majority of the remainder being issued by the service sector. The table also shows that the proportion of positive statements from the manufacturing sector declines over the period.

Positive and negative trading statements by stock market sector

Per cent

		<u>1994</u>	1995	1996	1997	1998
Manufacturing	-	40.0	44.2	33.3	39.0	36.4
	+	32.1	49.6	34.6	22.8	17.4
Services	-	56.0	41.6	52.9	56.1	61.4
	+	64.2	47.1	61.8	70.2	73.9
Others	-	4.0	14.3	13.7	4.9	2.3
	+	3.8	3.4	3.6	7.0	8.7

Note: The table presents the number of negative trading statements (first row) and positive trading statements (second row) as a percentage of the total number of such trading statements issued each year.

The profit warnings database

The second database comprises only negative trading statements. More specifically, negative trading statements that have been labelled as 'profit warnings' by the press. These profit warnings all relate to firms within the FTSE 350 at the time of their statement;⁽¹⁾ the database was constructed at the Bank of England by using the key-word search facility in Reuters Business Briefing every month. The data set analysed here spans the period from July 1997 to January 2000, and comprises 574 statements.⁽²⁾ It is richer in detail than the data gleaned from the database described above. It includes full information relating to the reason for the statement, thus indicating the extent to which, for example, profit warnings related to the strength of sterling have had a larger impact than those related to more firm-specific events. Four key concerns are identified within these trading statements: (i) the level of sterling; (ii) levels of aggregate demand; (iii) the impact of the Asian/Russian crisis; and (iv) firm-specific factors. These data give an interesting new insight into the nature of UK business conditions over the sample period.

Chart 2 gives a quarterly breakdown of these statements by industrial sector. The total number of profit warnings declined after peaking in the second half of 1998. Though both manufacturing and service sector profit warnings declined since then, those related to the manufacturing sector fell the most. There were proportionately more service sector related profit warnings at the start of 2000. Chart 3 shows the reasons given for the warnings. The gradual increase in Asia/Russia-related warnings⁽³⁾ is evident. These decline and eventually disappear as the crises pass. There is also evidence of sterling's impact on the UK economy, with sterling-related warnings mainly confined to 1997 and 1998, following sterling's strengthening in 1996. The fact that these warnings disappeared despite sterling's continued strength suggests that firms had adapted to this shock by early 1999.

Chart 2 FTSE 350 profit warnings by industrial sector







The impact of trading statements on share prices

To determine the information content of the statements in both data sets, share price data were collected for

(1) The full Bank of England profit warnings database consists of all warnings from firms listed on the London Stock Exchange.

(2) The data set is updated every month by Bank staff as part of their regular monitoring of economic conditions in the

UK economy. For an assessment of recent profit warnings activity, see the February 2001 Inflation Report, page 12.

⁽³⁾ These are combined as, following the Russian crisis, firms began citing both regions in the same statement as a reason for their difficulties. Clearly the earlier statements in this category relate to the Asian crisis only.

each firm making a statement, and the behaviour of these share prices was monitored following the statement. The share price data are daily and span the period from 1994 to 2000. A conventional event study was undertaken, risk-adjusting the individual equity returns using a version of the market model.⁽¹⁾ To this end data were also collected on the FTSE 100 share index, to be used as a proxy for the market portfolio. This exercise is useful in determining the degree to which the trading statements contain additional information, and could help to establish a role for trading statements as a leading indicator of other key UK macroeconomic data.

Results: Extel trading statement database

Chart 4 plots the cumulative return for neutral statements (in excess of the return on the market index), where day 0 is the day of the announcement. The chart shows that the series is very close to the origin at all times. This indicates that these statements were indeed 'neutral' in their impact. The average response to positive statements is also shown. The test statistics (not presented here) indicate that the positive average response on day 0 of 1.0% is strongly significant (this test is equivalent to a test of the significance of average abnormal returns on this day, since the return is not cumulated). By day 9 cumulative returns of 0.63% exist, but these are not statistically significant.

Chart 4 Cumulative abnormal returns following **UK trading statements**



The response to negative statements is far stronger. The average abnormal return on the day of the announcement is -7.13% and is massively significant.

Given this large response on day 0 we should not be surprised to find that the cumulative abnormal returns are still significant between day 0 and day 9. The cumulative return over this period is highly significant at -8.01%.

The asymmetry between 'good' and 'bad' news is clear in Chart 4, and is a typical finding of studies of this kind. The most popular explanation of this type of asymmetric reaction was proposed originally in the field of psychology, where researchers found that people tended to 'overreact' to bad news and 'underreact' to good news.(2)

Results: profit warnings database

The analysis of stock price behaviour was repeated using the Bank's database of profit warnings around the time of the warning. The statements were split into four categories according to the reason for the statement: firm-specific factors, the strength of sterling, the Asian/Russian financial crisis and domestic demand. Chart 5 presents the cumulative abnormal returns following profit warnings relating to the four different statement types. The chart shows that for each of these categories, the cumulative abnormal return is more negative than for those negative trading statements shown in Chart 4.⁽³⁾ This makes sense since these statements are likely to be the most extreme of the negative trading statements. On the day of the announcement, statements relating to domestic demand cause the largest average price fall of -13.68%, but over the full ten days sterling-related statements led to a

Chart 5 Cumulative abnormal returns following specific



(1) The standard event study methodology, which is common in the finance literature, was used. For more precise details of the methodology, see Chapter 4 of Campbell, Lo and MacKinlay (1997).

⁽²⁾ See DeBondt and Thaler (1985) for an application of this theory to financial market data.

⁽³⁾ Although they are drawn from different sample periods.
-15.27% fall, on average. The test statistics for the cumulative returns after the release of the statements show that for all four types of statement, the cumulative returns over the full ten-day window are all highly significant.

Does the incidence of profit warnings lead other economic variables?

The results outlined above indicate that quite substantial revisions to share prices occur when trading statements report an adverse outlook for the profitability of firms. Given that these warnings are about 'things to come', it may be that on average they lead other key economic variables. A formal statistical analysis of the relationship between the number of profit warnings and future economic activity would be rather ambitious with such a short sample period, so a simpler approach is used. A time series of the quarterly incidence of UK negative trading statements/profit warnings was constructed, using the quarterly incidence of the negative trading statements from the Extel database up until 1998 Q4 and the FTSE 350 profit warnings from 1999 Q1 to 2000 Q1.

Chart 6⁽¹⁾ plots the monthly time series of profit warnings alongside an index of the outlook for the profits of UK quoted companies from August 1998 to June 2000. This index is compiled by Merrill Lynch and is based on a survey of UK fund managers. It shows that the profit warnings series is a relatively good mirror image of the profits outlook series. Clearly it is possible that the respondents to the Merrill Lynch survey on profits outlook are being influenced by negative trading

Chart 6

Profit warnings and profits outlook twelve months ahead



statements, but it is comforting nonetheless to find that the profit warnings series is negatively correlated with this forward-looking index of UK company profits.

Chart 7 plots the incidence of these FTSE 350 statements against UK GDP growth. So what are the stylised facts with respect to the incidence of these statements over this longer sample period?⁽²⁾ Chart 7 shows that between 1995 Q1 and 1996 Q2 there were between 15 and 20 FTSE 350 profit warnings per quarter; after this period profit warnings declined, until their numbers began to increase at the end of 1997. The number of warnings then grew again until the end of 1998; there were 23 FTSE 350 profit warnings in the last quarter of 1998, alongside the Russian debt crisis and the continuing strength of sterling. The number of profit warnings then fell to the end of the sample period.



Chart 7 suggests that there might be a weak, inverse correlation between the incidence of profit warnings and the rate of growth of GDP, with profit warnings seemingly leading GDP growth. It should also be borne in mind that the profit warnings data are available without the lags associated with aggregate macroeconomic data.

Clearly further work is needed to establish whether the incidence of these warnings has leading-indicator properties or not and whether it adds to information that can be derived from other variables.

Conclusions

This article has investigated the extent to which trading statements issued by UK companies contain

(1) Charts 6 and 7 use data that have been updated since the completion of the event study.(2) For more recent analysis of profit warnings trends, see the February 2001 *Inflation Report*, page 12.

important information about the firms themselves and about the UK economy. Standard event study techniques show that trading statements do represent genuine news to UK equity markets, more so for negative than for positive statements, and especially so for negative statements labelled 'profit warnings'. News about the future profitability of UK firms may also be related to the outlook for the UK economy more generally. But the evidence for this is so far only tentative.

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Interpreting movements in high-yield corporate bond market spreads

By Neil Cooper, Robert Hillman and Damien Lynch of the Bank's Monetary Instruments and Markets Division.

Spreads of corporate bond yields over risk-free rates are often used as a leading indicator of macroeconomic conditions. The large widening of spreads within the US high-yield bond market during the second half of 2000 might be a precursor of a downturn in the US economy. This article describes work done at the Bank during the last two months of last year that attempted to interpret these movements and assess their implications for the US economy.

Introduction

Credit spreads in the United States widened considerably during 2000, particularly in the high-yield bond market. Even indices of single-A and AA rated bonds widened in the last few months of the year. By contrast, with the exception of telecoms bonds, there was little evidence of widening in UK credit spreads. In this article we explain why US spreads widened, and assess the implications for the US macroeconomic outlook.

Chart 1 shows movements in UK credit spreads against $swaps^{(1)}$ across credit classes. During the second half of 2000, there was evidence of only a very small widening in spreads for single-A and BBB firms. And they have certainly not attained high levels by historical standards. Chart 2 shows spreads against swaps for the same credit classes in the United States. It is clear that there was a much more dramatic widening of spreads from May 2000 onwards. By early November 2000, spread levels for all three credit ratings were at the levels reached during the recession of the early 1990s. Did this mean that financial markets were pricing in expectations of a recession? This article describes work done at the Bank during the last two months of 2000 that addressed this question. Since then, high-yield spreads have narrowed substantially. The focus of the article, however, is to interpret the movements from the beginning of June until the end of December.

Chart 1 Spread of UK corporate ten-year par yields over swaps



Chart 2 Spread of US corporate ten-year par yields





⁽¹⁾ We use interest rate swap rates rather than government bond yields as the benchmark. In both the United States and the United Kingdom, there is evidence to suggest that government bond yields have become an increasingly distorted proxy for risk-free rates, as the supply of government bonds has fallen. An interest rate swap exchanges an agreed fixed rate of interest on a notional principal—the quoted swap rate—for a floating interest rate. The fixed rate may be interpreted as the yield on a bond that is trading at par. Although in principle this yield contains a small credit risk premium, we think that changes in corporate bond spreads over swap rates are likely to be more accurate measures of changes in spreads over the 'true' risk-free rate than changes in spreads over benchmark government bond yields.

The leading-indicator properties of corporate bond spreads

Fixed-income market spreads have been used as leading indicators of macroeconomic conditions since the early part of the 20th century when Irving Fisher (1907) suggested a link between the term structure of interest rates and expectations of economic growth. Like other financial data, spreads are determined in forward-looking markets, and are available at a higher frequency than standard macroeconomic variables. These features have generated a substantial literature assessing the information in government bond term spreads (long yields minus short yields), swap spreads, international spreads, and corporate bond spreads.⁽¹⁾ While most of the latter work has used investment-grade bonds, recent work by Gertler and Lown (2000) has suggested that there may be more useful information contained in the spreads of lower-grade debt. In their paper, they attempt to capture the historical correlation between high-yield spreads and subsequent movements in output with a simple econometric model. They found that adding lags of the high-yield spread to a simple forecasting model containing lags of the US real output gap improved forecasts of the future real output gap. The statistical significance of the high-yield spread was found to be robust to changes in the model specification in the face of other competing explanatory variables.

What can account for the leading-indicator properties of the high-yield spread for output? There are three possible (and not necessarily mutually exclusive) links between the two variables:

- Rational investors in corporate debt form expectations of the possible losses on a bond resulting from future default. In doing so they need to look forward and assess the strength of cash flows being generated by the firms issuing the debt. A perception of the possibility of a future macroeconomic slowdown is likely to result in a downward revision to these expected cash flows and an increase in default probability, particularly for high-yield bond issuers whose interest payments are relatively high. So if investors are expecting a macroeconomic slowdown, high-yield bond credit spreads may be a particularly informative leading indicator.
- The widening of credit spreads is as much a cause as a symptom of a slowdown. One part of the

recent macroeconomics literature emphasises the role that financial market imperfections play in reinforcing a downturn in output. It argues that firms have to pay a premium for raising external finance rather than investing internally generated funds. In a slowdown, with less internal cash flow generated, firms respond by investing less-a reduction in the *demand* for capital. This then exacerbates an initial fall in output, and so on. Gertler and Lown (2000) argue that this premium is also likely to be counter-cyclical and that high-yield bond spreads are the best observable proxy for this premium. Hence a widening of the spread reflects an increase in the external debt premium, which causes companies to cut back on investment and GDP subsequently to fall.

Widening credit spreads may be indicative of a broad-based and sudden restriction in the *supply* of credit via the bond markets. A deterioration of the financial position of investors may cause them to move away from risky assets towards less risky securities such as government bonds. The restriction in the supply of credit is also likely to result in a widening of corporate bonds spreads. So a widening of bond spreads is likely to lead a downturn in the macroeconomy.

Chart 3 plots the historical relationship between the spread of the Merrill Lynch high-yield index over swaps and US real GDP growth. Because we have swap data only back to 1988 we also plot the spread between the high-yield index and an index of AAA bonds to get a longer time series. The two spread indices tend to track each other closely. To gauge the implications of the historical correlation between high-yield spreads and

Chart 3 High-yield spreads and US GDP growth



(1) Two useful studies that also contain surveys are Dotsey (1998) and Bernard and Gerlach (1996).

output, we regressed real GDP growth four quarters ahead on lags of quarterly real GDP growth and lags of the high-yield spread.⁽¹⁾ From a base of 2000 Q4, this model predicted that annual US real GDP growth in 2001 would be 0.9%. Not surprisingly, the confidence intervals around this forecast are wide (the model predicts with 95% confidence that growth will be between -1.8% and +3.5%), but taken at face value annual growth of less than 1% is significantly lower than other forecasts being made at the time. For example, in December 2000 the average forecast for 2001 growth in The Economist's 'poll of forecasters' was 3.0%, and was still at 2.3% at the end of January 2001. This type of econometric model is bound to predict a sharp decline in growth because the last time spreads rose as much as they did, during the last half of 2000, GDP growth fell sharply. The crucial question was: is it sensible to extrapolate from what happened to aggregate spreads prior to the 1991 sharp downturn to the situation today?

Simple structural models of corporate bond spreads

What should drive credit spreads? Theory tells us that it should be the expected losses on a bond resulting from the possibility of default. Structural models of credit spreads following Merton (1974) use option pricing theory to show how to value the credit risk of corporate bonds. In the simplest version of this model firms issue equity and a single bond with a given face value. At the maturity of the bond, the firm either has sufficient value to pay off the bond or it defaults. If it defaults, the bond-holders receive whatever is available and the equity-holders get nothing. If the firm is worth more than the face value of the debt, the debt-holders receive the face value and the equity-holders get the rest.

The debt can be thought of as a combination of a default risk free bond minus a put option on the value of the firm's assets with a strike price equal to the face value of the debt. This put option reflects the opportunity the debt-holders provide to the equity-holders of walking away with limited liability in the event of bankruptcy. The credit spread is simply the price of this option in terms of the extra yield paid to bond-holders and reflects the expected losses on the bond. Given this simple framework we can use option pricing theory to work out the determinants of spreads, calculate theoretical values for the spread, and monitor the change in spread as the capital structure and characteristics of the firm change. This model is consistent with the Miller-Modigliani theorem: at any time the total value of the firm is unaffected by the capital structure. The model tells us how the firm's current value is split between equity and debt-holders.

For an individual firm, the standard Merton (1974) model suggests that credit spreads should depend on:

- the value of the underlying assets; the higher the value of the expected cash flows generated by the firm's business, the more likely it is to be able to pay off its debt. A fall in the expected profitability of the firm *ceteris paribus* will cause a widening of credit spreads and a fall in equity values;
- the face value of the debt; the more debt there is, the more likely the firm will be unable to pay it off;
- the *future* volatility of the value of the firm's assets; the more diverse the range of future possible values for the firm, the higher will be the probabilities attached to states of the world in which the firm defaults. And higher probabilities will also be attached to states of the world where recovery rates are low; and
- the maturity of the debt; for most firms⁽²⁾ there is an upward-sloping credit term structure. Firms' values may look fine now but the more time there is, the more chance there is that bad news will arrive to depress a firm's value.

The model is especially useful in showing the *non-linear* dependence of credit spreads on these variables. For a firm with a high valuation relative to debt, a big fall in the value of its equity (which is the observable proxy for the firm's underlying value) may not result in much

⁽¹⁾ We followed a general-to-specific methodology to specify the model. Beginning with four lags of the spread and four lags of GDP growth on the right-hand side, we dropped all insignificant variables (at 90% confidence), and were left with just the first lag of the spread and a constant. This model was used to generate the out-of-sample forecast. Because no lags of GDP growth were selected as explanatory variables, we were able to produce a forecast from this model in December 2000, before Q4 GDP data was available. We do not see this as an optimal forecasting model, but as a simple way to quantify the implications of assuming that a linear regression model can capture the visual relationship seen in the chart.

⁽²⁾ Very highly geared firms have a downward-sloping credit term structure in this model. They have so much debt that if they had to pay it back tomorrow they would default. But with sufficient time, it is possible that enough beneficial shocks will occur to enable them to pay back their debt.

change in its credit spreads. Intuitively, even though the firm's value may have dropped significantly, the chances of default may still be very remote. But as valuations continue to fall, default becomes a real possibility and at some point credit spreads significantly increase. As we explain below, this insight is crucial to understanding recent conditions within US credit markets.

Chart 4 demonstrates this effect using the model. We assume a company with debts with a face value of \$40 and a range of volatilities⁽¹⁾ for the underlying asset value. We then use the model to generate bond prices and the associated credit spreads for different levels of the firm's value and volatility. The equity price is given by the firm's value minus the bond price. The chart then plots credit spreads against equity values. It is easy to see that as the value of the firm's equity falls (reflecting falls in the underlying asset values), the credit spread increases at an increasing rate.





What can macroeconomic data tell us about bond spreads?

An obvious approach to interpreting the movements in high-yield bond spreads would be to apply this framework to corporate America as a whole. Could we attribute the widening of US credit spreads in the second half of 2000 to the above drivers of credit spreads at a macroeconomic level? And did they explain why US spreads widened during the second half of 2000 while UK spreads remained broadly stable? Taking equity values first, although there had been a great deal of volatility, by 2000 Q4 the broad equity indices (shown in Chart 5) were not far from their levels in January 2000. The Nasdaq was considerably lower than at the beginning of 2000 and much lower than the early spring peaks, but the broad-based Wilshire 5000 was only around 5% lower than at the start of 2000. And the movement in the Wilshire compared with the FTSE All-Share index could not explain the relative widening in spreads in the United States versus the United Kingdom.

Chart 5 Broad equity indices



Neither by the end of November 2000 did survey measures of expectations of corporate profitability imply any dramatic fall in corporate profitability in the near-term future. Chart 6 shows the results of Merrill Lynch's survey of fund managers' expectations of

Chart 6





(1) In the model the firm's future returns are normally distributed and the volatility determines their variability. A firm with a volatility of 20%, for example, will have future annual returns with a standard deviation of 20%.

aggregate earnings per share (EPS) forecasts. Although expectations of EPS growth for 2001 were lower than for 2000 and have since fallen sharply, at the end of November they were still buoyant at more than 7% in both the United Kingdom and United States.

Had levels of US corporate gearing risen dramatically during 2000? Chart 7 shows that aggregate gearing, measured by debt as a proportion of total market value, had actually been falling during the late 1990s and reached a low in early 2000. But this reflects the rapid rise in equity values over that period. The chart also shows the value of corporate debt as a proportion of GDP. Levels of debt had been rising to relatively high levels on this measure but there was no rapid rise in aggregate debt levels that would have suggested a large widening in credit spreads.

Chart 7 Corporate debt in the United States



Could equity market volatility at an aggregate level explain the rise in spreads? The answer again is no. By late November 2000, forward-looking expectations of volatility, as indicated by the implied volatility of equity index options, were lower in both the United Kingdom and the United States than at the start of 2000, despite the rises during the summer. And as Chart 8 shows, implied volatilities have tracked each other closely for both markets so this cannot explain the divergence between the United States and the United Kingdom.

It might be reasonable to expect credit spreads to be related to the probabilities of large falls in equity prices. So in Chart 9 we present the implied probabilities of large falls in the US and UK broad equity indices. Although these probabilities did increase a little towards the end of 2000 (but have since fallen back partially),

Chart 8 Equity index implied volatility



Chart 9 Implied downside risk of equity indices



the story is similar to that for implied volatility: downside risk was lower by the end of 2000 than at the start of the year and little higher in the United States than in the United Kingdom.

So at an aggregate level it is difficult to understand the widening in credit spreads in terms of expectations of corporate profitability or their volatility, as the structural model above would suggest. And although levels of corporate debt have been rising in recent years, there was no sudden increase during 2000 that was likely to be sufficient to raise spreads by as much as actually occurred.

Interpretation via disaggregation

In order to reconcile the widening of average spreads with a lack either of falls in aggregate market indices or increases in volatility or gearing we have to disaggregate the data. In addition, we need to recognise two things: first, the non-linear response of spreads to the equity price that was generated by our simple theoretical model and, second, the fact that there has been a great deal of heterogeneity in the movement of spreads within credit classes in the latter half of 2000. If firms whose share prices have dropped considerably suffer a much bigger widening of their credit spreads than the narrowing of spreads enjoyed by those firms who have seen an equivalent rise in their share price, then it is possible for the average of a set of spreads to rise even though the average equity movement is nil.

To examine this we calculated a large number of credit spreads for single-A, BBB and high-yield⁽¹⁾ US corporates. For each firm we then calculated the change in the credit spread between June and November 2000, and the corresponding change in the share price. Charts 10, 11 and 12 plot the change in the credit spread against the change in the share price for single-A, BBB and high-yield, corporates respectively. Each observation refers to a particular firm in each of these three rating classes.⁽²⁾

So we need lots of observations in the top left quadrant and few in the bottom right quadrant. In other words, some firms that have seen a big fall in share prices experience a large increase in their credit spreads, but firms whose share prices have performed well do not see an equivalent reduction in credit spreads. Note that we know from the theoretical model that it is perfectly possible for a firm to suffer a large fall in its share price and yet not suffer a large spread widening if it starts off with sufficiently low gearing. We are therefore likely to find that the firms whose spreads have dramatically increased come predominantly from the poorer end of the credit quality range.

Chart 10 demonstrates that our explanation works well at explaining movements in high-yield credit spreads. The mean increase in credit spread in this sector was 91 basis points but the median (50th-percentile) firm saw an increase of only 48 basis points. The average spread series is being pulled up by a few firms that are experiencing especially large spreads.

To see this effect in practice, we examine the behaviour of Xerox's share price and its credit spreads over the second half of 2000 (see Chart 13). Each observation plots the combination of the share price and the credit

Chart 10 Changes in spread vs changes in equity price for high-yield US corporates



Chart 11





Chart 12 Changes in A-rated corporate credit spreads vs changes in share prices



(1) Members of Merrill Lynch's US high-yield master index.

⁽²⁾ For these charts that compare spreads over time, we had to use bonds that were common to both the June and

December indexes.

Chart 13 Xerox share price and credit spread



spread on a particular day. Xerox's share price fell dramatically when it issued a profit warning in early October. Until the share price dropped below \$15 there was only a very limited widening in the credit spreads for its bonds. But as it dropped to \$10 and below, the spreads increased to more than 1,000 basis points.

Charts 11 and 12 demonstrate that for the better credits the story does not work so well. There is still some evidence of a non-linear relationship within the universe of BBB firms. But at single-A it is more difficult to make that judgment. Remember, however, that it was mainly the widening in high-yield spreads to which observers were pointing as an indicator of a possible hard landing. And the evidence is that we can explain much of the average widening as the result of a subset of firms whose credit spreads have increased substantially.

How widespread have spread increases been?

There appears to have been a much greater diversity of experiences between US companies over the second half of 2000 than earlier in the year. Chart 14 plots the distribution of high-yield credit spreads at the start of June and the end of December. The mean spread in June was 7.61 percentage points; by December it was 14.22 percentage points. The median spread had also increased from 3.67 percentage points to 6.37 percentage points. The mean had been pulled up by some firms whose bond spreads had increased substantially, causing the distribution to become more positively skewed.⁽¹⁾ In June there were four bonds yielding 100 percentage points or more than swaps. By December there were 22 bonds in this position.

Chart 14 Distribution of US high-yield credit spreads



Note: The units on the y-axis represent the probability of the spread being within +/-50 basis points of any given spread.

Lower-rated bonds experienced much greater widening of spreads than higher-rated bonds. For example the average spread (over Treasuries) in Moody's high-yield index of Caa-rated bonds widened by 753 basis points over 2000. By contrast, the average spread increase of Ba-rated bonds (the highest rating in their high-yield index) increased by only 141 basis points.

Another useful indicator that closely tracks the trends and turning-points in the high-yield spread is the ratio of downgrades to upgrades determined by ratings agencies. This, like the spread, is currently very high, nearly at the levels reached in the early 1990s. However, consistent with our analysis of the high-yield spread, there has been a considerable dispersion of experience within the index. The lowest-rated firms (the index comprises Ba, B, Caa-C) have suffered far more than the higher-rated firms.⁽²⁾ This ratio was 5 to 1 (downgrades per upgrade) for Caa-C ratings in 1998–2000. For higher ratings, like Ba for example, the ratio was considerably lower at 1.2 to 1.

Downgrades per upgrade by rating category

	All ratings	Ba	<u> </u>	Caa
1988-90	2.9	$\begin{array}{c} 1.6 \\ 1.2 \end{array}$	3.6	4.5
1998-2000	2.2		2.3	5.4

The table shows upgrade-downgrade ratios for 1988 to 1990 and 1998 to 2000. Chart 15 shows these ratios on a quarterly basis from 1988 to 2000. Prior to the last downturn, downgrades were much more widespread across the high-yield ratings. Anecdotal evidence

(1) Skewness (measured as (mean-median)/standard deviation) increased from 0.22 to 0.28.

⁽²⁾ This analysis of upgrade/downgrades is based on data provided by Moody's, and is discussed by them in their *Global Outlook 2001*.

Chart 15 Downgrades per upgrade by rating category



suggests that this is what we would expect to find in terms of our spread distributions as well.⁽¹⁾ There was a more generalised widening of spreads the last time the index had reached the recent high levels. These findings lend weight to the idea that we should perhaps be careful about extrapolating from the past based on just the aggregate index data.

Idiosyncratic risk and sector-specific stories

One factor that can explain this widening of the high-yield sector is an increase in idiosyncratic risk affecting firms. We have already demonstrated that implied index volatility was at about the same level at the end of the year as halfway through the year, and somewhat lower than at the start of the year. However, there have been big increases in firm-specific risk as measured by individual equity implied volatilities based

Chart 16 Stock average vs index implied volatility for S&P 500



on individual firm options. Chart 16 below plots two series. The first is simply the implied volatility for the S&P 500 index. The second is the average of the implied volatilities of the individual stocks that make up the index. The two differ because the index is effectively a diversified portfolio of stocks. The risk that is idiosyncratic to a firm is diversified away in such a portfolio leaving only risk that is systematic to all firms. What the chart shows is that forward-looking expectations of individual firms' volatility have on average increased from about 35% at the beginning of 1998 to close to 60%. In contrast, the implied volatility of the index has increased only from 20% to 25%. In other words there has been a large rise in the degree of idiosyncratic risk associated with future movements in US firms' values. And the chart shows that most of this increase has occurred since mid-1999.

This matters for interpreting credit spreads because the expected loss on a firm's debt is determined by the total risk of a firm's returns—idiosyncratic as well as systematic risk. Increased risk in the US economy may well have been an important factor in explaining the widening of credit spreads during 2000. But risk has to be measured at the level of the individual firm using the implied volatility for each firm's equity, and not from the implied volatility of the index. This is demonstrated by Chart 17, which plots changes in firms' credit spreads against changes in the implied volatility of their equity prices. This indicates that for high-yield firms, there was a positive relationship between changes in implied volatility and changes in credit spreads

Chart 17





(1) Unfortunately prior to 1996, Merrill Lynch only has the high-yield bond index number, and not the list of constituents or individual bond yields. This has limited our ability to do disaggregated analysis historically, given that we would like to determine the extent to which the increases in spreads in the early 1990s were a generalised phenomenon. between the beginning of June and the end of December 2000.

We also explored whether most of these firms with credit spread increases were heavily concentrated within particular sectors. Given the large falls in the Nasdaq index during the second half of 2000, it might be expected that many of the firms whose spreads had widened were within the technology sectors. To examine this, we divided firms into sectoral groups and examined the distribution of changes in spreads between the beginning of June and the end of December 2000. Chart 18 shows the results. The yellow bar represents the range between the 25th percentile and the 75th percentile of spread changes for each sector. The blue lines represent the median spread change. A number of observations may be made:

- there is clearly a great deal of dispersion even within particular sectors;
- although it is true that two of the sectors that experienced large widening of spreads were telecommunications and technology, there were also plenty of firms whose credit spreads widened dramatically within the basic industry, consumer cyclicals, consumer non-cyclicals and capital goods sectors. In other words this was not just a 'new economy' story; and
- the large difference between the 75th percentile and the median change in spreads suggests that

Chart 18





even within sectors there is a considerable diversity of experience.

So, overall, sectoral distinctions seem to play a minor role. Rather, as we argued before, much of the widening of aggregate credit spread indices appears to be due to firm-specific phenomena.

What are the implications for the US macroeconomic outlook?

Summarising the stylised facts associated with the widening in US high-yield spreads during 2000:

- High-yield bond index spreads widened dramatically during the second half of 2000 to levels not seen since the US recession of the early 1990s.
- At an aggregate level it is difficult to understand why this widening occurred in terms of movements in equity prices, volatility or gearing levels.
- The disaggregated data show that the relationship between credit spreads and their determinants is highly non-linear. Because spreads change much more in response to bad news than good, an increase in the diversity of corporate performance can increase spreads on average. So much of the widening of credit spreads has been due to very large spread increases suffered by a limited subset of firms.
- Some sectors have performed worse than others but there remains a great deal of dispersion within sectors, suggesting that much of the widening is as a result of firm-specific events.

What do these facts imply for the macroeconomic outlook? One possibility is that the diversity of firms' experience has been much greater recently than in previous episodes. The market had dramatically revised down the valuations of a specific subset of firms, causing in some cases massive increases in the cost of debt capital. Such events are perfectly consistent with the notion of capital markets efficiently re-allocating capital between firms. And the degree of heterogeneity between firms' experiences was arguably a natural phenomenon in an economy experiencing a high degree of structural change. This suggests that the historical negative correlation between high-yield spreads and subsequent macroeconomic performance may have broken down, and the outlook is less pessimistic than an extrapolation of this relationship would indicate.

But another possibility is that this diversity of corporate experience is typical of oncoming recessions, which 'weed out' weak firms, so that what has been witnessed is the market assessing which firms might be likely to default, ahead of a slowdown. On that basis, the previous sequence might be expected to recur, with a slowdown following a widening of credit spreads.

There is no conclusive evidence enabling us to choose decisively between these two possibilities. In particular we cannot now subject previous episodes to the same disaggregated analysis as we apply to the events of last year. We have only limited evidence from credit ratings and from market anecdote that experience across firms is more diverse this time round.

But even if large increases in the cost of debt capital are unusually concentrated in a specific subset of firms, this could still have significant macroeconomic consequences. If the firms in trouble were those that had invested heavily in recent years, there might still be a significant downside risk to aggregate investment if their investment were drastically curtailed.

On balance the recent experience seems to be sufficiently different from that of the early 1990s that it would be unwise to rely on a simple forecast using a high-yield credit index. On the other hand we could not rule out the possibility that the widening of spreads *was* a precursor to a slowdown. In particular, there might be a significant downside risk to investment.

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An analysis of the relationship between international bond markets

Working Paper No. 123

Andrew Clare and Ilias Lekkos

This paper focuses on the relationship between international capital markets, in particular government bond markets, in response to a concern that the apparent growing globalisation of capital markets might limit the influence of monetary authorities over their domestic economies, especially in times of financial market crisis. We attempt to gauge: the amount of influence that monetary authorities can have on the shape of the yield curve via changes in short rates; the extent (in terms of duration and magnitude) to which the slope of the yield curve is influenced by international factors during periods of financial crisis; and, finally, by how much co-movements in long bond rates, or indeed the components of these co-movements, change during periods of financial market stress.

The starting-point of the analysis is the rational expectations hypothesis of the term structure (REHTS), which is used to calculate measures of the covariance between the UK, German and US government bond markets. We decompose government bond yields from the three markets into 'fundamental' and 'risk premium' components. We define the fundamental long bond yield as the yield that would prevail if the REHTS held, and define the (*ex post*) bond market risk premium as the difference between this theoretical yield and the actual long bond yield.

The theoretical yield is derived by estimating a system of equations that contains the changes in a short rate and a measure of the slopes of the yield curves from the German, UK and US government bond markets. Thus, unlike similar studies, which use this methodology with only domestic variables, our system allows for the possibility that long rates are determined by international factors, proxied in each case by information from the yield curves of the other two major markets.

Estimation of this system allows us to decompose the variance of the slopes of both the domestic and foreign term spreads. This decomposition provides an estimate of the proportion of the movement in any one yield spread that can be attributed to shocks from other government bond markets. Since we estimate the system on a rolling basis we can also create a time series of this variance decomposition allowing us, for example, to gauge the time-varying impact of shocks to overseas interest rates on the slope of the UK yield curve.

The main result is that during global financial turmoil (for example, the sterling exchange rate crisis of 1992, the Asian financial crisis of 1997, or the Russian debt crisis of 1998) these slopes respond mainly to 'international factors', presumably as global investors reallocate their bond portfolio holdings and local investors readjust their expectations about domestic interest rates. However, these periods of international influence appear to exist for relatively short periods of time, with no clear sign of any longer-term, permanent effect on the relationship between the markets. The decomposition of the covariance between these government bond markets indicates that risk premia and/or contagion effects have played an important role during these periods, moving the covariance between the markets away from where we might have expected them to be if international bond rates were determined solely by REHTS arbitrage.

Age structure and the UK unemployment rate

Working Paper No. 124

Richard Barwell⁽¹⁾

According to conventional textbook analysis, when unemployment falls below its natural or equilibrium rate wage inflation starts to rise. However, over the past few years UK unemployment has fallen well below what was thought to have been its natural rate and yet wage inflation has remained subdued. One possible explanation for this is that the natural rate of unemployment itself has fallen. Explanations for such a fall have included a decline in union bargaining power, reduced generosity of unemployment benefits, and deregulation of labour markets. This paper investigates a further explanation, namely that the fall in equilibrium unemployment is due to the changing age structure of the workforce. In particular, the paper investigates the hypothesis that a decline in the proportion of youths in the labour force has reduced the equilibrium unemployment rate.

Two key stylised facts provide the springboard for the subsequent analysis. First, youths, defined as workers aged between 16 and 24, have a higher equilibrium unemployment rate than older workers. The paper argues that the youth unemployment problem is caused either by higher quit rates among younger workers, or by firms discriminating against their younger employees when they need to lay off workers. The second stylised fact is that the proportion of youths in the workforce almost halved between the early 1980s and mid-1990s. This was partly due to an echo effect from the sharp fall in the birth rate between the mid-1960s and mid-1970s, and partly to a substantial rise in the proportion of youths in full-time higher education during the 1990s.

The core of the paper produces a range of estimates of how much of the fall in UK unemployment can be

explained by the changing age distribution of the workforce. The method adopted for investigating this issue is a 'shift-share' analysis of the UK workforce during the years 1984 to 1998. The analysis is complicated by having to make an allowance for changing participation rates among different age groups. Using data from the Labour Force Survey, it is estimated that about 55 basis points of the 565 basis point fall in the UK unemployment rate between 1984 and 1998 can be accounted for by changes in the age structure of the labour force with given participation rates. Even after controlling for changing labour force participation rates by age, demographically driven shifts in the age composition of the labour force still explain about 40 basis points of the fall in unemployment. An attempt is also made to assess whether shifts in the composition of the labour force have had any effect on the youth and adult unemployment rates, such as through generational crowding effects. But no clear evidence of such effects was found.

Finally, the paper takes some projections of the evolution of the composition of the labour force up to 2007, in order to assess whether any further impact on equilibrium unemployment might be expected from demographic change. It is estimated that such changes as could be anticipated would have a negligible further impact.

In summary, this paper provides evidence that the falling proportion of youths has made a significant contribution to the fall in UK unemployment between the mid-1980s and late 1990s, but no further contribution from this factor is expected over the successive decade.

 The paper was written while the author was working at the Bank of England. An extended non-technical version of this working paper was published in the August 2000 *Quarterly Bulletin*, pages 257–65.

Assessing the impact of macroeconomic news announcements on securities prices under different monetary policy regimes

Working Paper No. 125

Andrew Clare and Roger Courtenay

On 6 May 1997 the UK government granted the Bank of England operational independence with respect to the implementation of monetary policy subject to an inflation target, later set at $2^{1/2}$ % per year. Since this date the Bank has tried to be as transparent as possible in its decision-making process. This paper looks at the extent to which the Bank has been successful in this aim by comparing financial market reactions to key monetary policy announcements before and after Bank independence. It also considers whether the reaction of market participants to key macroeconomic data releases has changed.

To address these issues we use high-frequency data from LIFFE and from the foreign exchange market, monitoring the prices of the short sterling interest rate, long gilt and FTSE 100 contracts and the dollar/sterling and Deutsche Mark/sterling exchange rates from immediately before to just after the scheduled announcements. We concentrate on a narrow window around these announcements in order to capture the 'pure' reaction to the announcement itself. Many other announcements occur during a trading day and cloud the picture if prices at close of business on successive days are used (as in some other studies).

The methodology involves splitting the sample period into days when scheduled announcements are made (announcement days) and days when they are not (non-announcement days). The set of non-announcement days represents a 'norm' against which to measure any unusual activity following scheduled announcements. We can compare the behaviour of the market when, for example, RPI announcements are made, with those days when RPI announcements are not made. This is done for the period prior to Bank independence and for the period after Bank independence, and we test for systematic differences in price volatility and trading activity between the two periods.

The results indicate that there may well have been changes in the way that financial markets incorporate key economic data into securities prices. The total (cumulative) reaction of the LIFFE contracts and exchange rates to interest rate changes appears to be either unchanged or lower in the post Bank independence period, depending on the market observed. This supports the idea that the news content of monetary policy announcements may have fallen. However, while the total reaction supports this view, the more immediate reaction to interest rate changes is found to be higher in the post-independence period for all the markets studied. We also tested for a change in the way that these markets absorbed macroeconomic data following Bank independence. Looking at exchange rate responses, there is very clear evidence to support the idea that foreign exchange market agents now pay more attention to UK macroeconomic data announcements than in the pre-independence period. This evidence appears to suggest that the underlying economic data have become more important in these markets relative to the key monetary policy announcement. A different picture emerges when we consider the impact of the same set of announcements on all three LIFFE contracts, which is lower in the post Bank independence period at all horizons.

New estimates of the UK real and nominal yield curves

Working Paper No. 126

Nicola Anderson and John Sleath

This paper presents a new method for calculating estimates of the UK real and nominal yield curves. This is helpful in assessing implied market interest rate expectations at various horizons and for deriving inflation expectations. The estimates differ in a number of ways from those previously published. First, we adapt for the UK market a spline-based technique originally developed by Waggoner for the United States. Second, data from the generalised collateral (GC) repo market are used, in addition to coupon bond prices, to improve the quality of the estimates at shorter maturities. Third, estimates of the real curve are extracted from the prices of index-linked gilts. Each of these issues is described in detail in the paper, and discussed briefly below.

To arrive at the new estimates we have made a detailed comparison of four competing yield curve estimation methods, assessing each against the following three criteria:

- Smoothness—the technique should give relatively smooth forward curves rather than trying to fit every data point, since the aim is to supply a market expectation for monetary policy purposes, rather than a precise pricing of all bonds in the market. Nonetheless, subject to the former, a better fit to the data would be preferred.
- 2) Flexibility—the technique should be sufficiently flexible to capture movements in the underlying term structure. More flexibility is likely to be needed at shorter maturities (where expectations are better informed and more subject to revision as news reaches the market) than at the longer end.
- Stability—estimates of the yield curve at any particular maturity should be stable in the sense

that small changes in the data at one maturity (such as at the long end) do not have a disproportionate effect on forward rates at other maturities.

The aim is to find the yield curve model that provides us with the most reliable and useful estimates, not only on any particular day, but also over time. The models tested are: the new method (called the 'variable roughness penalty', or VRP, method); the parametric technique of Nelson and Siegel; the extended parametric approach due to Svensson; and the spline-based method of Fisher, Nychka and Zervos. We find that the VRP method significantly outperforms the others on all our criteria.

Having chosen this as our basic model, we then turn our focus to the short end of the yield curve, where there is a lack of data in both the conventional and index-linked gilt markets. The challenge is to investigate whether there are alternative sources of data that can feasibly be included to help fill the gaps. In the case of the real yield curve, there is very little we can do—index-linked gilts are the only direct source of real interest rate data, at least in the United Kingdom. For nominal yields, however, we find that data from the GC repo market can successfully be used to supplement bond data at the short end of the conventional gilt market.

In the final section of the paper we re-examine estimates of the real yield curve derived from index-linked gilt prices. We demonstrate that a model that combines the VRP technology with a modified version of the framework proposed by Evans is able to improve significantly on the iterative technique used previously. This naturally also leads to improved measures of the inflation term structure, being the difference between the real and nominal yield curves.

International and domestic uncertainties

In this speech,⁽¹⁾ the **Governor** first describes the Monetary Policy Committee's mandate and the approach the Committee takes in trying to meet it, essentially by maintaining a balance between overall demand and supply. He surveys the record of the authorities in meeting that goal since 1992. Turning to the current international situation, the Governor observes that it has been clear for some time that there needed to be a slowdown in the growth of the US economy to a more sustainable rate. He concludes that, while the United States may be in for a bumpy ride over the next few months, the most likely outcome for the year as a whole is continued growth of perhaps 2%-3%, and the overall world economy will probably grow at somewhat above its longer-term average rate. The Governor then identifies and discusses the major uncertainties in the domestic economic scene: the extent of supply-side capacity, the tightness of the labour market, and the growth rate of aggregate demand.

Mr Chairman, I am delighted to join with you in welcoming everyone to dinner this evening here in Sheffield, and I should like to begin by thanking you, Master Cutler, for allowing us to host the event here in the Cutlers' Hall. I have had the pleasure of speaking here before—some five years ago, at the Cutlers' Feast and it is indeed a privilege which we greatly appreciate. Thank you.

Since then, of course, the Bank of England has been subject to new legislation. The new Bank of England Act confers upon us-specifically upon the newly created Monetary Policy Committee—independent responsibility for the conduct of monetary policy; but it also expanded and increased the role of our Court of Directors, including giving an oversight responsibility to the Non-Executive Members of Court to ensure that the Monetary Policy Committee (MPC) has collected the regional, sectoral and other information necessary for the purposes of formulating monetary policy. These changes, inter alia, have made the Bank especially conscious of the importance of its regional presence. As you know, we have a branch office up here in Yorkshire, in fact in Leeds, which serves as a part of our network of eyes and ears and indeed voices at 13 locations throughout the United Kingdom. The new responsibility made us more conscious than ever of the importance also of visits around the country by senior members of the Bank in London, including members of the MPC and indeed our Directors, both to inform themselves about

local economic conditions and to explain locally what it is that we are trying to do. That explains why you have been seeing much more of us in recent years and it explains in particular tonight's invasion of Yorkshire, by 11 of our 16 Directors and 6 of the 9 members of the MPC. Tomorrow in Leeds will in fact be the third occasion on which our Court has held one of its monthly meetings outside London since the new legislation was introduced in 1998, a practice which we intend to continue.

So that, I hope, explains why we are here—and I hope that you will avail yourselves of the opportunity to bend the ears of our representatives where you can—but preferably not until I've finished speaking to you! For my purpose tonight is to explain what it is that the Bank, through the MPC, is trying to do in its conduct of monetary policy, to say something about where we are, and to explain some of the risks and uncertainties that we are facing as we look forward.

What then are we trying to do? The MPC's mandate from the Government is to maintain price stability (currently defined as an inflation rate of $2^{1/2}$ %—on a specific measure of retail price inflation) and subject to that to support the Government's economic policies, including its objectives for growth and employment. Now no one can reasonably suppose that inflation could be held precisely at $2^{1/2}$ % consistently over time. But we are consistently to aim at that target. Now what that

⁽¹⁾ Given at the Yorkshire Forward/Bank of England Regional Dinner for Yorkshire and the Humber business and civic leaders and MPs at the Cutlers' Hall, Sheffield on 16 January 2001. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech110.htm

involves essentially is trying to keep aggregate nominal demand in the economy more or less continuously in line with the overall supply-side capacity of the economy—as a whole—to meet that demand. In fact, although our objective is defined narrowly in terms of price stability—the 2¹/₂% target—we can only hope to achieve it by maintaining stability in a much broader sense—that is by consistently maintaining a balance between overall demand and supply. That, essentially, is how best we can contribute to the Government's objectives for growth and employment.

It is in fact a necessary condition for maintaining the steady economic progress that we have seen in recent years.

There is not a great deal that we can do—through monetary policy—directly to affect the supply side of the economy, the underlying rate of growth that we can hope to sustain. Maintaining a stable monetary environment can certainly help, but that is essentially determined by the ingenuity and skills of our business managers and our workforce, by the whole range of Government policies and importantly too, Mr Chairman, by the imagination, energy and enthusiasm of organisations like your own Yorkshire Forward in developing and putting into effect your Regional Economic Strategy. Our job—as I say—is to keep overall demand in the economy growing broadly in line with supply-side capacity.

So how then are we doing?

First, on inflation. Since we came out of the last recession, in 1992, retail price inflation (the Government's target measure) has averaged 2.7%; it has in fact been marginally below the $2^{1}/_{2}$ % target for much of the past two years and was 2% in the latest twelve months to December. Short-term interest rates—which went up to 12% (and tentatively even to 15%) before we left the ERM in 1992—have been stable at 6% for the best part of a year. Helped by a decline in inflationary expectations, UK ten-year government bond yields have fallen to around $4^{3}/_{4}$ % which, apart from a brief period at the beginning of 1999, is the lowest they've been for nearly 40 years. They are now just about as low as in any major industrial country with the exception of Japan.

At the same time our economy has now grown continuously quarter by quarter for more than $8^{1/2}$ years at an average annual rate of 3%, which is well above most estimates—at least until recently—of the longer-term trend rate of $2^{1/4}\%$ – $2^{1/2}\%$.

And the number of people in work has recently been at an all-time high in the United Kingdom as a whole, and close to its high point in your own region; while the rate of unemployment, on a claimant count basis, is at a 25-year low in the United Kingdom as a whole and at its lowest for 20 years in Yorkshire and Humberside.

The question now of course is—can we keep it up?

The answer to that question depends on developments both at home and abroad, but let me comment first on the international situation, which is currently the focus of a great deal of attention.

As I explained in a speech last night in Edinburgh, the bounce-back from the world economic slowdown in 1998/99 was such that in the year just ended world economic activity grew at a rate of some $4^{1/2}$ %, which equals the fastest rate for 16 years-and compares with an average rate of some $3^{1}/_{4}$ % over the past 10 or 20 years. In large part this recovery was underpinned by unusually strong growth in the United States, averaging some $4^{1}/_{2}$ % over the past 4 years and surging to a peak of some $5^{1/2}$ % at an annual rate in the first half of last year—compared with an average rate of $2^{3}/_{4}$ % over the preceding decade. This remarkable strength of the US economy was possible, without overheating, against the background of unusually rapid productivity growth as investment in IT spread through the US economy improving its supply-side capacity. These developments together implied higher corporate earnings growth in the United States pushing up the stock market and at the same time attracting massive direct and portfolio capital inflows into the United States—substantially from the euro area-which comfortably over-financed a burgeoning US current account deficit and underpinned the strong dollar.

However helpful all this was in supporting the world economy it clearly could not continue for ever or without limit. At some point—and no one could know at all precisely at what point—demand in the United States would begin to outstrip supply and the growing external imbalance between the United States and the rest of the world would become unsustainable; relative asset prices—including the dollar's exchange rate would over-discount prospective US corporate earnings growth, and both equity and foreign exchange markets would then become vulnerable to abrupt correction.

Against that background it has been clear for some time that there needed to be a slowdown in the growth of the US economy to a rate which was more sustainable, both in the United States itself but also in terms of the imbalance within the global economy—and the debate turned to whether it would come as the 'soft landing' we would all welcome or a more disruptive 'hard landing' which we could all well do without.

And slowdown, of course, is what we have seen over the past six months. In the third quarter US GDP growth fell to an annualised rate of some $2^{1/4}$ —less than half that in the earlier part of last year—and much of the more recent data suggest a further weakening. This slowdown has been reflected in a fall in equity prices—including a sharp fall in the previously hugely overblown 'tech-heavy' Nasdaq index; and this in turn has contributed to a typically rapid escalation in the language of commentators, from slowdown, to imminent downturn or recession, to possible slump.

Of course it is always possible that it will come to this no one has a crystal ball—and it goes without saying that we are all watching what's happening very carefully. But that is not my own view of the most likely outcome, nor that of my central bank colleagues from around the world when we met in Basel a week ago. We met in the wake of the Fed's move to cut interest rates, which was widely welcomed as timely and appropriate, demonstrating sensitivity to the possibility of a spiralling decline in financial market and business and consumer confidence. We noted, too, that in announcing its move the Fed had made a point of emphasising its expectation of continuing relatively strong productivity growth, giving it more room for manoeuvre than it would otherwise have. Against that background, the view was that, while the US economy might be in for a bumpy ride over the next few months, associated for example with inventory adjustment in the motor industry, the likely outcome for this year as a whole is that the US economy will continue to grow, by perhaps 2%–3%, and that the overall world economy-helped by steady growth in the euro area-would again this year grow probably at somewhat above its longer-term average rate. That, certainly, is a slowdown in the recent rate of growthand a downward revision of earlier expectations of growth for the current year; but it is not a downturn in the sense of contracting activity. On this view, the

slowdown in prospect would have relatively benign effects in terms of the longer-term sustainability of the global economic expansion; and developments so far have already had positive effects, both in terms of their impact on the world oil price and in terms of their impact on the pattern of exchange rates, notably by reducing the exaggerated weakness of the euro.

On that basis the global economic environment should provide a reasonable background for our own economy. We—and our partners in the European Union—would be relatively little affected by the US economic slowdown. The world economy as a whole would certainly be helped by the somewhat softer oil price. And the recovery of the euro—including its recovery against sterling-will help to ease the severe imbalance within our own economy between the domestically orientated sectors, which have typically been doing relatively well, and those businesses and sectors that are most exposed to competition from the euro area and which have been having a rough time. That imbalance is, I know, a real concern to many up here in Yorkshire, including many of you here in Sheffield. It has, for some time, been one of the most difficult issues confronting us in conducting monetary policy.

What then are the major domestic uncertainties? There are really three key areas:

- first, there is uncertainty about what in fact is happening on the supply side of the economy; that's to say how rapidly can aggregate demand be allowed to increase before it begins to run ahead of supply and put upward pressure on inflation or, alternatively, how rapidly must demand increase in order not to run below supply-side capacity and cause inflation to fall significantly short of the inflation target. The target is, of course, symmetrical;
- second, and specifically in relation to the labour market, at what point does the growth of employment or the fall in unemployment lead to a rate of increase in pay settlements, or earnings growth, which would subsequently lead to accelerating inflation in goods and services markets; and
- third, what is happening or is likely to happen to the rate of growth of aggregate demand in the economy anyway.

Now, as I said earlier, there is not a great deal that wethrough monetary policy-can do directly to affect the first two of these areas of uncertainty, which relate to the supply side of the economy. The major challenge for us in these areas is in assessing-or quantifying-their impact. And that's not at all easy because, while the effects gradually become apparent over time, many of the relevant developments cannot be directly observed or measured; neither therefore can they be predicted with any great confidence. But we are sensitive to the fact that certainly over the past two or three years price pressures in both product and labour markets have been less than we would have expected based on earlier experience, given the strength of demand. You might explain this in terms of more intense competition and lower margins in product markets; or in terms of an increase in the rate of productivity growth, perhaps related to the application of new technology, such as we have seen in the United States; and you might explain the recent relatively benign real earnings growth in terms of the more flexible functioning of labour markets. But we cannot be sure of the explanation, or of how large or persistent the relevant effects will prove to be. We are nevertheless sensitive to these possibilities: we do indeed try to allow for them in our forecasts and in our policy judgments, based upon careful scrutiny of all the latest information that we have. But the process remains necessarily judgmental, and that, of course, leaves us vulnerable to assertions that we don't give sufficient weight to this or that factor. That, some of our critics maintain, is why inflation has been below target for much of the past two years. In fact the undershoot has been marginal-given the uncertainties-and can just as well be explained by the unexpected strength of sterling's effective exchange rate, reflecting the weakness of the euro, which has both directly dampened the price level and constrained external demand.

We, of course, can and do actually affect the third main area of uncertainty—the nominal demand side of the economy—by setting short-term interest rates. But here, too, we have to rely to a considerable extent upon judgment, given the uncertainties about:

- what is currently happening to demand, given the lags and contradictions in the data and the fact that they are in many cases subject to later revision;
- the strength and persistence of the underlying forces driving demand looking ahead; and

• the sensitivity of the various components of demand to changes in the level of interest rates.

It can't be said too often that the operation of monetary policy is an art rather than a precise science, although practising that art needs to be—and is—informed by as much science as we can bring to bear.

For what it is worth, at the time of our last forecast in November, our central projection—on the assumption of 6% interest rates—was for output growth of around $2^{1/2}$ % over the next couple of years, with RPIX inflation remaining modestly below target this year but rising to $2^{1/2}$ % in 2002. There was, of course, a good deal of uncertainty around that central projection, as there always is, for the reasons that I've tried to explain. But on the basis of that forecast the short answer to the question: 'can our steady economic progress be maintained, over the next couple of years anyway?' is a cautious 'yes'.

Since that forecast was completed things have gone in different directions. The prospect for external demand has somewhat weakened and so too has the oil price. There are mixed messages relating to tightness in the labour market, but earnings growth has so far remained reasonably well contained—as it must continue to do. On the domestic demand side, private consumption growth has remained stronger than we had supposed, while the growth in private investment has been weaker; meanwhile it is not clear that underlying public sector demand has—at least yet—picked up as rapidly as planned. The exchange rate has fallen, and so, too, have market interest rates.

I would not venture to suggest how these—and all the other developments we look at—will influence our next forecast in February; and it would be pointless to anticipate possible future policy decisions. I would be surprised if they radically altered the broad prospect of relatively steady progress over the next two years. But I can assure you of one thing: if the prospect—or the balance of risks around it—were to change significantly—either in the context of our February forecast or subsequently—we will promptly react to that change. Despite the fact that we left interest rates on hold again last week, we have certainly not gone to sleep!

Current threats to global financial stability—a European view

In this speech,⁽¹⁾ David Clementi, Deputy Governor responsible for financial stability, discusses prospects for the US economy and the implications of a US slowdown for the global financial system and the UK economy. He goes on to describe the proposed revisions to the Basel Accord and the implications for financial stability. He concludes that, while a soft landing for the United States is still the most likely outcome, the financial system, due in part to the Basel Accord, is in a better position than a decade ago to absorb a sharp downturn.

Introduction

It is a great pleasure to be here in New York. I was last at a British Chambers of Commerce meeting towards the end of 1998 when I talked about the readiness of London for the arrival of the euro. My message thenthat while the United Kingdom might be outside EMU, the City of London was very much part of the euro area-has been borne out by events. London remains by far the largest financial centre in Europe and the most international. Nowhere has a larger concentration of foreign banks, or greater daily turnover in foreign exchange and derivatives or trading in foreign shares. And much of the new business in euro is conducted through London. The majority of euro-denominated debt is issued in London; and more than a third of deals on the London Stock Exchange take place in euro. US financial organisations, many of them represented here tonight, make a significant contribution to this success.

This evening I would like to address two rather different subjects. The first is to reflect on recent developments in the US economy and the potential impact this has for the United Kingdom, and for the stability of the financial system more generally. I would then like to say a few words about the proposed revisions to the capital requirements for international banks, announced last week by the Basel Committee;⁽²⁾ not just because it is topical but also because these capital requirements are central to the stability of the system and its capacity to withstand shocks; and as cautious central bankers it is important to take stock from time to time.

US and UK economic ties

As a very open economy, and one with close trade and investment links with the United States, especially in the financial sector, the United Kingdom is a keen observer of events here.

While much has been made in recent years of globalisation, the links between the United States and United Kingdom are long-standing and deep-rooted, not least in the financial sector. For many years, US financial institutions have been among the biggest players in the City. US firms take the top three positions in London as book-runners in international bond and equity issues, and as arrangers of syndicated credits. Through their dynamism and innovation, US firms also play a major role both in maintaining London's pre-eminence as an international financial centre and as a potent force for strengthening the competitiveness of the United Kingdom's own financial institutions. Our interest in the continued financial strength of US firms is thus clear.

Foreign banks are similarly active in US markets. For example, they account for 40% of the US syndicated loan market regularly surveyed by the Federal Reserve. UK banks, in particular, have sizeable direct investments in the United States and large cross-border exposures to US banks and corporates. Cross-border exposures to US non-bank borrowers stand at around \$62 billion, more than 50% higher than the equivalent exposures to the rest of Europe, while the total exposure of UK banks to the United States amounts to \$110 billion, or 8% of UK

⁽¹⁾ Given at the New York Palace Hotel, New York on 22 January 2001. This speech can be found on the Bank's web site

at www.bankofengland.co.uk/speeches/speech111.htm (2) See 'Bank capital standards: the new Basel Accord', pages 55-63 of this *Bulletin*.

GDP. Close ties in financial markets parallel the strong links in other sectors. Whether it is Grand Met seizing the Pilsbury Doughboy or Ford making off with Jaguar and Aston Martin, there has been a significant and increasing flow of direct investment in both directions across the Atlantic. The close correlation between movements in the FTSE and the Dow Jones is testament to the links between the US and UK corporate sectors.

Given the strength of these ties, UK banks and investors are inevitably vulnerable to a US slowdown. The scale of UK exposures to the United States helps to give some dimension to the scale of this risk. An analysis based on the market ratings of borrowers suggests that the statistically expected annual losses on UK bank's exposures to the United States are likely to be around \$1 billion, or about 1% of UK exposure. In principle, banks should have fully anticipated these losses in their loan pricing and general provisioning. But bank capital is there primarily to absorb unexpected losses, for example the consequences of an unexpectedly deep US recession. I will return to banks' capital adequacy later but first I want to say a few words about our perception of the US economy and the implications for the United Kingdom.

US economy: soft or hard landing?

The dramatic improvement in US economic performance through the 1990s, in terms of growth and productivity, gave rise to a sharp increase in expected returns to investment and, as a result, increased domestic and foreign demand for US assets. Investment has been particularly concentrated in ICT (information, computers and telecommunications), much of it financed by borrowing on the strength of projected future profits.

However, growing uncertainty over the size and permanence of these productivity gains, and about the long-run growth of GDP and profits, has fuelled the recent increase in market volatility. In addition, there have been more immediate worries about the impact of a cyclical downturn in productivity and earnings.

Another area for debate has been the implications of any reversal in capital flows. As I have noted, buoyant earnings expectations drove up equity prices and encouraged high rates of investment. But alongside the rapid rise in the market value of US household wealth in relation to income came a sharp fall in domestic savings. The gap between savings and investment—manifested in an external current account deficit, which has risen to an unprecedented rate of $4^{1/2}$ % of GDP—has been filled by large capital inflows. One of the major questions in the current environment is whether foreign investors will continue to finance the current account deficit, given the current uncertainties about the conjuncture. If not, there will be important consequences for the US and world economies.

A powerful lesson from recent problems in Japan and East Asia has been the debilitating impact of weak balance sheet structures. The need by both borrowers and lenders to put overstretched balance sheets on a sustainable footing reduces the potential of expansionary monetary policy to restore investor confidence and so can lead to a deeper and more prolonged downturn in domestic demand and economic activity. The issue in that case for the rest of the world would be where an increase in domestic demand in their own countries would come from to fill the gap left by the weaker domestic demand in the United States.

So it should come as no surprise that, in the latest issue of the Bank of England's *Financial Stability Review* published in December, the strength of the dollar over the last few years and the size of the US current account deficit and its counterpart in the personal and corporate sector deficits were identified as among the most significant issues in the global conjuncture. A reversal of foreign inflows, leading to a correction in both the dollar and US domestic asset prices, would have an impact far wider than the United States.

The fact that the United States has enjoyed an unparalleled period of strong and continuous growth during the 1990s owes a great deal, of course, to the policies of the US authorities. They have had to steer a difficult path between maintaining conditions conducive to growth while not being seen to underwrite the risks of 'irrational exuberance' in security markets or lax lending standards by banks. This balance became especially difficult to strike towards the end of last year in the face of sharply lower corporate earnings projections and widening spreads on higher-risk borrowings. As some lower-rated companies found access to the capital markets increasingly difficult, and as banks tightened credit standards, liquidity fears for some borrowers intensified. These factors, together with a sharp downturn in business optimism and mixed economic data, added to growing fears of a recession this year.

Such a climate of uncertainty calls for clear signals from the authorities, and over the past two months the Fed has responded in a decisive fashion. The adjustment in the policy bias and recent cut in rates have increased the probability of a soft landing and will, from an international perspective, reduce the risk of a sharp reversal of capital flows into US markets. The combination of a slower-growing—but still expanding— US economy and a weaker dollar should provide a more sustainable pattern of current accounts and capital flows, reducing the risk of instability in financial markets in both the United States and abroad.

The direction of some of the trends we have seen in the last few weeks is not unwelcome, in particular the stronger euro and weaker dollar, and the reduction in oil prices; and a soft landing looks more likely as a result. But the speed of the adjustment remains a cause for concern. It is important that the irrational exuberance that marked the run-up in equity prices to their peak last year should not give way to irrational despondency. The view among central bank governors meeting recently in Basel was that while the next few months may be difficult, for the year as a whole the US economy will continue to grow, by perhaps 2%–3%, and the overall world economy-helped by steady growth in the euro area—would grow again this year above its long-term average. No doubt this is a slowdown compared with recent rates of growth and a downward revision of earlier expectations of growth for the year, but it is not a downturn in the sense of contracting activity. A soft landing in the United States with the associated benefits for the global economy still therefore seems to me the most likely outcome.

Implications for the United Kingdom

Turning to the United Kingdom, the need to avoid irrational despondency is even more apparent. While a slowdown in the United States will have some impact on the United Kingdom, the direct trade effect will be relatively small. The United Kingdom is more dependent on growth prospects in the euro area, which is the market for more than half of UK exports. If there is an impact, it is more likely to come via some other effect such as financial contagion or financial constraints on the UK affiliates of US companies. There is no doubt that a sharp correction in US equity prices would be felt in the United Kingdom but with a US soft landing the effects should be more limited, confined perhaps to some reduction in income from US direct investment or slower growth in financial and business services. After all, the two economies are in different positions. The reasons the Fed gave to explain their recent cut do not apply to the United Kingdom. The Fed pointed to further weakening of sales and production; tight conditions in some segments of financial markets given lower consumer confidence; and higher energy prices. Current conditions in the United Kingdom are more robust. Consumer confidence measures were, if anything, higher in the fourth quarter than the third; household demand has remained relatively strong; consumer credit numbers are strong; and in the pipeline are planned increases in government expenditure, though the outlook for the public finances remains strong. However it is clear that the balance of risks has changed in the past couple of months, with the recent slowdown in world demand, signs of an easier labour market and the latest inflation numbers comfortably below target. All this will make the next meeting of the MPC interesting, particularly since the February meeting will include our quarterly review of the two-year MPC inflation forecast, in which we will try to calibrate the effects of the various changes I have mentioned.

Proposed revisions to the Basel Accord

Compared with the previous US recession in the early 1990s, a source of strength to the global financial system as the US economy slows is the much stronger capital position of most major international banks.

The 1988 Basel Accord and its market risk amendment were intended both to set a floor to the capitalisation of the world's major banks, and to smooth out competitive inequalities between banks from different countries. Bank capital ratios have increased significantly in the last decade. Between 1988 and the end of the 1990s, the ratio of capital to risk-adjusted assets of major banks in the G10 rose on average by around 3 percentage points. Of course, introduction of the Accord was not the only factor involved but studies agree it played a significant role in rising bank capital.

However, by the second half of the 1990s, it became apparent that the Accord required a radical overhaul to take account of changes in the nature of banking business and risk management since 1988. One concern has been that in some countries, various forms of regulatory arbitrage have diluted the level of capital relative to the true risks being run by banks.

Last week, the Basel Committee, chaired by Bill McDonough, President of the New York Fed, unveiled its 'Second Consultative Package', which sets out the details of a new Accord. The intention is that this should be agreed by around the turn of the year, in order to allow implementation by 2004.

We warmly welcome the new proposals and have played a major part in their negotiation alongside the UK Financial Services Authority and other G10 central banks and regulators. We particularly support the proposed use of banks internal ratings to calculate capital. Banks should know more about the riskiness of their individual borrowers than, for example, external rating agencies or supervisors, and the new Accord will provide them with the proper incentive to do so.

The new Accord also recognises that in today's complex banking markets, a focus on capital adequacy alone is not enough. This has to be reinforced by a rigorous review of banks' internal risk management processes, and also by greater transparency and market discipline. Together, these three mechanisms—which are intended to be mutually reinforcing—are known as the three 'Pillars' of the new Accord.

A fundamental change within the first Pillar—capital levels-compared with the original Accord is that improved risk management in banks has allowed the proposed new Accord to incorporate greater sensitivity of credit risk capital charges. There will be a menu of approaches, depending on the sophistication of the bank. A 'standard' approach differentiates between credit exposures on the basis of external ratings. A 'foundation' internal ratings based approach will allow banks to differentiate between credit exposures on the basis of their internal estimates of borrower default probabilities; and an 'advanced' approach allows other inputs required to assess credit risk also to be provided by the bank, rather than the regulator. In addition to all this, there will be for the first time an explicit capital charge for operational risk.

Systemic implications of the revised Accord

What I have described so far is how the Accord is intended to be applied to individual banks. But given the Bank of England's responsibilities for the stability of the financial system as a whole, our principal concern is with the overall impact on the system.

The Basel Committee has said that the new Accord is intended broadly to deliver the same level of bank

capital on average across banks as at present. How should we assess the adequacy of this from the viewpoint of overall financial stability?

As I suggested earlier, the role of bank capital is to provide a buffer sufficient to cover unexpected losses. So it seems sensible to link minimum capital requirements to a confidence level. In its work, the Basel Committee's approach has been to set those requirements equivalent to an investment grade rating.

It is important that this rating level is maintained. First, there is growing evidence that without it a large bank would have insufficient freedom of operation as its counterparties' limits on unsecured exposures stemming from interbank, swap and foreign exchange transactions to the bank concerned would be too small. Second, the frequency of banking crises does not suggest that the current minimum level of regulatory capital is too high: four of the G10 countries have suffered a banking crisis over the past decade.

Another important issue is the possible impact of any new capital requirements on the business cycle. It has been argued that capital requirements can potentially contribute to a credit crunch because in a period of severe downturn, they can become binding should write-offs and loan loss reserves reduce the amount of capital that a bank has available to back new lending. If banks are insufficiently forward-looking in their assessments of risk, more risk-sensitive capital requirements could lead to an added pro-cyclical effect to the extent that capital requirements would increase in recessions as the average riskiness of borrowers rose. It is therefore essential that banks take a longer-term view of creditworthiness.

We think, however, that such fears of pro-cyclicality are exaggerated and are more than matched by the other benefits from the new regime—in particular, the reduced opportunities for regulatory arbitrage and the incentives given to banks to strengthen their risk management.

Moreover, a number of factors seem likely to mute the impact of the new proposals on the cycle. First, many banks have a buffer of capital well above the regulatory minimum. Second, in a recession, demand for bank credit may anyway fall. Third, to the extent that banks (and ratings agencies) assign assets to risk categories in a forward-looking manner, it should be possible to avoid wholesale reclassifications to lower credit-risk categories during cyclical downturns, particularly those of normal amplitude.

Conclusion

The new Accord will make a significant contribution to strengthening the international system. But even under

the current Accord, banks should find themselves better placed than in the past to deal with any sudden downturn. A soft landing for the United States still seems the most likely outcome but the system is in far better shape now than a decade ago to absorb, if necessary, a somewhat harder bump. I am not complacent, and you can rely on the Bank of England to remain vigilant, whatever the outcome.

Contents of recent Quarterly Bulletins

The articles and speeches which have been published recently in the *Quarterly Bulletin* are listed below. Articles from November 1998 onwards are available on the Bank's web site at www.bankofengland.co.uk/qb/qbcontents.htm

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Monetary and Financial Statistics (Bankstats) contains detailed information on money and lending, monetary financial institutions' balance sheets, analyses of bank deposits and lending, international business of banks, public sector debt, money markets, issues of securities and short-term paper, interest and exchange rates, explanatory notes to tables and occasional related articles. *Bankstats* is published on a quarterly basis in paper form. However, it will continue to be published free on the Internet on a monthly basis—reference: http://www.bankofengland.co.uk/mfsd/latest.htm The paper publication of *Bankstats* is priced at £60 per annum (4 issues) in the United Kingdom for 2001.

Further details on content are available from: Daxa Khilosia, Monetary and Financial Statistics Division, HO-4, telephone 020–7601 5353; fax 020–7601 3208; e-mail daxa.khilosia@bankofengland.co.uk

The following articles have been published in recent issues of *Monetary and Financial Statistics*. They may also be found on the Bank of England web site at www.bankofengland.co.uk/mfsd/article

Title	Author	Month of issue	Page numbers
Banks' average interest rates	Jonathan Bailey and Jim Thame	February 2001	1–3
Personal sector lending: a report of a half-day meeting of the Financial Statistics Users' Group	Sid Downie (Barclays Group Treasury)	December 2000	1-4
New estimates of the UK term structure of interest rates	John Sleath	August 2000	5-7
Developments in international banking statistics in 1999	Sarah Wharmby	August 2000	1-4

Targeting Inflation book

In March 1995, the Bank hosted a conference of central banks currently adhering to inflation targets. This book, edited by Andrew Haldane, draws together contributions from each of the eight countries represented at the conference. It details cross-country experiences of this monetary framework and the key operational and theoretical issues it raises. The book is suitable for both academics and practitioners. The price of the book is £20.00 plus postage and packaging.

Index-linked debt book

In September 1995, the Bank held a conference to discuss a broad range of theoretical and practical questions raised by index-linked debt in general, and the UK experience in particular. This book contains revised versions of the papers presented at the conference, as well as the papers that were circulated by the Bank ahead of the conference, setting out background information and key policy issues. The price of the book is £10.00 plus postage and packaging.

Openness and Growth book

The *Openness and Growth* book, published in October 1998, contains the proceedings of an academic conference held at the Bank of England in September 1997. The research described in the book investigates the link between productivity growth and the international openness of the UK economy. The price of the book is £10.00 plus postage and packaging.

Economic models at the Bank of England

The *Economic models at the Bank of England* book, published in April 1999, contains details of the economic modelling tools that help the Monetary Policy Committee in its work. The price of the book is £10.00 plus postage and packaging. An update was published in September 2000 and is available free of charge.

Government debt structure and monetary conditions

In June 1998 the Bank of England organised a conference to discuss the interactions between the size and structure of government debt and monetary conditions. This book published in December 1999, contains all but one of the papers presented at the conference, plus a background paper prepared within the Bank. The price of the book is £10.00 plus postage and packaging.

Quarterly Bulletin

The *Quarterly Bulletin* provides regular commentary on market developments and UK monetary policy operations. It also contains research and analysis reports on a wide range of topical economic and financial issues, both domestic and international.

There is a new format for the *Quarterly Bulletin* (introduced at the start of 2001). The *Bulletin* now carries a somewhat broader range of material than before, particularly in relation to the formulation and conduct of monetary policy.

The *Quarterly Bulletin* and *Inflation Report* are no longer published on the same day. Publication dates for 2001 are as follows:

Quarterly Bu	lletin	Inflation Report			
Spring	12 March	February	14 February		
Summer	11 June	May	16 May		
Autumn	29 August	August	8 August		
Winter	26 November	November	14 November		

The Bank's quarterly *Inflation Report* was first published in 1993. Since then the *Bulletin* and *Inflation Report* can be bought as a combined package. The *Inflation Report* can also be bought separately. Current prices are set out overleaf.

Back issues of the *Quarterly Bulletin* from 1981 are available for sale. Summary pages of the *Bulletin* from February 1994, giving a brief description of each of the articles, are available on the Bank's web site at www.bankofengland.co.uk/qb/index/htm

The *Bulletin* is also available from Bell & Howell Information and Learning: enquiries from customers in Japan and North and South America should be addressed to Bell & Howell Information and Learning, 300 North Zeeb Road, Ann Arbor, Michigan 48106, United States of America; customers from all other countries should apply to White Swan House, Godstone, Surrey, RH9 8LW, telephone 01444 445000.

An index of the *Quarterly Bulletin* is also available to customers free of charge. It is produced annually, and lists alphabetically terms used in the *Bulletin* and articles written by named authors.

Bound volumes of the *Quarterly Bulletin* for the period 1960–85 (in reprint form for the period 1960–85) can be obtained from Schmidt Periodicals GmbH, Ortsteil Dettendorf, D-83075 Bad Feilnbach, Germany, at a price of DM 200 per volume or DM 4,825 per set.

Inflation Report

The Bank's quarterly *Inflation Report* sets out the detailed economic analysis and inflation projections on which the Bank's Monetary Policy Committee bases its interest rate decisions, and presents an assessment of the prospects for UK inflation over the following two years.

The *Report* starts with an overview of economic developments; this is followed by six sections:

- analysis of money, credit and financial market data, including the exchange rate;
- analysis of demand and output;
- analysis of the labour market;
- analysis of costs and prices;
- summary of monetary policy during the quarter; and
- assessment of the medium-term inflation prospects and risks.

The minutes of the meetings of the Bank's Monetary Policy Committee (previously published as part of the *Inflation Report*) now appear as a separate publication on the same day as the *Report*.

Quarterly Bulletin and Inflation Report subscription details

Copies of the *Quarterly Bulletin* and *Inflation Report* are available from the Bank as a **combined** package; the Inflation Report is also available separately. The prices are set out below:

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Countries ou Surface mai	utside Europe: l	£48.00	£12.00	£14.00	£3.50	£48.00	£12.00	£14.00	£3.50
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The **concessionary rates** for the combined *Quarterly Bulletin/Inflation Report* package and the separate *Inflation Report* are noted above in *italics*. Academics at UK institutions of further and higher education are entitled to a concessionary rate. They should apply on their institution's notepaper, giving details of their current post. Students and secondary schools in the United Kingdom are also entitled to a concessionary rate. Requests for concessionary copies should be accompanied by an explanatory letter; students should provide details of their course and the institution at which they are studying.

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